

---

# PRODUCTIVITY IN THE ASIA-PACIFIC: PAST, PRESENT, AND FUTURE

---



50 YEARS OF THE ASIAN PRODUCTIVITY ORGANIZATION



---

# PRODUCTIVITY IN THE ASIA-PACIFIC: PAST, PRESENT, AND FUTURE

---



50 YEARS OF THE ASIAN PRODUCTIVITY ORGANIZATION



Productivity in the Asia-Pacific: Past, Present, and Future

Tsu-Tan Fu, Republic of China, served as the volume editor.

First published in Japan  
by Asian Productivity Organization  
Leaf Square Hongo Building 2F  
1-24-1 Hongo, Bunkyo-ku  
Tokyo 113-0033, Japan  
[www.apo-tokyo.org](http://www.apo-tokyo.org)

The views expressed in this publication do not necessarily reflect the official views of the Asian Productivity Organization (APO) or any APO member.

All rights reserved. None of the contents of this publication may be used, reproduced, stored, or transferred in any form or by any means for commercial purposes without prior written permission from the APO.

© 2015 Asian Productivity Organization

ISBN 978-92-833-2437-9 (paperback)  
eISBN 978-92-833-2438-6 (PDF)

300.07.2015

Designed by Word by Design Creacomm  
Printed by Hirakawa Kogyosha Co., Ltd., Japan

# CONTENTS

Foreword	v
Acknowledgements	vi
Profile of Experts	vii

---

## **PART 1: PRODUCTIVITY IN RETROSPECT**

---

Summary - Productivity in Retrospect	2
Bangladesh	15
Cambodia	21
Republic of China	31
Fiji	39
India	51
Indonesia	63
Islamic Republic of Iran	72
Japan	81
Republic of Korea	92
Lao PDR	100
Malaysia	108
Mongolia	120
Nepal	127
Pakistan	136
Philippines	151
Singapore	170
Sri Lanka	188
Thailand	196
Vietnam	206

---

## **PART 2: PRODUCTIVITY IN FOCUS**

---

Summary - Productivity in Focus	216
Green Productivity and Economic Development	221
Demographics and Productivity: Aging Society	226
SME Competitiveness in a Globalized Economy	238
Out-of-the-Box Rural Development	251
Public-sector Productivity	257
Agriculture Productivity and Sustainability	271

---

## **PART 3: PRODUCTIVITY IN THE FUTURE**

---

Summary - Productivity in the Future	286
Climate Change and Food Supply in the Asia-Pacific Region	291
Scope and Opportunities of Bioengineering and Biotechnology in Agriculture and Related Industries	305
Scope and Opportunities for Green Energy and Green Technology	314
The Development and Applications of ICT In Selected APO Member Economies	320
Entrepreneurship and Productivity	328
Health Care for the Aging Society	343
Social Enterprises for Rural Innovations	350

# FOREWORD

After more than 50 years of leading the productivity movement in the Asia-Pacific region, it was decided that the time was ripe for a comprehensive review of the achievements of the Asian Productivity Organization (APO) and the socioeconomic development of its members. The 32 chapters of this book were contributed by 46 writers, all of whom are internationally recognized experts in economics or other productivity-related fields. The volume is divided into three parts. Part 1, *Productivity in Retrospect*, is divided into two sections. The first chronicles productivity-enhancing initiatives and programs undertaken by the APO as a whole or its individual member countries starting from the year they joined the organization, establishing the relationship between macroeconomic performance and productivity indicators. Focusing on innovations in technology and management or indigenous practices that have evolved into established standards, the second section of Part 1 examines how those have affected productivity over the past 50 years.

Part 2, *Productivity in Focus*, covers strategic themes of the APO in the past and more recently. It describes the history and progress in specific areas and includes case studies of national examples. The themes selected were: Green Productivity and economic development; aging society; SME competitiveness in a globalized economy; rural community development; public-sector productivity; and agricultural productivity and sustainability. All are topics of great importance and significant expertise is available on them within the APO membership.

Part 3, entitled *Productivity in the Future*, offers the visions of experts working in different disciplines on factors that will influence productivity regionally and globally in the next 20 years. They give their perspectives on: climate change and food supply; biotechnology, bioengineering, and green energy; information and communication technology; entrepreneurship development; healthcare for an aging society; and social enterprises and rural innovations.

A companion volume, *Handbook on Productivity*, was published simultaneously to orient readers in the fundamental concepts, principles, tools, and methodologies of productivity. It also contains a glossary of terms commonly used in the productivity movement and is meant to serve as a basic guide.

The APO is grateful to all involved in the production of this volume, especially to the Government of the Republic of China for the financial contribution that made the publication possible; the coordinating experts for Parts 1, 2, and 3 Dr. Tsu-Tan Fu, Dr. Feng-Shang Wu, and Dr. Alfred Li-Ping Cheng, respectively; and the individual writers.

I hope that this volume will serve as both a reflection of past productivity efforts and how they have shaped the current socioeconomic dynamics of the Asia-Pacific and as a guide to future efforts that will result in continuous improvement in the quality of life for all.

**Mari Amano**  
Secretary-General  
Tokyo  
July 2015

# ACKNOWLEDGMENTS

This publication is due to the tireless efforts, contributions, and advice provided by individuals both inside and outside the APO. The China Productivity Center (CPC) and the APO Secretariat were instrumental in conceptualizing, planning, organizing meetings, collecting information, and publishing this book.

## CPC

Sheng-Hsiung Hsu (Chairman, China Productivity Center)

Dr. Pao-Cheng Chang (President, China Productivity Center)

Dr. Eugene Yu-Ying Lin (Director, Planning and Training Division, China Productivity Center)

## APO Secretariat

Sherman Loo (Director, Administration and Finance Department)

Joselito Cruz Bernardo (Director, Agriculture Department)

Setsuko Miyakawa (Former Director, Industry Department)

Dr. Muhammad Saeed (Senior Program Officer)

K.D. Bhardwaj (Senior Program Officer)

Arlene Donaire (Former IPR Officer)

Martini Abdul Aziz (IPR Officer)

Masaya Amau (Former Program Officer)

Akiko Ohara (Project Assistant)

Yoko Fujimoto (Administration Assistant)

Cynthia Yenches (Consulting Editor)

# PROFILE OF EXPERTS

## Chief Expert

Dr. Tsu-Tan Fu

Dr. Fu received a PhD in Agricultural Economics at the University of Georgia, USA. He is currently head of the Department of Economics and chairman of the Center for Commercial Research and Development, Soochow University, ROC. He is also a Research Fellow of the Institute of Economics, Academia Sinica, ROC. His major field of research is productivity growth and efficiency analysis. Dr. Fu has published widely on productivity studies and acts as associate editor and guest editor of the Journal of Productivity Analysis and other academic journals while continuing consultancy services.

## Coordinating Experts

Dr. Alfred Li-Ping Cheng

Dr. Cheng received a PhD in Economics from the Northern Illinois University, USA, and is currently teaching at the National Chiao Tung University (NCTU), ROC, in the Department of Information Management and Finance, School of Electronic Engineering, and Graduate Institutes of Finance and Business Management. Despite consultancy services in other fields, his long-term research interest has been transaction cost analysis and contractual arrangements, industrial development and business models, and corporate governance..

Dr. Feng-Shang Vincent Wu

Dr. Wu is a professor at the Graduate Institute of Technology, Innovation and Intellectual Property Management, National Chengchi University, ROC. He received a BSc and MSc in Chemical Engineering from National Tsing Hua University, ROC, and Texas Tech University, USA, respectively, and holds an MBA and a PhD in Management from Rensselaer Polytechnic Institute, USA. He is a consultant to several government agencies and on the board of directors of several high-tech corporations. He is a fellow of the Chinese Society for Management of Technology, ROC.

---

## PART 1: PRODUCTIVITY IN RETROSPECT

---

### Bangladesh

Dr. Md. Nazrul Islam

Dr. Islam is currently the director of the National Productivity Organisation under the Ministry of Industries of Bangladesh. He holds a BA (Hons.) and an MA in Economics as well as an LLB and a PhD. Dr. Islam has published extensively on productivity-related topics and the economics of irrigation. His work experience includes stints with the Ministry of Agriculture, Ministry of Labour and Manpower, and Bangladesh Water Development Board.

### Cambodia

Yea Bunna

Currently the head of the National Productivity Centre of Cambodia, Bunna has long experience in the Ministry of Industry, Mines and Energy (MIME). Prior to his posts in MIME, he served on the research team of the Economics and Rehabilitation Office of the UN Transition Authority of Cambodia and as a lecturer at the National Institute of Economics (currently the National University of Management). Bunna holds a Bachelor's degree in Economics as well as an MBA.



## Republic of China

Dr. Tsu-Tan Fu

As provided above.

Dr. Yih-Ming Lin

Dr. Yih-Ming Lin is Associate Professor, Department of Applied Economics, National Chiayi University, ROC. Dr. Lin received a BA in 1987 from National Taiwan University and earned a PhD in Economics in 2005 from Vanderbilt University, USA. Areas of research interest include efficiency and productivity, applications of game theory in industrial economics, applications of contingent valuation methods, and happiness studies. He has published papers on applied economics, economics and human biology, media economics, and social indicators research.

## Fiji

Binesh Chand

After completing an MBA at the University of the Sunshine Coast, Australia, Chand has maintained active membership in professional accounting, management, and training bodies in Australia, Fiji, and New Zealand. He has been involved in the Fiji Business Excellence Awards as an evaluator since 2004. Now the manager of Productivity and Quality, he was worked for the National Training and Productivity Centre of Fiji National University for more than 11 years.

## India

Dr. Kolathupadavil Philipose Sunny

Dr. Sunny is the group head of Economic Services and Support Services at the National Productivity Council (NPC) of India. Prior to his appointment in August 2010, he was deputy director of Economic Services at the NPC between 1997 and 2009. He holds a Master's degree and PhD in Applied Economics with several years of multisector consultancy experience and publications on productivity promotion.

## Indonesia

Dr. Nunung Nuryartono

Dr. Nuryartono is the head of the Economics Post Graduate Program, Faculty of Economics and Management, and director of the International Center for Applied Finance and Economics, Bogor Agricultural University, Indonesia. He has worked on projects funded by the World Bank, USAID, AusAID, and FAO and co-authored papers on agricultural and economic development. Dr. Nuryartono holds Bachelor's and Master's degrees in Agricultural Economics from Bogor Agricultural University and a PhD from the University of Göttingen, Germany.

## Islamic Republic of Iran

Mohammad Kazem Ebrahimi Khorramabadi

Khorramabadi has been the managing director of the Iranian Lean Production and Services Company since 2008. Prior to that, he served as the managing director of the National Iranian Productivity Organization and as president of the Iran Productivity Organization. He received a BA and MSc in Industrial Engineering from Sharif University of Technology and Amirkabir University of Technology, respectively.

## Japan

Dr. Tsutomu Miyagawa

Dr. Miyagawa is a professor in the Department of Economics, Gakushuin University, Japan. He specializes in macroeconomics, international macroeconomics, and Asian economies. His list of economic publications is extensive. He utilized his experience in banking and education as a visiting scholar at Harvard and Yale Universities and as an assistant professor at the Institute of Economic Research, Hitotsubashi University.

## Republic of Korea

Dr. Keun Hee Rhee

Dr. Rhee is a senior researcher at the Productivity Research Institute, Korea Productivity Center (KPC). He has worked at the KPC since 1988 and long experience in analyzing productivity issues, including total factor productivity at firm, industry, and regional levels. He has been actively involved in APO research projects since 2007 and has published widely on productivity promotion.

## Lao PDR

Somdy Inmyxai

Inmyxai was appointed director general of the National SME Promotion and Development Office (currently the Department of Small and Medium Enterprise Promotion) by the prime minister of Lao PDR in 2004. His responsibilities have included formulating SME policies and designing plans for SME development, advising the government on SME policies, and managing the SME Development Fund. He graduated from Engineering College Carl-Zeiss, Germany.

Sayasith Khamphasith

Khamphasith was appointed Director for Productivity, Quality and Standard Division at the Small and Medium Enterprise Promotion and Development Office (SMEPDO) under the Ministry of Industry and Commerce in 2004. He also serves concurrently as the APO Liaison Officer for Lao PDR. He graduated from the Charles University in Prague, Czechoslovakia.

## Malaysia

Dato' Mohd. Razali Hussain

Mohd Razali Hussain has been the director general of Malaysia Productivity Corporation (MPC) since 2009. He represented MPC in numerous working and research committees, presented papers at international and national forums, and deputed as a technical expert on systems development in the areas of productivity, quality, competitiveness, and innovation. At present, Mohd Razali also serves as the alternate director for Malaysia in the Governing Body of the Asian Productivity Organization. He has a Master of Science in Industrial and Systems Engineering from Ohio University, USA.

Lok Lee Lee

Lok is currently the manager of the Publication House Division under the Global Competitiveness Department, Malaysia Productivity Corporation (MPC). In 20 years with the MPC, she has conducted research on industry, benchmarking, and competitiveness, with numerous publications on benchmarking, best practices, and innovation. Lok serves as an auditor for the Quality Management Excellence Award and assesses good governance in Malaysian universities.

Rauzah Zainal Abidin

Abidin is the director of Knowledge Management Department, MPC, with more than 30 years' experience in productivity and TFP measurement and analysis. She leads the development and application of the database on productivity statistics, TFP, and KLEMS. Her expertise was shared in many research publications and presentations at regional and international meetings.

Zaffrulla Hussein

Hussein, with more than 15 years at the MPC, is the manager of the Knowledge Research Unit under the Knowledge Management Department. He oversees the development of the productivity and TFP database at the sectoral and national levels and plays an instrumental role in publishing the annual productivity report.

## **Mongolia**

Otgontuya Dorjkhoo

Dorjkhoo holds an MBA and is a researcher at the Mongolian Productivity and Quality Center. She worked as a trainer and business consultant (senior expert) in the Training and Promotion Department of the Mongolian Productivity Organization between 2010 and 2012.

## **Nepal**

Prabin Kumar Acharya

In his posts as branch officer and APO liaison officer at the National Productivity and Development Centre of Nepal, Acharya's consultancy activities focus on the food, beverages, and tobacco; textile and leather products; and consumer goods sectors. He has carried out subsector, preinvestment, and impact studies in a variety of fields. Acharya's education includes a Master's in Economics from Tribhuvan University, Kathmandu.

## **Pakistan**

Khawaja Muhammad Yousuf

From January 2010–2014, Khawaja M. Yousuf served as the CEO of the NPO of Pakistan. With long experience in strategic planning, business unit development, project and product management, and system engineering strategies, he has held positions on the Federal Advisory Council, FPCCI Executive Committee, Multan Chamber of Commerce & Industry (MCCI), Pakistan Tanners' Association, and Multan Cotton Association. He also received the MCCI Prime Minister's Award, FPCCI Best Exports Trophy, and Fellowship of the World Academy of Productivity Science.

Rabia Jamil

Rabia Jamil is Head of International Relations, National Productivity Organization, Ministry of Industries & Production, Government of Pakistan; honorary APO Liaison Officer; and Secretary General, Productivity Association of Pakistan. Jamil has a Master's in Business Administration from the Institute of Management Sciences, Pakistan; has authored/co-authored papers on development-related issues; and is a member of several academic, trade, and public policy bodies, both national and international.

Liaqat Ali

Currently Chief Statistical Officer of the Pakistan Bureau of Statistics (PBS), Liaqat Ali received an MA in the Philosophy of Economics from the International Islamic University, Islamabad, and MA in Business Administration from Allama Iqbal Open University. He is currently in a PhD in Management Sciences course at Hamdard University, Islamabad. His research interests include productivity, earnings differentials, and seasonality analysis and he has participated in a number of research projects on these topics.

## Philippines

Carlos A. Sayco, Jr.

Sayco is vice president for International Relations, Innovation & Strategic Convergence Initiatives and Partnerships of the Development Academy of the Philippines (DAP). His academic achievements include a BA in Economics from the University of the Philippines Diliman; Diploma in Productivity and International Labor Standards in SMEs from the ILO International Training Centre in Turin, Italy; Certificate in Total Quality Management from the American Productivity & Quality Center; and Certificate in Advanced Management Consultancy from the Productivity and Standards Board of Singapore. He acts as a consultant, adviser, and resource person for productivity programs of the DAP and other public and private organizations.

Dr. Gilberto M. Llanto

Dr. Gilberto M. Llanto is currently the President of the Philippine Institute for Development Studies, the foremost government policy think tank. He has extensive experience in development policy research and capacity building, publishing, and education. Dr. Llanto holds a PhD in Economics from the University of the Philippines School of Economics. His research interests include public economics, growth economics, financial inclusion, microfinance, local governance, regional integration, and infrastructure regulation.

## Singapore

Low Hock Meng

Low is the executive director of the Singapore Productivity Association (SPA), an affiliate of SPRING Singapore. Prior to the SPA, he served in various positions at SPRING Singapore, with his last appointment being divisional director in the Enterprise Productivity Division. He has also previously served as APO liaison officer for Singapore and is an APO Fellow.

Sharon Chang

Chang is the deputy director of Research at the Singapore National Arts Council (NAC) and previously the head of Policy, Research, and Statistics at SPRING Singapore. Chang served as the national expert for Singapore in the APO's Productivity Data & Analysis Project and involved in an international study led by Denmark to develop an international entrepreneurship index.

## Sri Lanka

D.L. Kumaradasa

Kumaradasa is a senior public service officer in Sri Lanka who held the post of additional secretary in the Ministry of Labour Relations and Productivity Promotion in Sri Lanka before retiring from public service in 2011. He was the head of the National Productivity Secretariat from 2004 and named an Honorary Fellow of the APO in 2011. Kumaradasa holds a Bachelor's degree in Development Studies (Special) from the University of Sri Jayewardenepura; postgraduate diploma in Manpower Studies from the University of Manchester, UK; postgraduate diploma in Productivity from the ILO International Training Centre in Turin, Italy; and postgraduate diploma in Applied Manpower Research from IAMR India.

P.G. Jayasooriya

After retiring from the Central Bank of Sri Lanka, where Jayasooriya's final concurrent titles were additional director of Regional Development and deputy director of the Statistics Department, he began consultancy for the APO. He holds a BA in Development Studies from the University of Sri Jayewardenepura; a postgraduate diploma in Economics from the University of Warwick, UK; and an MSc in Economic Development Planning from the University of Keele, UK.

E.L.K. Dissanayake

Dissanayake is a labor economist focusing on empirical studies on youth unemployment. He is an MSc graduate from the ILO' International Training Centre in Turin, Italy, and holds a Bachelor's degree in Statistics and postgraduate qualifications in Business Management and Public Administration. Dissanayake has 17 years of experience in public service and is now deputy director of Administration and Human Resources at the Telecommunication Regulatory Commission of Sri Lanka.

## Thailand

Dr. Phanit Laosirirat

Laosirirat is the executive director of the Thailand Productivity Institute. Prior to his appointment in 2005, he was director of the Research and Information Technology Division at the institute from 1999. He was previously executive vice president of the Thailand Bond Dealing Centre and a researcher at the National Science and Technology Development Agency. He holds a Master's degree in Public Management and Policy Analysis and a PhD in Public Administration.

## Vietnam

Dr. Nguyen Huu Thien

Dr. Thien served as director general of the Directorate for Standards, Metrology and Quality (Ministry of Science and Technology). Between 1996 and 2004, he served as APO director for Vietnam and was awarded an APO Honorary Fellow. He has lengthy experience in standards and quality development.

---

## PART 2: PRODUCTIVITY IN FOCUS

---

### Green Productivity and Economic Development

Dr. Suporn Koottatep (Thailand)

Dr. Koottatep is an experienced environmental specialist and has worked as a lecturer, associate professor, advisor, solid waste expert, and environmental engineer, among others. He has been an active international expert for the APO in conducting Green Productivity projects and workshops throughout Asia since 1999. He has published several papers on the environment and has for long participated as a resource person in international workshops on environmental topics.

### Demographics and Productivity: Aging Society

Dr. Hanam S. Phang (Republic of Korea)

Dr. Phang is a Senior Research Fellow at the Korea Labor Institute and also an adjunct professor of Social Welfare at Yonsei University in the Republic of Korea. He has researched and published widely on labor economics, including social welfare, and has been a member of various committees in the Ministry of Labor and the Ministry of Health and Welfare.

### SME Competitiveness in a Globalized Economy

Dr. Shin-Horng Chen (Republic of China)

Dr. Chen is a Research Fellow and director of the International Division at Chung-Hua Institution for Economic Research. He is an experienced researcher in ICT, R&D, and industrial and innovation policies and spearheads various research on national and international economies to inform government policy making. He was given the Award for Innovation Model Promoter and the First National Industry Innovation Award in 2011 by the Republic of China government.

### **Out-of-the Box Rural Development**

Mechai Viravaidya (Thailand)

Viravaidya is the founder and chairman of Population and Development International, Population and Community Development Association, and Mechai Viravaidya Foundation. He has held senior positions in the government of Thailand and has won various awards and honorary degrees in the areas of community development and development economics, including on population and health.

### **Public-sector Productivity**

Dr. Shin Kim (Republic of Korea)

Dr. Kim is a Research Fellow in the Department of Regulation and Evaluation at the Korea Institute of Public Administration. He is an extensively experienced researcher and consultant on government reforms, knowledge management, and regulatory reform.

### **Agriculture Productivity and Sustainability**

Prof. Kunio Tsubota (Japan)

Prof. Tsubota studied agricultural economics at Kyushu University, Japan. He has worked as an economist in the Ministry of Agriculture for nearly 35 years since 1972. During this period, he developed his career in the FAO, OECD, and ADB. He also served as the director of the Agriculture Department in the APO from 2002 to 2005, after which he became a professor at the Kyushu University Asia Center and moved to the Meiji University in 2010. His major research fields include world food projections, rural development in Asia, and agricultural trade.

---

## **PART 3: PRODUCTIVITY IN THE FUTURE**

---

### **Climate Change and Food Supply in the Asia-Pacific Region**

Dr. Venkatachalam Anbumozhi (India)

Dr. Anbumozhi, head of the Environment and Energy Intelligence Unit of the Economic Research Institute for ASEAN and East Asia, Indonesia, previously held positions with several international organizations. A distinguished fellow of the Asia Pacific Rim University Forum on Development and Environment, he has also advised on numerous sustainable development projects; published widely on natural resource management, environment-friendly infrastructure design, and private-sector participation in green growth. He holds a PhD from the University of Tokyo.

Dr. Vangimalla R. Reddy (USA)

Dr. Reddy is a plant physiologist and research leader at the USDA-ARS Crop Systems and Global Change Laboratory, Beltsville Agricultural Research Center, USA. His research focuses on the development of mechanistic, process-level crop simulation models for major crops, environmental stress physiology, and global climate change impact on crop production. He studies crop photosynthesis, respiration, transpiration, carbon and nitrogen metabolism, and growth analysis in response to changes in temperature, CO<sub>2</sub>, light, water, and nutrient levels.

## **Scope and Opportunities for Biotechnology and Bioengineering in Agriculture and Related Industries**

Prof. Paul P. S. Teng (Singapore)

Dr. Teng is a professor at the Nanyang Technological University, where he holds appointments as principal officer at the National Institute of Education and senior fellow (Food Security) at the S. Rajaratnam School of International Studies. Previous posts include leadership positions in academia, the private sector, World Fish Centre, and International Rice Research Institute. Dr. Teng has published over 250 technical papers and been recognized for contributions to science and development through numerous awards.

## **Scope and Opportunities for Green Energy and Green Technology**

Prof. Osamu Kitani (Japan)

Prof. Kitani is professor emeritus of the University of Tokyo and honorary president of the International Commission of Agricultural Engineering. He is also a researcher on biomass systems and teaches at the Advanced Research Institute for Science and Humanities, Nihon University, Japan.

## **The Development and Applications of ICT in Selected APO Member Economies**

Dr. Chuan-neng Lin (Republic of China)

Dr. Lin is the director general of the Department of Industrial Technology, Ministry of Economic Affairs. As an experienced industrial engineer, he is responsible for formulating industrial technology policies to promote value creation in the Republic of China. Prior to his current position, he held different positions in the same department from 2004.

## **Entrepreneurship and Productivity**

Prof. Wong Poh Kam (Singapore)

Prof. Wong is a professor in the Department of Strategy and Policy at the National University of Singapore (NUS) and director of the NUS Entrepreneurship Centre. He has a long history of scholarly work and top management experience in universities and other agencies.

## **Health Care for the Aging Society**

Dr. Anuwat Supachutikul (Thailand)

Dr. Supachutikul is the CEO of the Healthcare Accreditation Institute, a Thai government agency, with experience in the management of health systems. He is a physician with interest in health insurance, health promotion, and quality management.

## **Social Enterprises for Rural Innovations**

Dr. Harish Hande (India)

Dr. Hande has over 20 years of experience in the field of decentralized renewable energy for developing countries. He is the cofounder of SELCO India, the country's first social for-profit enterprise, working on rural energy access and building the ecosystem for the provision of decentralized energy solutions with technology, finance, and community dissemination. The enterprise has benefited over 160,000 low-income and underserved households over the last 20 years.

---

# **PART 1: PRODUCTIVITY IN RETROSPECT**

---





---

# SUMMARY - PRODUCTIVITY IN RETROSPECT

DR. TSU-TAN FU

**Research Fellow**

Institute of Economics, Academia Sinica

**Professor**

Department of Economics

Soochow University

---

## INTRODUCTION

Part 1: Productivity in Retrospect chronicles the 50 years of productivity dynamics in the Asian Productivity Organization (APO) member economies. Factors and government policies that influenced productivity changes are examined. In addition to these two aspects, each country report describes major productivity organizations and the productivity movements in the last five decades. The issues and challenges in improving the productivity of each country are also discussed.

The patterns of economic growth and productivity changes differ among the APO member economies and between time periods. Therefore, productivity dynamics analysis consists of cross-period and cross-country comparisons of productivity changes for the APO member economies. In addition, identifying drivers of economic growth in each country over the last 50 years is another main focus of Part 1. Furthermore, all country reports follow the same analytical models, which are defined in the Methodology Appendix of this summary report for the sources of growth and productivity regression analyses.

The productivity regression analyses intend to identify major factors that influenced the changes in total factor productivity (TFP) and labor productivity in the last five decades for the APO member economies. Therefore, the results could provide useful references to newly developing and less developed countries. In this study, national experts were responsible for reporting their countries' productivity performance in relation to the influencing factors or government policies over the past

50 years. They were also expected to present major productivity movements, organizations, and government policies in their countries for different time periods.

In this summary report, the economic and productivity performance of the last 50 years for the APO member economies are presented first. This is followed by Sources of Economic Growth Analysis and Productivity Regression Results, then by the summary results of the productivity regression from individual economies. Also described briefly are the general ways productivity movements were adopted in the APO member economies in the past decades. This report ends with a description of issues and challenges in enhancing productivity growth for the APO member economies [1].

## ECONOMIC PERFORMANCE AND PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

The APO was established in 1961. Fifty years after its establishment, the APO now has a total of 20 member economies (referred to hereon as the APO20). The APO20 is geographically located across three regions, from East Asia to the Middle East. The East Asia and Pacific region includes 14 members. They are the Republic of China (ROC), the Republic of Korea (ROK), Hong Kong, Japan, Mongolia, Cambodia, Lao PDR, Indonesia, Malaysia, the Philippines, Singapore, Thailand, Vietnam, and Fiji. The South Asia region has five members, consisting of Bangladesh, India, Nepal, Pakistan, and Sri Lanka. Islamic Republic of Iran (IR Iran) is the only member economy in the Middle East region.

Table 1. Real GDP Growth Rate by Region

Region	1961–70 (%)	1971–80 (%)	1981–90 (%)	1991–2000 (%)	2001–10 (%)	1961–2010 (%)
East Asia & Pacific	8.455	4.696	5.045	3.024	3.641	4.972
South Asia	5.874	2.950	5.298	5.066	6.927	5.223
Middle East & North Africa	-	8.078	1.728	3.961	2.982	4.187
Europe & Central Asia	4.728	3.042	2.398	1.879	1.573	2.724
Latin America & Caribbean	5.285	5.489	1.285	3.182	3.283	3.705
North America	-	3.246	3.145	3.339	1.670	2.850
Sub-Saharan Africa	4.813	3.615	1.833	2.278	4.676	3.443
OECD members	-	3.451	3.195	2.606	1.513	2.691
European Union	4.739	3.061	2.388	2.202	1.288	2.735
World	-	3.732	3.189	2.826	2.502	3.062

Note: Figures in this table are calculated from the World Bank [2]

### GDP Growth by Region

The World Bank's World Development Indicators (WDI) database [2] has categorized the countries in the world into seven regions: East Asia and Pacific, South Asia, Middle East and North Africa, Europe and Central Asia, Latin America and Caribbean, North America, and sub-Saharan Africa.

The APO20 lies in the three fastest GDP growth regions. In the last 50 years (1961–2010), the average GDP growth rate was 5.22% for South Asia, 4.97% for East Asia and Pacific, and 4.19% for Middle East and North Africa (Table 1) [1]. The growth rates for these three regions were much

Table 2. Real GDP Growth Rate of the APO Member Economies

Real GDP Growth Rate	1961–70	1971–80	1981–90	1991–2000	2001–10	1961–2010
Fiji	4.986	4.816	1.365	2.321	1.023	2.902
Nepal	2.451	2.056	4.623	4.870	3.803	3.561
Mongolia	-	-	4.800	-0.025	6.258	3.678
Bangladesh	3.911	0.806	3.655	4.688	5.636	3.739
Philippines	4.806	5.749	1.671	2.823	4.652	3.940
Japan	9.343	4.366	4.531	1.174	0.816	4.046
Sri Lanka	4.470	4.307	4.105	5.085	5.039	4.601
IR Iran	10.664	3.290	2.046	3.653	4.947	4.920
Pakistan	6.973	4.576	6.093	3.864	4.531	5.207
Indonesia	4.022	7.573	6.182	4.133	5.084	5.399
India	6.190	2.961	5.403	5.314	7.472	5.468
Lao PDR	-	-	4.159	6.097	6.814	5.690
Thailand	7.844	6.632	7.557	4.360	4.237	6.126
Malaysia	6.283	7.539	5.806	6.865	4.490	6.197
Vietnam	-	-	4.516	7.303	7.009	6.276
Hong Kong SAR, PR China	9.705	9.150	6.495	3.843	3.955	6.629
ROK	7.885	6.990	8.368	5.902	4.056	6.640
ROC	9.480	9.320	7.550	6.200	2.760	7.062
Cambodia	-	-	-	7.176	7.568	7.372
Singapore	9.310	8.424	7.159	7.304	5.768	7.593

Note: Figures in this table are calculated from the World Bank [2]

greater than the Organisation for Economic and Co-operation and Development (OECD) member economies (2.69%), European Union (2.74%), and the world average (3.06%). It also can be seen that East Asia and Pacific led the growth in the 1960s and 1970s, whereas South Asia became the growth leader in the 1980s–2000s.

### GDP Growth by APO Member Economy

The GDP growth for APO20 from 1961–2010 (Table 2) ranks as: Singapore (7.59%), Cambodia (7.37%), ROC (7.02%), ROK (6.64%), Hong Kong (6.62%), Vietnam (6.27%), Malaysia (6.19%), and Thailand (6.12%).

In the 1960s, Japan, the four tigers Asia - Hong Kong, Singapore, ROK, ROC - and IR Iran led the growth. In the 1970s and 1980s, in addition

to the four Asian tigers, Malaysia, Thailand, and Indonesia caught up with high growth. In the 1990s, despite the impact of the Asian financial crisis in 1997, Singapore, Cambodia, Vietnam, Malaysia, ROC, and Lao PDR still had their GDP growth above 6%.

In the 2000s, irrespective of the world recession and financial tsunami, emerging economies such as Cambodia, Vietnam, India, Lao PDR, and Mongolia enjoyed strong GDP growth.

Overall, most of the APO member economies performed better in GDP growth compared to OECD, EU15, and the world average in the last 50 years. In contrast to the low growth of the high-income countries of Asia, the high growth of these emerging economies confirmed the supposed income convergence hypothesis.

Table 3. Labor Productivity Growth Rate by the APO Member Economies and Regions

Country	1970–80	1980–90	1990–2000	2000–08	1970–2008
ROK	5.064	6.474	4.779	1.417	4.903
ROC	5.691	4.997	4.652	2.014	4.586
Cambodia	-	-	3.663	4.593	4.159
Hong Kong	5.142	4.580	2.163	0.613	3.814
Thailand	3.368	4.424	4.221	2.591	3.706
Lao PDR	n.a.	1.848	3.651	2.895	3.488
Malaysia	4.241	2.576	3.617	4.514	3.431
Indonesia	5.523	2.213	2.525	4.303	3.412
Singapore	3.576	4.001	3.569	1.236	3.193
Sri Lanka	1.971	3.754	2.886	3.339	2.969
Vietnam	-1.635	1.095	4.942	4.592	2.830
Japan	3.628	3.643	1.023	2.074	2.481
India	1.195	1.847	2.851	3.262	2.457
Mongolia	4.092	1.028	0.587	3.253	2.362
Pakistan	1.589	3.625	1.912	1.101	2.145
Nepal	-0.210	3.542	2.018	4.086	1.857
Bangladesh	0.034	0.490	3.369	2.653	1.716
Philippines	1.826	-1.087	0.958	1.282	0.870
Fiji	-0.505	0.079	0.811	2.610	0.230
IR Iran	-3.449	0.017	0.773	3.383	-0.086
APO20	2.286	2.587	2.749	2.791	2.749
East Asia	4.724	4.144	2.641	1.874	3.629
South Asia	0.916	2.652	2.607	2.888	2.229
ASEAN	2.816	2.153	3.393	3.289	3.404
USA	1.024	1.453	1.838	1.628	1.478
EU15	2.582	1.797	1.720	0.714	1.755

Source: APO [1]

Table 4. Sources of Economic Growth from 1970–2008 for APO Member Economies

Country	GDP	Labor	Capital		TFP
			IT	Non-IT	
Fiji	2.73	1.72 (63)	0.17 (6)	1.36 (50)	-0.53 (-19)
Indonesia	5.88	1.20 (20)	0.20 (3)	4.05 (69)	0.43 (7)
ROK	7.26	1.02 (14)	0.38 (5)	4.25 (59)	1.61 (22)
Mongolia	4.70	0.80 (17)	0.18 (4)	3.20 (68)	0.52 (11)
Singapore	7.11	1.84 (26)	0.51 (7)	4.28 (60)	0.48 (7)
Vietnam	6.84	1.63 (24)	0.34 (5)	4.13 (60)	0.74 (11)
ROC	6.75	1.10 (16)	0.45 (7)	3.72 (55)	1.48 (22)
Hong Kong	5.82	0.93 (16)	0.38 (7)	2.94 (51)	1.57 (27)
Japan	2.92	-0.04 (-1)	0.28 (10)	1.95 (67)	0.73 (25)
Malaysia	6.49	1.05 (16)	0.36 (6)	4.98 (77)	0.10 (1)
Philippines	3.80	1.38 (36)	0.27 (7)	2.42 (64)	-0.27 (-7)
Thailand	5.84	1.08 (18)	0.36 (6)	2.77 (47)	1.63 (28)
Developing	5.181	1.266 (24)	0.269 (5)	3.273 (63)	0.374 (7)
Developed	5.972	0.97 (16)	0.4 (7)	3.428 (57)	1.174 (20)

Source: APO [1]

- Note: i. Vietnam data covers 1986–2008  
 ii. Developed countries include ROC, ROK, Singapore, and Hong Kong  
 iii. Developing countries include Fiji, Indonesia, Mongolia, Vietnam, Malaysia, the Philippines, and Thailand

### Labor Productivity Growth by APO Member Economies

The growth rate of labor productivity for APO20 (Table 3) was 2.75% from 1970–2008, which was about double that of the USA or 60% more than that of the EU15. The magnitude of such growth was, however, lower than that of East Asia and ASEAN, but higher than that of South Asia.

The average labor productivity growth rate of the last four decades is low in Japan (2.48%), but relatively high in the four Asian tigers and other emerging Asian economies such as Cambodia, Thailand, Lao PDR, Malaysia, and Indonesia. In the 1970s and 1980s, Japan and the four Asian tigers enjoyed relatively high growth rate compared to the other APO member economies. However, in the 2000s, the growth rate decreased in these countries but increased in the emerging economies.

### SOURCES OF ECONOMIC GROWTH ANALYSIS

#### Decomposition of GDP Growth

The APO Productivity Databook 2011 [1] provides sources of growth results for 12 APO member economies, namely ROK, Singapore, Vietnam, ROC, Malaysia, Indonesia, Thailand, Hong Kong, Mongolia, the Philippines, Japan, and Fiji. The sources of growth results for the APO member economies other than these 12 can be found in their respective country reports of this book. Table 4 shows the results of sources of growth analysis for these 12 economies from 1970–2008. The contribution share of TFP to output growth ranges from 28% for Thailand to -19% for Fiji, whereas the contribution share of labor ranges from 63% for Fiji to -1% for Japan. Finally, the contribution share of capital ranges from 73% for Malaysia to 53% for Thailand, among which, non-ICT capital accounts for 47%–77% and ICT capital

accounts for another 3%–10%. Therefore, the main source of economic growth for most of the APO member economies is through capital accumulation, namely non-IT capital accumulation.

By classifying Japan and the Asian four tigers as relatively developed economies and the other APO countries such as Malaysia, Indonesia, Thailand, Mongolia, the Philippines, Fiji, and Vietnam as developing economies, the difference in the pattern of sources of economic growth for these two types of economies are investigated. Table 4 shows that in 1970–2008, contribution shares of TFP, capital, and labor accounted for 20%, 64%, and 16% of GDP growth, respectively, for the developed economies, whereas the contribution shares are 7%, 68%, and 24% for the developing economies, respectively. Therefore, it can be concluded that capital

accumulation is the major driver of economic growth for both developed and developing economies of the APO member countries.

#### Decomposition of Labor Productivity Growth

The labor productivity growth can be decomposed into TFP growth and capital deepening growth. The growth in capital deepening can further be decomposed into growth by IT capital deepening and non-IT capital deepening. It can be seen from Table 5 that most of the labor productivity growth in the APO member economies comes from non-IT capital deepening effect. Thus, non-IT capital deepening can be regarded as the major driver of labor productivity growth. However, TFP growth also contributed a significant portion of labor productivity growth, especially in countries like ROK, ROC, Hong Kong, Japan, and Thailand, where their contribution shares were as high as 24%–44%.

Table 5. Sources of Labor Productivity Growth in 1970–2008 for APO Member Economies

Country	Labor Productivity	Capital Deepening		TFP
		IT	Non-IT	
Fiji	0.23	0.143 (54)	0.64 (274)	-0.53 (-228)
Indonesia	3.36	0.17 (5)	2.77 (82)	0.43 (14)
ROK	5.43	0.35 (7)	3.47 (64)	1.61 (30)
Mongolia	2.36	0.15 (6)	1.69 (72)	0.52 (22)
Singapore	3.31	0.39 (12)	2.43 (73)	0.48 (15)
Vietnam	3.81	0.28 (7)	2.79 (73)	0.74 (19)
ROC	4.86	0.41 (8)	2.97 (61)	1.48 (30)
Hong Kong	4.09	0.34 (8)	2.18 (53)	1.57 (38)
Japan	2.99	0.29 (10)	1.98 (66)	0.73 (24)
Malaysia	3.43	0.31 (9)	3.02 (88)	0.10 (3)
Philippines	0.85	0.21 (24)	0.92 (108)	-0.27 (-32)
Thailand	3.71	0.32 (9)	1.76 (47)	1.63 (44)
Developing	2.54	0.23 (9)	1.94 (76)	0.37 (15)
Developed	4.14	0.36 (9)	2.61 (63)	1.17 (28)

Source: APO [1]

Note: i. Vietnam data covers 1986–2008

ii. The developed economies include ROC, ROK, Singapore, and Hong Kong

iii. The developing economies include Fiji, Indonesia, Mongolia, Vietnam, Malaysia, the Philippines, and Thailand.

Table 6. TFP and Labor Productivity Growth Regression Estimations for 12 Member Economies

Variable	TFPG	TFPG	LPG	LPG
Edu_yr	0.155	0.168	-0.370**	-0.247
EXPG	0.0363*	0.0391*	0.0236	0.0185
INV/GDP	0.00917	0.0360	0.0574	0.0321
EX/GDP	0.00537	-	-0.0132	-
GOV/GDP	0.0457	-	0.147	-
NEX/GDP	-	0.0474*	-	-0.0343
Life	0.0618	0.0525	0.0696	0.0754
lnPOP	0.490***	0.339***	0.369	0.550***
GDPPC	-0.000019	-0.000029	0.000097	0.000050
Constant	-10.50***	-8.332***	-5.654	-6.708
# of sample	392	392	326	326

Note: i. \* for p-value <0.1, \*\* for p-value <0.05, \*\*\* for p-value <0.01  
 ii. Edu\_yr: average schooling year; EXPG: export growth rate; INV/GDP: Investment to GDP ratio; EX/GDP: export to GDP ratio; GOV/GDP: government consumption to GDP ratio; NEX/GDP: net export to GDP ratio; Life: life expectancy initiated at 1971, 1981, 1991, and 2001; lnPOP: log of population initiated at 1971, 1981, 1991, and 2001; GDPPC: GDP per capita initiated at 1971, 1981, 1991, and 2001

It also can be found that the contribution share of capital deepening accounts for 85% of labor productivity growth for the APO developing economies, whereas it accounts for 72% of labor productivity growth for the APO developed economies. In other words, over the past four decades, the contribution share of TFP growth for developed economies (28%) is much higher than that of developing economies (15%).

### PRODUCTIVITY REGRESSION RESULTS

The productivity regression intends to identify underlying factors that may affect TFP and labor productivity growth. The empirical estimation consists of pooling data analysis for the APO member economies and individual country productivity regression analysis.

#### Pooling Data Analysis for APO Member Economies

To examine the significance of factors that may affect TFP or labor productivity growth for the APO member economies, the data for the 12 APO member economies from 1970–

2008 were pooled. However, to examine the impact of R&D on productivity growth, shorter data and only for three developed economies - Japan, ROK, and ROC - had to be used.

#### TFP and Labor Productivity Growth Regression for 12 APO Member Economies

Table 6 presents the results of TFP growth regression. Included are factors reflecting human capital investment (Edu\_yr), private investment (INV/GDP), trade openness (EXPG, EX/GDP, NEX/GDP), government intervention (GOV/GDP), and also some initial condition factors (Life, ln POP, GDPPC), and time dummies. Results of Table 6 indicate that education (Edu\_yr) and trade openness (EXPG, Ex/GDP, NEX/GDP) have positive impacts on TFP growth as expected, as does investment intensity (INV/GDP). However, government consumption intensity representing government intervention had a positive and unexpected outcome. But as expected, the TFP growth positively correlated with the size of the country (ln POP), while the living and health conditions of people (Life) negatively correlated with the initial income level (GDPPC).

Table 6 also shows the labor productivity regression results, which indicate that education investment (Edu\_yr) had significant but unexpected negative outcome. Trade openness had no significant impact on labor productivity growth. Government intervention (GOV/GDP) was positively correlated with growth of labor productivity, private investment (INV/GDP) shows positive impact on labor productivity growth. The size of country population also positively correlated with labor productivity growth.

#### *TFP and Labor Productivity Growth Regression for Japan, ROC, and ROK*

To examine the impact of R&D investment on productivity growth, R&D was included in the equation. Only data from Japan, ROK, and ROC were used due to their availability. Table 7 shows that R&D investment had very significant and positive impact on the results of TFP growth of Japan, ROC, and ROK. On the contrary, government intervention (GOV/GDP) had negative and significant impact on

TFP growth. The impact of private investment was, however, unexpectedly negative.

The size of population (ln POP) with its negative value may reflect a significant difference between Japan and the other two countries. Trade openness does not have a significant impact on TFP growth. GDPPC with a negative value also confirms the hypothesis of income convergence hypothesis.

Table 7 also shows the results of labor productivity regression. The results indicate that R&D intensity had significant and positive impact on labor productivity growth of these three industrialized countries. The impact of other policy and initial condition variables were similar to those in the TFP growth regression.

#### **Individual Country's Productivity Regression Analysis**

Each country report also analyzes determining factors of productivity growth using its country-

Table 7. TFP and Labor Productivity Growth Regression Estimations for ROC, ROK, and Japan

Variable	TFPG	TFPG	LPG	LPG
Edu_yr	-1.880**	-1.152	-4.417***	-4.377***
INV/GDP	-0.285***	-0.078	-0.158	-0.117
EX/GDP	-0.072	-	-0.037	-
GOV/GDP	-0.532**	-0.190	-0.517	-0.442
R&D/GDP	4.594***	3.197*	6.675***	6.408***
NEX/GDP	-	0.136	-	0.001
Life	0.019	-0.121	0.305	0.284
lnPOP	-2.719*	-0.844	-3.725*	-2.845***
GDPPC	-0.00018***	-0.00009	-0.00011	-0.00010
Constant	58.271**	29.594*	63.845*	52.445**
R <sup>2</sup>	0.171	0.172	0.238	0.236
# of sample	99.000	99.000	99.000	99.000

Note: i. \* for p-value<0.1, \*\* for p-value <0.05, \*\*\* for p-value <0.01  
 ii. Edu\_yr: average schooling year; INV/GDP: Investment to GDP ratio; EX/GDP: export to GDP ratio; GOV/GDP: government consumption to GDP ratio; R&D/GDP: R&D intensity; NEX/GDP: net export to GDP ratio; Life: life expectancy initiated at 1971, 1981, 1991, and 2001; lnPOP: log of population initiated at 1971, 1981, 1991, and 2001; GDPPC: GDP per capita initiated at 1971, 1981, 1991, and 2001.

specific data. All the country reports adopt the same conceptual model to run regressions. The regression model consists of baseline and extended models that are defined in the methodology Appendix of this report.

Table 8 summarizes the significance and value of impact on the variables used in the TFP growth regression models from all country reports. Some interesting findings are summarized as follows:

- i. Education had shown positive and significant impact on TFP growth for Singapore, the Philippines, Thailand, Malaysia, and IR Iran
- ii. R&D investment had positive and significant impact on TFP growth for ROC, Japan, Thailand, and Malaysia
- iii. Trade openness policy induced positive impact on TFP growth for ROC, Indonesia, Singapore, ROK, India, the Philippines, Thailand, and Malaysia
- iv. Initial condition variables were significant in Mongolia, India, and Malaysia

Table 8 also summarizes the significance and value of the factors used in labor productivity regression. Some interesting findings are also drawn as follows:

- i. Education investment was found to be significant with positive impact on labor productivity growth in the Philippines, Thailand, Malaysia, and IR Iran
- ii. R&D investment was found to be important and significant to ROC, Japan, and Malaysia
- iii. Trade openness policy had significant and positive impact on labor productivity growth in Cambodia, Indonesia, Pakistan, the Philippines, Malaysia, and IR Iran
- iv. Initial condition variables were significant in Cambodia, ROK, the Philippines, Thailand, and Malaysia

## PRODUCTIVITY MOVEMENT IN THE APO MEMBER ECONOMIES

This section briefly summarizes general ways of productivity movements and government productivity promotion policies in the past decades for the APO member economies. Detailed descriptions on productivity movements can be seen in each country report.

Productivity movements undertaken by the APO member economies depend upon the stage of its economic development. In the 1960s and 1970s, the earlier developed economies of the APO such as ROC, ROK, Singapore, and Malaysia were at the stage of transforming from an agrarian economy to an industrialized economy. The productivity enhancing activities taken in this initial development stage largely focused on offering education and training programs, as well as management consultancy and advisory services. Similar productivity movements were adopted by the later developed APO member economies such as Mongolia, Cambodia, Bangladesh, and others from the 1980s–2000s. Their NPOs also planned to improve productivity through activities such as seminars, conferences, workshops, company demonstration projects, and publishing productivity promotional materials in their initial development stage.

In the 1980s and 1990s, the earlier developed APO member economies had taken productivity and efficiency-driven growth strategies to ensure successful industrialization and trade expansion. Therefore, in this period, low-cost automation and product quality promotion were main productivity movements. However, in the 2000s, the era of knowledge economy, the productivity movement seemed to focus on competitiveness and innovation promotion. Initiatives on increasing IT investment and on introducing new knowledge management concepts and management, and enhancing productivity in all (manufacturing and service) sectors were highly appreciated by the APO member economies.



Table 8: Determining Factors of TFP (and Labor Productivity) Growth for APO Member Economies: Summarized From Country Reports

Factor	Variable	ROC	Cambodia	Indonesia	Mongolia	ROK	Singapore	Pakistan	Philippines	India	Japan	Vietnam	Thailand	Malaysia	IR Iran	Sri Lanka	Nepal	Fiji	Bangladesh
Education	Edu - year	0/(0)	0/(0)	0/(0)	0/(0)	-/(0)	0/0	0/(0)	+/(+)	0/(0)		0/0	+/(+)	+/(+)	+/(+)		/(+)	-/(+)	
	Edu - ratio	0/(0)														+/			
R&D	R&D/GDP	+/(+)				0/(0)	-/(-)	0/(+)	+	0/(0)	0/(+)	0/0	+/(0)	+/(+)	0/(0)		/0		
	Trade/GDP						0/0	0/(+)	+			0/0	+/(0)	-/(0)	0/(0)	0/			0/
Trade openness	Export/GDP	+/(0)	0/(+)	+/(+)	0/(0)	-/(0)	+	0/(+)	0/(+)	-/(-)		0/0	+/(0)		0/(0)	0/		+/(0)	0/
	NE/GDP										+/(+)								
Government consumption	Import/GDP		0/(+)		-/(-)	+/(0)	0			+/(+)					0/(0)				
	FDI/GDP	0/(0)	0/(0)	+/(+)	0/(0)	-/(-)		0/(0)	+/(+)	0/(0)		0/0	-	+/(+)		0/		-/(0)	
Initial conditions	GOV/GDP	0/(0)			0/(0)	-/(-)		-/(-)		-/(-)		0/0	0/(0)	+/(+)	0/(-)	+/	/0	0/(-)	0/
	GDP (per capita)		0/(+)		0/(0)	0/(-)				+/(-)				+/(+)					
Time Dummy - year	Population		0/(+)		0/(0)	0/(-)	-/(-)		+	+/(+)				0/(0)					
	Life expectancy		0/(+)		+/(0)	0/(-)	+/(+)	0/(0)		0/(0)			-/(+)						
		0/(0)														0/			

- Note : i. Factors and variables shown in the table are those variables that are commonly used in most of the country reports. However, other country-specific factors/variables employed by each country are listed as follows : Edu-ratio: population with college or higher education ratio (ROC); HEALTH/GDP: Health Expenditure/GDP (Cambodia); EDUEX/GDP: Education Expenditure/GDP (Cambodia); Budget surplus/GDP: (Government Revenue-Government Expenditure)/GDP; GOV-inv/GDP: Government investment/GDP (Indonesia, Sri Lanka); Dummy crisis (Indonesia); K/L: Total investment/Total employment (Mongolia, ROK); Trade/GDP: (Export +Import)/GDP; Monetary Assets (M2) Growth (%) (Pakistan); Inflation rate (Pakistan, Philippines); Budget balance (Pakistan); Change in Real Exchange Rate (Pakistan); D dummy: if a period of democratic government = 1, otherwise 0 (Pakistan); P dummy: if a peace period = 1, otherwise 0 (Pakistan); EDU&HEALTH: Education and health expenditure (Philippines); NG: National Government Deficit (Philippines); Population (total) (Philippines); M/EX: Manufacturing exports as % of total exports (Philippines); Telephone lines/100 persons (Philippines); NE/GDP: Net Expenditure/GDP (Japan); IT: IT investment/GDP ratio (Japan); Pi: Public investment/GDP ratio (Japan); POW: percentage of working population (Thailand); STU/EM: The number of university students in total employee (IR Iran); Ln(Y\_US) : GDP per capita relative to the USA level (Singapore)
- ii. Figures shown in the table represent the impact direction and level of statistical significance of factors/variables on the growth of TFP or labor productivity, respectively. The figures left to the "/" refer to the impact on TFP growth, whereas the figures right to the "/" represent the impact on labor productivity growth
- iii. Notations are defined as: "0" : No significance at 10% level; "+" : Positive significance at 10% level; "-" : Negative significance at 10% level

## **CONCLUDING REMARKS: ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

While the APO member economies diversified in resource endowments and stages of economic development, they also undertook various productivity movements and formulated country-specific government policies to promote productivity growth in the different time periods over the last 50 years.

Despite facing resource, economic, and social constraints, the following issues and challenges were commonly confronted by most of the APO member economies. Details of the country-specific issues and challenges can be found in the respective country report.

### **R&D and Human Capital Investments**

R&D and human capital investments were required in most of the APO member economies in order to improve productivity in the era of knowledge economy. For the technology-led developed economies such as Japan, ROC, ROK, and Singapore, challenges in improving labor quality and productivity included finding ways to boost knowledge and innovative capacities of people and business in order to compensate the productivity loss due to declining labor force in the future. For other developing economies, investment in quality of human capital, education, and training for workers' skill upgrading were recognized as future direction of productivity initiatives.

### **Attracting Foreign Direct Investment (FDI) and Technology Inflow**

Despite recognizing the importance of capital and R&D investment in productivity improvement, most of the developing economies suffer shortage of capital expenditure and technology disadvantage. Therefore, the ways to provide effective incentives and trade and investment policies to attract more FDI and technology inflow from advanced economies is an important challenge in their productivity improvement.

### **Regional Economic Cooperation**

Asian developing economies are abundant in natural resources and human resources, but often lack in capital inputs and advanced technology. On the contrary, the developed Asian economies are rich in capital resources and advanced technology, but often lack sufficient market demand. Therefore, economic cooperation in forms of free trade or joint investment between these two types of countries would create mutual benefits. Such cooperation could also improve price competitiveness and induce technological diffusion, and have direct impact on economic and productivity growth. However, ways to establish bilateral or multilateral free trade agreement or investment cooperation among the APO member economies is a complicated issue and a challenge.

### **Development of Operational Environment**

Productivity will not be sustainable without proper development of operational environment. Political stability, economic certainty, conducive regulatory framework, infrastructure investment, and government policy support for productivity movements are crucial factors to the growth of productivity. However, factors that are key to successful productivity growth could vary depending on each country's advantage and constraints, which will be a difficult task for policy makers.

## **REFERENCES**

- [1] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011. e-Book.
- [2] World Bank. World Development Indicators database, 2012 available at <http://data.worldbank.org/news/wdi-database>.
- [3] Barro R., Lee J.W. A new data set of educational attainment in the world, 1950–2010. NBER Working Paper No. 15902, available at <http://www.barrolee.com/>.

## APPENDIX

### The Common Methodology Of The Country Report

Two methods were used in this study: i) the growth accounting approach was used to measure the TFP dynamics at national level for each country, and ii) productivity regression using the ordinary least-squares (OLS) method was employed to identify significant factors influencing TFP growth.

#### The Growth Accounting Approach

A simple model can serve to illustrate the concept of the growth accounting approach. Assuming the time path of a nation's aggregate economic activity can be summarized by the relationship:

$$Y_t = A_t \cdot f(K_t, L_t, t), t = 1, \dots, T, \quad (1)$$

where  $Y_t$  is some measure of real aggregate economic output (for example, GDP or GNP) in year  $t$ ,  $K_t$  is a measure of the capital stock or capital service in use in year  $t$ ,  $L_t$  is a measure of labor employment in year  $t$ ,  $t$  is a time index intended to capture the level of technology in place in year  $t$ ,  $A_t$  is an index of the efficiency with which  $K$  and  $L$  are utilized in year  $t$ , and  $f(\bullet)$  is a production function describing how capital, labor, and technology are used to produce output.

The rate of growth of aggregate output can be expressed as

$$G_Y = \varepsilon_K G_K + \varepsilon_L G_L + G_A + G_f, \quad TFPG = G_A + G_f \quad (2)$$

$$G_Y = \varepsilon_K G_K + \varepsilon_L G_L + TFPG \quad (3)$$

where  $G_Y$ ,  $G_K$ , and  $G_L$  denote rates of growth of  $Y_t$ ,  $K_t$ , and  $L_t$ ,  $\varepsilon_K = \partial \ln f(\bullet) / \partial \ln K_t$  denotes the elasticity of  $Y_t$  with respect to  $K_t$ ,  $\varepsilon_L = \partial \ln f(\bullet) / \partial \ln L_t$  denotes the elasticity of  $Y_t$  with respect to  $L_t$ ,  $G_A$  denotes the rate at which the efficiency of resource use is changing, and  $G_f$  denotes the rate at which technology is changing (that is, the rate of technical progress or regress). The sum of  $G_A$  and  $G_f$  can be regarded as TFP growth ( $TFPG$ ).

The estimates of elasticity of  $Y_t$  with respect to  $L$  and  $K$  can be obtained by empirical estimation of Equation (1). However, if such estimation is impossible due to data limitations, then we can replace the marginal productivities of factors with factor prices and express elasticity in factor share form. We have

$$G_Y = S_k G_k + S_l G_l + TFPG \quad (4)$$

where  $S_k$  and  $S_l$  are relative shares of income of capital and labor, respectively.

Since the growth rate terms in the above equations are for an instantaneous rate of change, for the discrete time we take the average of two consecutive periods:

$$\begin{aligned} TFPG_t &= (\ln TFP_t - \ln TFP_{t-1}) \\ &= (\ln Y_t - \ln Y_{t-1}) - 1/2 (S_{kt} + S_{kt-1})(\ln K_t - \ln K_{t-1}) \\ &\quad - 1/2 (S_{lt} + S_{lt-1})(\ln L_t - \ln L_{t-1}) \\ &= G_y - 1/2 (S_{kt} + S_{kt-1})G_k - 1/2 (S_{lt} + S_{lt-1})G_l \end{aligned} \quad (5)$$

This is the equation used in the estimation of the TFP growth rate. Note that we are working with two aggregated factors of production, capital, and labor. Also, we use the two-year moving average of income shares of labor and capital in estimating the TFP growth rate.

For ease of presentation, in what follows, we change the notation of Equation (5). Let

$TFPG = \Delta \ln TFP$ ,  $G_y = \Delta \ln Y$ ,  $G_k = \Delta \ln K$ ,  $G_l = \Delta \ln L$ ,  $S_k^* = 1/2 (S_{kt} + S_{kt-1})$ ,  $S_l^* = 1/2 (S_{lt} + S_{lt-1})$ . The following Equation (6), like Equation (5), can be expressed as: TFP growth = output growth – (capital share × capital growth) – (labor share × labor growth).

$$\Delta \ln TFP = \Delta \ln Y - S_k^* \Delta \ln K - S_l^* \Delta \ln L \quad (6)$$

#### The Growth Accounting Models

In the following section, we first show two basic growth accounting models, one for GDP growth and the other for labor productivity growth. We also show two IT-decomposition growth

accounting models, one for GDP growth and the other for labor productivity growth.

Model 1A: Basic model for GDP growth

Model 1A decomposes output growth into labor growth, capital growth, and TFP growth.

$$\Delta \ln Y = S_l^* \Delta \ln L + S_k^* \Delta \ln K + \Delta \ln TFP \quad (7)$$

Model 1B: Basic model for labor productivity growth

Model 1B is the labor productivity expression of Model 1A. It decomposes labor productivity growth into capital deepening and TFP growth. Capital deepening means the increase in capital share  $\times$  the growth of capital intensity (capital service used by per worker or per work hour).

$$\Delta \ln \left( \frac{Y}{L} \right) = S_k^* \Delta \ln \left( \frac{K}{L} \right) + \Delta \ln TFP \quad (8)$$

Model 2A: IT-decomposition for GDP growth

In Model 2A, capital is decomposed into IT and non-IT capital. Model 2A shows that output growth = (Capital share  $\times$  non-IT capital growth) + (Capital share  $\times$  IT capital growth) + (Labor share  $\times$  labor growth) + TFP growth.

$$\Delta \ln Y = S_k^* \Delta \ln IT + S_k^* \Delta \ln Non-IT + S_l^* \Delta \ln L + \Delta \ln TFP \quad (9)$$

Model 2B: IT-decomposition for labor productivity growth

Model 2B is the labor productivity expression of Model 2A. Model 2B shows that labor productivity growth = Non-IT capital deepening + IT capital deepening + TFP growth.

$$\Delta \ln \left( \frac{Y}{L} \right) = S_k^* \Delta \ln \left( \frac{Non-IT}{L} \right) + S_k^* \Delta \ln \left( \frac{IT}{L} \right) + \Delta \ln TFP \quad (10)$$

### Productivity Regression Approach

The OLS method was adopted to construct productivity regression. The productivity regression model can be described as:

$$TFPG = f(\text{factor}_1, \text{factor}_2, \text{factor}_3, \dots, \text{factor}_k) \quad (11)$$

$$\text{Labor productivity growth} = f(\text{factor}_1, \text{factor}_2, \text{factor}_3, \dots, \text{factor}_k) \quad (12)$$

where the TFP and labor productivity growth rates are dependent variables, and factor  $_i$  denotes the i-th factor affecting TFP and labor productivity growth.

Two types of regression models used in the country reports:

- i. Baseline Regression Model with four types of independent variables
- ii. Extended Regression Model with the addition of initial conditions, macroeconomic and policy variables, as well as country-specific variables

*Baseline Regression Model: Variables to be Used*

The baseline regression model includes four types of variables defined as:

- **Educational attainment:** Average schooling year representing human capital investment (data can be retrieved from Barro and Lee [3]). Each country report used the average schooling year from the variable Education Attainment for Population Aged 15 and Over in Total Population. Since the data only provided values for every five years, the data should be interpolated to fill in the intervening missing values
- **R&D investment:** Share of R&D expenditure as a percentage of GDP
- **Trade openness:** i) share of export in GDP and ii) share of FDI in GDP (Trade openness can also serve as an indicator of international technology transfer and spillover)
- **Government consumption:** Share of government consumption in GDP (government consumption expenditure on health and education could enhance productivity, but such expenditure may also increase operational regulations, resulting in lower productivity)

*Extended Regression Model: Variables to be Used*

In addition to the four types of variables in the baseline model, each country may also include the following variables in the extended regression model.

However, inclusion of these variables will depend upon their data availability and appropriateness of model specification.

i. Initial conditions

- Income per capita representing income level
- Life expectancy representing health condition
- Population size representing human resource endowment

ii. Macroeconomic variables and government policies

- Budget balance
- Change in real exchange rate
- Inflation rate
- Industrial policy and regulation
- Institutional quality and government efficiency

iii. Other country-specific variables

Major factors or policies influencing productivity growth may be different for each country. Therefore, each national expert can collect potential factors that are available and meaningful to the country study and productivity regression on these factors in the country report.

Please note that:

- i. Dependent variables (labor and TFP growth) are in the form of growth rates.
- ii. Independent variables could be empirically specified in a level form, in a growth rate form, or in a lag variable form, depending on its appropriateness in the model fitting.

---

# BANGLADESH

DR. MD. NAZRUL ISLAM

**Director**

National Productivity Organisation  
Ministry of Industries

---

## INTRODUCTION

Bangladesh is a small agricultural country with an area of 147,570 sq km. The country's population is about 145.46 million and it is the most densely populated country in the world. More than 843 people live on per sq km in Bangladesh and about 40% of its people live below the poverty line [1].

The Bangladesh economy continued to demonstrate satisfactory growth performance while maintaining macroeconomic stability during the financial year (FY) 2009–10 despite the global economic recession. The economy was provisionally estimated to have grown at a rate of 5.83%, slightly higher than the growth rate of FY2008–09 at 5.74%. The key feature of the economic performance during the FY2009–10 period was the sustained growth in the agriculture sector coupled with moderate growth in the industry and service sectors. Bangladesh was less affected by the slowdown in the international trade compared to other emerging Asian economies and has maintained strong economic fundamentals, including a sound fiscal stance. From the beginning of the global economic crisis, the government has been on high alert and monitors its impact on the economy through a task force involving concerned stakeholders from both the public and private sectors [1].

At the beginning, the impact of the global financial crisis on Bangladesh's economy was not observed. However, some weakening in export and import was observed in the last quarter of FY2008–09, which continued through the second quarter of FY2009–10. Exports rebounded from negative growth rate at the beginning of FY2009–10 and year-on-year growth of exports gained remarkably since

January 2010. The country's revenue grew at a satisfactory rate. Remittances inflow maintained their steady growth, current account surpluses recorded its highest ever level at USD3.73 billion, and the foreign exchange reserves crossed the USD10 billion mark during FY2009–10. All these factors placed the economy on a stronger footing in 2009–10 [1].

## Economic Growth Savings and Investment

According to the Bangladesh Bureau of Statistics' revised provisional estimates in FY2009–10, its GDP growth of 5.83% was contributed by corresponding growths in agriculture, industry, and services sectors, which grew by 4.67%, 6.01%, and 6.38%, respectively, indicating satisfactory performances across the three broad sectors of economy. The share of services in GDP amounted to 49.88%, followed by industry at 29.88%, and agriculture at 20.24% at constant prices.

On the aspect of expenditure, a total consumption of GDP increased significantly to 81.01% in FY2009–10 from 79.91% in the previous fiscal year. The rise in consumption was driven by good agriculture output, a remittance-induced demand, and well-supported budgetary stimulus, including higher social safety net spending. Investments acquired momentum as it increased 24.96% of GDP (20.19% for private investment and 4.77% for public investment) in FY2009–10, up from 24.37% in the previous fiscal year. The marked increase is credited to improvements in the business environment, a rebound of slow growth in the private-sector credit, and sluggish import of capital machinery and industrial raw materials in the second quarter of FY2009–10. With a moderate inflow of remittance, gross national savings in FY2009–10 fell to 28.75% from 29.57% in FY2008–09. The per capita national income

(Gross National Income or GNI) exceeded the USD700 mark for the first time. The per capita GNI and GDP stood at USD751 and USD685, respectively, during FY2009–10 [2].

### PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

Table 1 features the trends of labor productivity based on hours worked as well as the number of employment and other indices in Bangladesh from 1961–2010.

over, and the ratio of public investment to total investment of Bangladesh from 1961–2010 is included in the table [3].

Table 1 also reveals that the GDP trends at constant prices moved up from 1961 to 2010. The actual GDP at current prices also showed similar trends, while the trends of share of net exports maintained their growth in this area. The average schooling year for populations aged 15 and over and 25 and over maintained

Table1. Productivity and Other Indices of Bangladesh from 1961–2010

Productivity Indices	1961–70	1971–80	1981–90	1991–2000	2001–10
Total factor productivity	-	-	-	-	-
Labor productivity (based on hours worked) (index 2000=1)	-	0.57	0.58	0.64	0.81
Labor productivity (based on number of employment) (index 2000=1)	-	0.68	0.69	0.76	0.97
GDP at constant prices index (2000=1)	-	0.39	0.53	0.81	1.15
GDP at constant prices (USD'billions)	-	48.37	65.95	100.17	159.89
Share of R&D expenditures (to GDP)	-	-	-	-	-
Share of net exports	-	0.02	0.10	0.56	1.95
Average schooling year (population aged 15 and over)	-	-	0.02	0.02	0.04
Average schooling year (population aged 25 and over)	-	-	0.01	0.01	0.01
The ratio of public investment to total investment	-	51.56	47.25	33.71	23.39

It is also observed in Table 1 that labor productivity based on hours worked showed a consistent upward trend during the period under study. The percentage of labor productivity based on the number of employment also showed a similar trend [3].

Other indices such as the trends of GDP at constant prices, actual GDP at constant prices, share of net exports, average schooling year for population aged 15 and over, average schooling year for population aged 25 and

an almost similar trend throughout the period under study. The only downward trend in the table is the ratio of public investment to total investment.

Table 2 shows periodic growth rates by each five-year period of the GDP, labor input, and labor productivity.

Table 2 highlights the average annual growth rates of GDP at constant prices, showing an upward swing throughout the entire period under review.

Table 2. Periodic Growth Rate of Bangladesh in Different Indices

Indices	Year			
	1990–95 (%)	1995–2000 (%)	2000–05 (%)	2005–08 (%)
Average annual growth rate of GDP at constant prices	4.3	5.1	5.3	6.2
Labor productivity growth, using 2005 public-private partnerships	2.8	3.9	1.8	4.0
Labor input growth	12.35	5.49	17.71	9.73

As for the growth rates of labor productivity, the figures fluctuate annually. The percentage of labor input growth maintained a similar trend with labor productivity growth.

#### FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES

The government played a positive role in creating the conditions necessary for encouraging productivity promotion and growth. These include a congenial climate for productivity through reforms in fiscal and monetary policies, lessening physical control, and developing other economic measures for creating competitive conditions.

A government's vital role is to provide the necessary infrastructure and create opportunities for growth. Infrastructure comprises education and training, health, power, water, education, transport, communication, R&D, and technology availability. The inefficiency of enterprises can be reduced to zero on the national scale of infrastructure, which assures that the distribution and redistribution of goods and services are effective.

Table 3 shows the periodic contribution of export share and public investment toward productivity over a 10-year period using a regression model.

Table 3. Productivity and Other Indices

Item	1971–80	1981–90	1991–2000	2001–10
Labor productivity (Y)	0.68	0.69	0.76	0.97
Share export ( $x_1$ )	0.02	0.10	0.56	1.95
Ratio of public investment ( $x_2$ )	51.56	47.25	33.71	23.39

The regression model is:

$$Y = a + b_1x_1 + b_2x_2$$

The estimated multiple regression is:

$$Y = 0.6737 + 0.1513 x_1 + 0.000045 x_2$$

For the unit change of  $x_1$ , expected change of Y is 0.1513, where  $x_2$  remains constant, and for unit change of  $x_2$ , the expected change of Y is 0.000045, where  $x_1$  remains constant.



The lack of necessary government intervention resulted in low productivity. The available policy instruments include public enterprises, accelerated depreciation allowances, low-interest loans, subsidy programs, advance exemptions and reductions, tax concessions, and incentives, including tax holidays and pioneer status for new businesses. All these have been used effectively and with discrimination in many countries to accelerate and redirect capital investment, and promote high rates of economic and productivity growth.

## **PRODUCTIVITY ORGANIZATION AND MOVEMENTS**

In Bangladesh, productivity issues were never considered priority areas for action in the early 1980s. It was not understood, theoretically or practically. Bangladesh became a member of the Asian Productivity Organization (APO) after a decade of independence. During that time, there were no specialized agencies in the country to deal with productivity issues. The understanding of productivity depended on knowledge of close relationships between various factors - labor, capital, and management - and the impact of human element on each of these factors. In a country like Bangladesh, where resources are limited and resulting in poor per capita income, productivity can be raised only by giving emphasis to labor, i.e., awareness of labor productivity is to be created through the mechanism of labor efficiency. Unless labor contributes more toward GDP and GNP, productivity cannot be attained at a satisfactory level in the country. Therefore, in the context of Bangladesh, an upgrade of labor productivity is the easiest and the only available means to break the vicious cycle of poverty.

The National Centre for Monitoring Labor Productivity (NCMLP) was established in 1983 by the government with a view of this outcome. The fundamental objective for establishing the NCMLP was initially only to cater to the needs of measuring and monitoring labor

productivity. The NCMLP was subsequently renamed Bangladesh Productivity Centre (BPC) with a wide scope of objectives and to play the role of a catalyst for promotion of productivity under the same ministry. Until 1987, BPC was engaged mainly in self-development and institutional buildup, and was entrusted with ministering trends of labor productivity in selected sectors of the national economy.

In consideration of the dire need for strengthening the role and function of BPC as a national-level institution for promotion of productivity, the government obtained the services of an Internet expert on productivity under the UNDP/ILO Technical Assistance project. Under this project, the professional staff of BPC were trained at home and abroad while the awareness on the concept of productivity and its importance for industrial development was disseminated by BPC in a limited range among employers, trade union representatives, government officials, academicians, etc. The government of Bangladesh stressed on the need for productivity for the rapid industrialization of the country. BPC was once again renamed National Productivity Organisation (NPO). The organization was transferred to the regular revenue budget of the government of Bangladesh, from the Ministry of Labour and Manpower to the Ministry of Industries in 1989.

In Bangladesh, the issue of productivity movement began after the establishment of the NPO. With the assistance from NPO Bangladesh, the issue of productivity became a matter of devotion to the lifestyle of its people. The main objectives of the NPO are to:

- i. Act as a promoter to create productivity consciousness and awareness to the masses, particularly industrial enterprises
- ii. Evolve institutional framework for productivity movement in the country
- iii. Undertake programs for human resource development for productivity improvement and skill development

- iv. Conduct surveys, studies, and researches on productivity
- v. Work as a catalyst to promote plant-level productivity through consulting services
- vi. Convert industrial enterprises into efficient, profitable, and productive organizations by adopting productivity improvement activities continuously and systematically
- vii. Assist the government in formulating productivity policies

### **Role of NPO in Managing the Rapidly-Changing Environment of Productivity Movement**

NPO Bangladesh strives to fulfill its entrusted responsibilities, and the organization has successfully introduced regular training programs on different subjects of productivity targeted at management and trade union officials in the public and private sectors. Research and study reports on productivity trends and analysis were published regularly. Productivity awareness campaigns were also strengthened by introducing various new measures. NPO Bangladesh assisted in incorporating national productivity into the Fifth Five-Year Plan Document (1997–2002). In the Revised Industrial Policy 1997, productivity was earmarked as a major objective. It was also incorporated into the National Industrial Policy 2010.

### **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

In the journey of achieving Vision 2021, specific issues needed to be addressed by concerned and committed people backed by appropriate policies and strategies. The overall goal of Bangladesh, with a focus on development, needs to be associated with productivity and its movement. The holistic scenario and priority issues of concern regarding productivity in Bangladesh are briefly delineated below. However, these issues are not an exhaustive list, rather an indicative one so as to focus on various views and ideas on the subject.

### **Human Resource Development**

According to the APO, the understanding of productivity depends on a better knowledge of the close relationship among labor, capital, and management, and the impact of the human element on each of these factors. Bangladesh faces a limitation in its resources and low income per capita. Thus, upgrading labor productivity is the easiest and the most available means for its people to come out of poverty.

Human resource development is closely linked with productivity in Bangladesh, and to some extent, all aspects of human development (i.e., education, health, employment, manpower development, science and technology, etc.) have been covered by both public and private initiatives, but there is a lack of integrated approach. All the various types of skill development programs, especially vocational training, need to be designed more efficiently, which will gradually transform the large population of Bangladesh into a skilled and productive workforce.

Increasing productivity, as well as rapidly reducing poverty and inequality in Bangladesh, hinges largely on the proper utilization of its productive labor force or Demographic Dividend. Bangladesh is passing through the window of opportunity, where the share of working population (ages 15–64) has been steadily rising from 40% in 1970 to 62% in 2009. Despite its large population of 150 million, the nation's economy can be free of increased poverty along with high unemployment and underemployment problems through the creation of opportunities and skills [4].

### **Infrastructure Development**

Infrastructure is divided into two subgroups - economic and social. Economic infrastructure refers to the amount of physical and financial capital embodied on roads, railways, waterways, airways, port facilities, and other forms of transportation and communication. It also includes water supplies, telecommunication networks, financial

institutions, and electricity. Social infrastructure comprises facilities such as educational institutions, hospitals, justice facilities, and community facilities. The heightened level of infrastructural development in a country enables firms and industries to improve their manufacturing productivity, which will lead to improved economy.

Infrastructure can have three main effects on productivity: by acting as "free input" (direct effect); by facilitating product or process innovations (indirect effect), which allow firms to do what they do now in a better way or to do new things; and finally, by affecting the productivity of other inputs, what is often referred to as the factor bias effect [4].

## REFERENCES

- [1] Bangladesh Bureau of Statistics. Statistical Year Book of Bangladesh 2009. Dhaka: 2010.
- [2] Economic Adviser's Wings. Bangladesh Economic Review 2010. Dhaka; Finance Division, Ministry of Finance; 2010.
- [3] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [4] Barakat A. Productivity Movement in Bangladesh: Strategy for 2021. Paper submitted at the Multilateral Conference on Productivity Movement in Bangladesh: Strategy for 2021, Dhaka, Bangladesh, 2 October 2011.

---

# CAMBODIA

YEA BUNNA

**Director**

National Productivity Centre of Cambodia  
Ministry of Industry, Mines and Energy

---

## INTRODUCTION

The Cambodian economy has enjoyed a robust growth over the past decade, except in 2009 when its growth rate turned to negative. The average annual real GDP growth rate from 1994 to 2010 was approximately 7.7%, while in 2009, it was recorded at -1.8%. After the global economic crisis hit the Cambodian economy hard in 2009, particularly in the export, tourism, and construction sectors, the economy recovered with a strong momentum. In 2010, the growth rate was 5.9%, while in 2011, the export industry grew by 17%, the service sector by 5%, and agriculture by 3.1%. However, the influence of economic growth on rural poverty is limited by landlessness, reduced access to common property resources, and low stock of productivity-enhancing infrastructure.

According to Poverty Assessment 2006 [1], Cambodia's poverty rate was reduced from 47% to 30.1% between 1993–94 and 2007. About 91% of the poor are in rural areas, and a substantial percentage have no access to land for cultivation. The poor have virtually no access to modern energy sources, water, and sanitation. Many studies have emphasized the importance of agriculture development and poverty. According to the World Development Report 2008, for the poorest people, GDP growth originating from agriculture was about four times more effective in reducing poverty than GDP growth originating outside the sector [2]. However, in Cambodia, there is underinvestment in the sector, especially in agribusiness, which accounts for only about 4% of GDP in 2007 [3]. This is despite it being essential to move up the value chain of processing activities to absorb more abundant labor from rural areas, which accounts for more than 80% of the total population.

Since the first general election in 1993, the Cambodian economy has increasingly integrated with the world economy. Cambodia became a member of the World Trade Organization in 2004 and a member of ASEAN in 1999, while the ASEAN Free Trade Area, which is expected to be realized in 2015, will give Cambodia the opportunity to compete in the world's competitive free markets. Raising productivity is crucial for Cambodia's economy to survive in the new, globalized environment. Productivity has played a major role in modern economic growth and is one of the main factors of income difference among countries.

## PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

To date, research on productivity in Cambodia is rare. A number of productivity researches were generated on the garment industry and agriculture - the two main sectors that have supported the economic growth in Cambodia over the past decade.

Net inflow of FDI as percentage of GDP ( $100 \times \text{FDI}/\text{GDP}$ ) and GDP per capita at constant prices 2,000 (GDPPERCAPITA) were obtained from the World Bank DataBank. Education data was extracted from the Barro-Lee data set [4] by interpolation of every five years (EDU). Labor productivity growth is calculated as the annual change in GDP/labor force, using data from the World Bank DataBank, including data on Import/GDP (IM/GDP), Export/GDP (EX/GDP), population (POPULATION), and life expectancy (LIFEEXPECTANCY).

Public health expenditure as percentage of GDP ( $100 \times \text{HEALTH}/\text{GDP}$ ), public spending on education as percentage of GDP ( $100 \times \text{EDU}/\text{GDP}$ ), budget surplus as percentage of GDP

(100\*BUDGETSURPLUS/GDP) are from the Asian Development Bank's country table.

### Labor Productivity Growth and Total Factor Productivity (TFP) Growth

The following methods are used to compute growth accounting. Considering that the data on capital stock is not available, an assumption was used, where capital stock is equivalent to gross fixed capital formation (I) divided by the long-run growth rate of GDP plus depreciation rate of capital stock ( $\delta$ ). The depreciation

but decreased to -10% in 2005. However, the growth rate appeared to stabilize over the 2003–08 period, which is about 5% (Figure 1).

The large increase in the contribution of labor to TFP, particularly from 1996 to 2000 may have resulted from the increasing movement of women workers from low productivity agriculture sector to the more productive garment sector during its initial development stages in the country. Garments first came into the market in the 1990s as foreign investors

Table 1. Growth Accounting Result for Cambodian Economy 1994–2009 (capital share = 0.3)

Period	GDP Growth (%)	Capital Growth (%)	Labor Growth (%)	TFP Growth (%)	Share Contributed By		
					TFP (%)	Capital (%)	Labor (%)
1994–95	7.80	23.86	2.08	-0.84	-10.80	92.10	18.70
1996–2000	7.30	12.37	4.11	0.75	10.20	50.50	39.20
2001–05	9.40	12.21	3.24	3.44	36.70	39.10	24.20
2006–09	6.50	13.27	2.41	0.78	12.20	61.70	26.10
1994–2009	7.80	1.81	0.41	0.18	17.90	53.70	28.30

rate is also assumed at 13.5%. Then capital stock at time (t) can be calculated as  $K_t = I_t / (g + \delta)$  [5]. The annual average growth rate of real GDP is about 7.7% over the 1994–2010 period. Assuming that production function is a constant return to scale and takes the form of Cobb-Douglas with fixed capital share  $\alpha = 0.3$ , then the growth rate of TFP can be calculated as  $TFP = \Delta Y/Y - (1 - \alpha)\Delta L/L - \alpha \Delta K/K$ .

Growth accounting shows that the Cambodian economic growth over the 1994–2009 period was largely driven by factor accumulation. Capital and labor accumulations contributed about 82% to growth, while productivity contributed only about 18% over the period. Of the annual average GDP growth rate of 7.8% for 1994–2009 period, 4.2% is attributed to increase in capital stock, 2.2% to employment, and 1.4% to TFP. In other words, 53.7% of the growth rate is due to increase in capital stock, 28.3% to employment, and only 17.9% to productivity improvement (Table 1). The TFP growth rate fluctuated highly over the 1994–2002 period. It reached nearly 8% in 1994,

were attracted to available export quotas. The sector made up about 80% of total exports and represented nearly 15% of GDP. By 2000, the industry employed more than 100,000 workers and about 250,000 workers by 2005. Currently, more than 350,000 workers are employed. The overwhelming majority of garment workers are women, representing more than 90% of its workforce with most of them coming from rural areas of low productivity.

The contribution of TFP is not far different from some countries in East Asia over the period of 1966–90, during which contribution of TFP for Republic of China and Republic of Korea were at 20% and 12%, respectively. The contribution is much lower than OECD countries over the same 1966–90 period [5].

The 1994–2009 period showed remarkable GDP growth and moderate labor force growth, which were at 7.8% and 3.2%, respectively. The annual growth rate of labor productivity averaged at 4.6%.

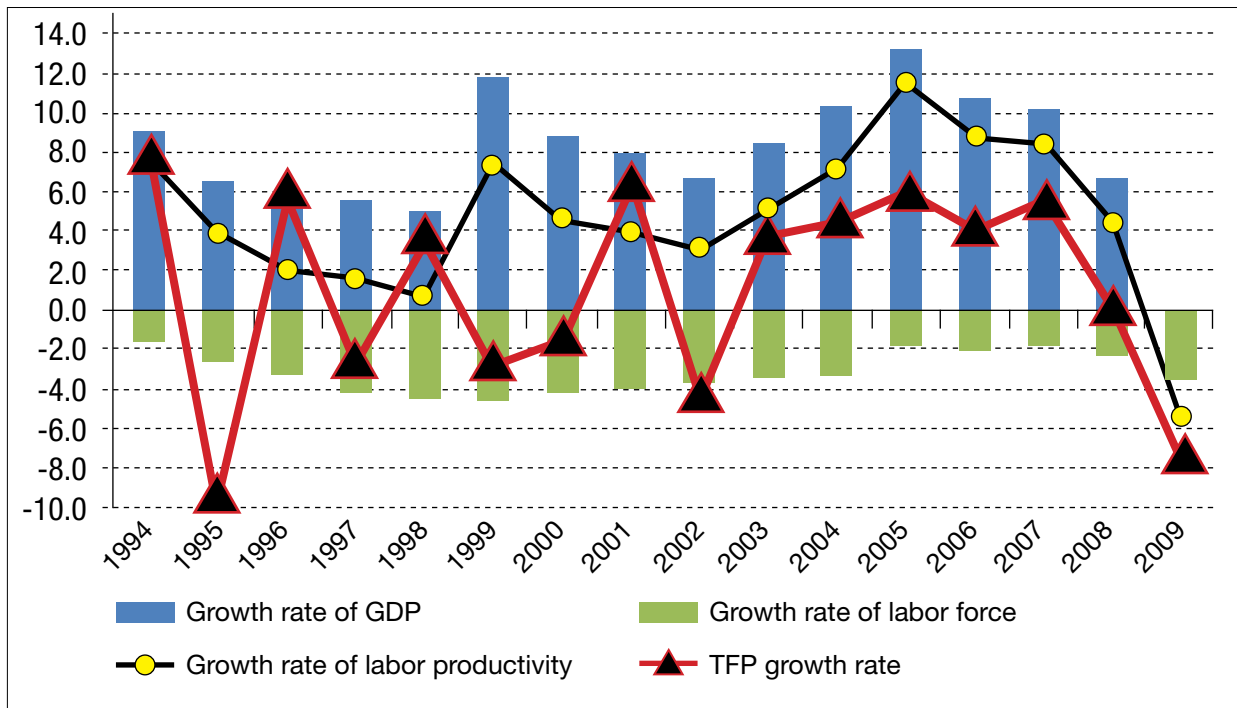


Figure 1. TFP Growth and Labor Productivity Growth Rates

From 1994–98, the growth rate decelerated due to continued decrease in the growth rate of GDP, but it saw a continued increase in the growth rate of labor force in the economy (Figure 1). However, the labor productivity growth jumped from 0.6% in 1998 to 7.4% in 1999 due to the remarkable GDP growth in 1999. From 1999–2002, labor productivity began to decrease again, mainly resulting from the large decrease in GDP growth rate coupled with the slight decrease in labor force growth rate.

Labor productivity growth increased again over the 2002–05 period because of the decrease in the growth of labor force and the large increase in GDP growth, which reached its peak at 13.3% in 2005. From 2005–09, labor productivity growth decelerated as GDP growth slowed down, while labor force growth was moderate.

## FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES

### Labor Productivity

The first model to estimate the factors that can affect labor productivity is obtained by regressing labor productivity growth upon

variables in Table 2. Share of export in GDP and share of FDI in GDP are the two main factors that have significant positive impact on labor productivity growth. If export/GDP increases by 1%, then labor productivity can grow approximately 16% in Model 1. Similarly, when FDI/GDP increases by 1%, labor productivity will grow between 5% and 8%, as indicated in Model 1 to Model 6 in Table 2. GDP per capita, population, life expectancy, and budget surplus/GDP also demonstrate significant positive effects on labor productivity. Stock of human capital, for which the average schooling year was used as a proxy, and expenditure on health seemed to have positive effects on labor productivity, although the result is not statistically significant.

### TFP Growth

According to the result of the regression analysis in Table 3, stock of human capital, FDI/GDP, and Health Expenditure/GDP have positive impacts on TFP growth rate. It was also noted that government budget surplus can significantly affect TFP growth. When budget surplus/GDP increases by 1%, TFP grows by 1.2%.

Table 2. Factors Affecting Labor Productivity Growth Rate

Item	Model 1 Coef	Model 2 Coef	Model 3 Coef	Model 4 Coef	Model 5 Coef	Model 6 Coef
Const.	2.55 (1.51)	2.73 (1.42)	-40.10* (-2.16)	-577.49** (-2.84)	-259.03* (-2.06)	5.66** (3.12)
Dln(EDU)	176.34 (0.76)	151.29 (0.57)	297.43 (1.51)	327.04 (1.81)	312.74 (1.50)	99.40 (0.54)
Dln(100*EX/GDP)	16.35* (1.91)	12.51 (0.69)	23.97** (3.08)	24.81*** (3.52)	25.93** (3.00)	9.86 (1.36)
Dln(100*FDI/GDP)	5.59* (2.11)	5.09 (1.47)	7.32** (3.18)	8.13*** (3.75)	7.80** (3.12)	5.36** (2.56)
Dln(100*HEALTH/GDP)	3.70 (0.67)	3.63 (0.62)	3.75 (0.83)	3.52 (0.86)	4.51 (0.95)	2.31 (0.53)
Dln(100*EDUEX/GDP)	-6.14 (-0.61)	-7.37 (-0.63)	-3.47 (-0.42)	-3.41 (-0.45)	-4.15 (-0.48)	-2.54 (-0.31)
Dln(100*IM/GDP)	-	6.68 (0.25)	-	-	-	-
ln(GDPPERCAPITA)	-	-	7.12* (2.31)	-	-	-
ln(POPULATION)	-	-	-	35.38** (-2.84)	-	-
ln(LIFEEXPECTANCY)	-	-	-	-	63.93* (2.08)	-
100*BUDGETSURPLUS/GDP	-	-	-	-	-	0.95** (2.53)
Number of obs	15.00	15.00	15.00	15.00	15.00	15.00
F-statistics	1.35	1.01	2.54	3.37	2.26	2.86
Prob >F	0.33	0.48	0.11	0.06	0.14	0.09
R <sup>2</sup>	0.43	0.43	0.66	0.72	0.63	0.68
Adj R <sup>2</sup>	0.11	0.01	0.40	0.50	0.35	0.44

Note: \*, \*\*, \*\*\* denote significance 10%, 5%, 1% levels, respectively. Dependent variable is Labor Productivity Growth Rate

#### Description of variables

- EDU : Total Schooling Interpolated (unit: schooling year)
- EX/GDP : Export/GDP
- FDI/GDP : Foreign Direct Investment/GDP
- HEALTH/GDP : Health Expenditure/GDP
- EDUEX/GDP : Education Expenditure/GDP

- IM/GDP : Import/GDP
- GDPPERCAPITA : GDP Per Capita (unit: USD)
- POPULATION : Total Population (unit: person)
- LIFEEXPECTANCY : Life Expectancy (unit: year)
- BUDGETSURPLUS/GDP : (Government Revenue - Government Expenditure)/GDP
- D(x) : Difference  $x_t - x_{t-1}$
- In(x) : Natural Logarithm of x

### Government Policies and Productivity

The Cambodian economy was a planned economy in the 1980s, but like many other countries, Cambodia has transformed her economy from a planned economy to a market-oriented one as outlined in the Cambodian constitution. A series of important development strategic documents were published and implemented by the government. The most important strategic documents included the Rectangular Strategy, the Cambodian Millennium Development Goals 2003, the Socio-Economic Development Plan 2001–05, the National Poverty Reduction Strategy 2003–05, and Cambodia's National Strategic Development Plan (NSDP) 2006–10, which was updated to 2009–13.

While the overall aim of NSDP was to reduce poverty and implement the government's Rectangular Strategy, a number of productivity improvement strategies in some sectors of the economy were outlined in NSDP. National Strategy for Agriculture and Water 2006–10 had the primary goals of “enhancing agriculture productivity and diversification and improving water resources development and management”.

Promotion of the private sector as the main engine of economic growth has been the cornerstone of the Royal Government of Cambodia's economic policy from inception, and was reiterated in the Rectangular Strategy. The Cambodia Investment Board of the Council for the Development of Cambodia acts as the focal point to attract and clear private investments in Cambodia.

In Chapter 5 of the Law on Investment of Cambodia promulgated in 1994 and Chapter

5 of the Law on Amendment to the Law on Investment, the government provides incentives, which include the exemption, in whole or in part, of duties and taxes to Qualified Investment Projects to encourage investment in the country. With the aim of attracting FDI, a special economic zone scheme was developed and introduced in 2005. The law on the special economic zone was drafted and placed under the examination of the government. The number of licensed Special Economic Zones was 21, of which six have been actively developed (The Phnom Penh Post) [6].

### PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

Two main productivity organizations in Cambodia are the National Productivity Center of Cambodia (NPCC), supported by the Asian Productivity Organization (APO), and the Garment Industry Productivity Center (GIPC), supported by USAID. The GIPC was established to focus on raising productivity in the garment sector mainly by introducing lean manufacturing to help workers improve techniques in sewing, cutting, etc.

#### National Productivity Center of Cambodia

After Cambodia became a member of the APO in May 2004, the government allowed the establishment of a national productivity unit (NPU), the Cambodian National Productivity Organization, held at an office level under the Industrial Affairs Department of General Department of Industry (GDI). The GDI falls under the jurisdiction of the Ministry of Industry, Mines and Energy (MIME). In order to play a more effective role in productivity development in Cambodia, the government decided to



Table 3. Factors Affecting TFP Growth

Item	Model 1 Coef	Model 2 Coef	Model 3 Coef	Model 4 Coef	Model 5 Coef	Model 6 Coef
Const.	0.786 (0.36)	0.35 (0.14)	-14.01 (-0.46)	-347.32 (-0.98)	-51.72 (-0.26)	4.82* (2.04)
Dln(EDU)	200.1 (0.66)	261.26 (0.77)	242.09 (0.74)	290.53 (0.92)	227.47 (0.68)	100.19 (0.41)
Dln(100*EX/GDP)	-6.347 (-0.57)	3.04 (0.13)	-3.70 (-0.29)	-1.27 (-0.1)	-4.42 (-0.32)	-14.78 (-1.56)
Dln(100*FDI/GDP)	2.517 (0.73)	3.74 (0.84)	3.12 (0.82)	4.04 (1.07)	2.96 (0.74)	2.22 (0.81)
Dln(100*HEALTH/GDP)	5.74 (0.8)	5.91 (0.79)	5.76 (0.77)	5.64 (0.78)	5.90 (0.78)	3.94 (0.69)
Dln(100*EDUEX/GDP)	-19.64 (-1.5)	-16.63 (-1.1)	-18.71 (-1.36)	-18.00 (-1.36)	-19.24 (-1.38)	-14.96 (-1.42)
Dln(100*IM/GDP)	-	-16.30 (-0.47)	-	-	-	-
ln(GDPPERCAPITA)	-	-	2.47 (0.48)	-	-	-
ln(POPULATION)	-	-	-	21.23 (0.98)	-	-
ln(LIFEEXPECTANCY)	-	-	-	-	12.83 (0.26)	-
100*BUDGETSURPLUS/GDP	-	-	-	-	-	1.23* (2.52)
Number of obs	15.00	15.00	15.00	15.00	15.00	15.00
F-statistics	1.32	1.04	1.04	1.25	1.00	2.81
Prob >F	0.34	0.47	0.46	0.37	0.49	0.09
R <sup>2</sup>	0.42	0.44	0.44	0.48	0.43	0.68
Adj R <sup>2</sup>	0.10	0.02	0.02	0.10	0.00	0.44

Note: \*, \*\*, \*\*\* denote significance at 10%, 5%, 1% levels, respectively. Dependent variable is TFP growth rate

upgrade the NPU to a departmental level under the GDI of MIME, by a subdecree that was signed by the Prime Minister of Cambodia in January 2006. The new organization was responsible for the productivity development in Cambodia.

In the subdecree, the NPCC's role and responsibilities are:

- Fulfill the duties and carry out all obligations as a member of the APO
- Communicate and cooperate with other national productivity organizations
- Manage, facilitate, and promote the productivity movement in Cambodia
- Prepare policy, strategy, and other action plans in order to encourage productivity for socioeconomic development along with the policy of the government
- Recommend policies and productivity-quality promotion programs and work effectiveness for the national act
- Recommend national productivity goals by participating in building the national development plan
- Coordinate and cooperate with ministries, relevant institutions, and the private sector to promote labor productivity
- Create and propose productivity concepts according to trends and concepts that are appropriate to the level of socioeconomic development
- Provide consultation and productivity training services
- Promote and support the establishment of private consultation service in the field of productivity management in manufacturing and service
- Promote benchmarking on the productivity level of private enterprise to speed up productivity improvement
- Develop productivity and quality, especially the culture of productivity so as to enhance competitive capacity
- Cooperate with national and international organizations so as to

prepare and implement productivity development projects

- Cooperate with the APO to award qualified entities or persons in productivity development
- To operate under the General Secretariat of Cambodian Productivity Council
- Research, gather, compile, organize statistics and productivity indication, and disclose the productivity information

Today, the NPCC has a total staff of 25 to carry out seven main activities under the support of the APO and other agencies such as the Japan International Cooperation Agency (JICA), ADB, and the International Monetary Fund of the World Bank. The main activities include:

- i. Multicountry workshops
- ii. Multicountry training courses
- iii. Multicountry observational study missions
- iv. National seminars
- v. National training courses
- vi. Company demonstration projects
- vii. Developing, publishing, and distributing productivity promotional materials

These activities are mainly under the APO and JICA programs with a focus on improving food processing activities in the country as well as to develop the agriculture sector.

### **Garment Industry Productivity Center**

The garment industry has been Cambodia's most successful industry. Established in the late 1990s, it grew rapidly under the system of quotas that had been restraining the global textile trade for 30 years and it earned generous quota allocation from the USA for implementing progressive labor policies. It now employs more than 350,000 people and represents nearly 15%

of the economy and 80% of export earnings, amounting to more than USD2 billion a year.

Concerned about the economic repercussions of the end of quotas, USAID and Cambodia commissioned a study to clarify issues and benchmarks to improve the competitiveness of the garment industry. The study identified labor productivity and a general lack of training in production, and the technical aspects of management as weaknesses not addressed by donors and programs (Measuring Competitiveness and Labor Productivity in Cambodia's Garment Industry, Nathan Associates Inc., June 2005). USAID then solicited proposals for productivity training and technical training in Cambodia.

The project was awarded to Nathan Associates Inc., by the Garment Industry Productivity Training Center with straightforward objectives:

- To improve the competitiveness of Cambodia's garment industry by creating a training center that will develop competitive strategies and implement plans for outreach training programs and best practice management systems
- To expand the economic impact of the garment sector and be a model for other industry clusters

## **PRODUCTIVITY MOVEMENT IN CAMBODIA**

Productivity is an action of belief on unlimited betterment, and the productivity movement is the joint effort of all stakeholders, especially from the public and private sectors, and the academic fraternity. The movement has to solicit commitment and active involvement of the government, enterprises, and universities to sustainably increase productivity. Therefore, the awareness, involvement, and commitment from the high leaderships of the mentioned stakeholders are crucial to ensure the success of productivity movement.

Based on the above understanding, NPCC has been engaging Cambodian top leaderships to support and promote the productivity

movement since its start-up. Due to the country's situation and limitation in resources, responsiveness on productivity development was left behind. Though the government had approved the building of a USD1.1 million productivity center in 2006, the project failed to take off as the Ministry of Finance did not have the budget to proceed with the building project. The approval for the building of the productivity center was been moved year by year until 2012.

The productivity movement in Cambodia started with both top-down and bottom-up. From the top, NPCC has tried to create awareness in the public sector via promoting involvement of government officers from related ministries and institutions, enterprises, and academia to participate in the APO annual programs, study missions, seminars, and workshops on productivity concepts, tools, and techniques. NPCC reports to the Prime Minister of Cambodia and sends copies of documents to related ministries while requesting the mass media to disseminate the information.

From the bottom, NPCC has been promoting productivity awareness via building model companies as successful showcases for employers, employees, and general workers at the enterprise level. Cambodia's mass media support has also been active in supporting productivity movement in Cambodia, especially in the dissemination of success stories of enterprises that implement productivity techniques such as 5S and KAIZEN. So far, the 5S and KAIZEN practices are promoted throughout all 24 provinces of Cambodia, even though the awareness is limited due to the lack of intensive promotion of activities.

The productivity movement in Cambodia has been very limited in terms of annual campaign activities, which consisted of only exhibitions that were held in tandem with the MIME exhibitions and the SME associations between three to four times a year. As highlighted, the productivity movement campaign was never implemented nationwide due to budget

constraints. The productivity award system was prepared while initial activities begun in a coordinated way. Progress was achieved steadily, despite the limitation of resources.

The productivity movement in Cambodia is still currently in the awareness stage, although training and specific activities have been implemented through the APO program. This is due to the fact that the productivity concept and practice are still very limited in terms of understanding and lacking on the enterprise level. More vigorous productivity movement programs must be designed and systematically implemented, while all stakeholders, from the public and private sectors to the academia, must be highly conscious with the spirit of ownership. Once achieved, there will be a sustainable productivity movement in Cambodia set to take place in the period of 2013–15 with the joint effort of the GDI, as the productivity movement is already in its agenda.

## **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

In principle, the intervention of the government is to remain committed to “facilitate”. The cost-sharing principle and scheme is the real trend. Efforts to continuously monitor how the market develops are gaining greater relevance as the vehicle of assistance.

As observed, the value chain development approach is gaining momentum among the international donor community. Government assistance would strongly complement this development to maximize the synergistic effects of international assistance.

The government-established NPCC has been providing pilot support activities in the areas of productivity management to the Cambodian SMEs. NPCC has been taking all relevant stakeholders’ policies and strategies into account in order to respond to the matter effectively. Currently, the main stakeholders of NPCC are MIME and the APO, while the Federation of Association for Small & Medium

Enterprises of Cambodia and Chamber of Professional & Micro Enterprises of Cambodia are the main partners to serve the SMEs. NPCC gained further recognition from international donors as an effective institution to implement the Business Development Services (BDS) program in the area of productivity enhancement for SMEs. Consequently, NPCC must be revamped to meet the increasing demands of serving the government’s goals by supporting SMEs and the developing programs of international donors to strengthen the private sector in Cambodia as the country forges its way to a free market economy.

It is important to continue the current activities with concrete strategies to avoid overlapping with other BDS providers and to maximize the results. Further outreach approach in 5S and KAIZEN (in the context of practical needs to achieve Business Excellence) is crucial through pilot support activities and comprehensive capacity building of NPCC staff on company diagnosis and appropriate productivity tools and techniques. The objectives of the two current streams of pilot activities by NPCC and their tasks need to be refined to fit into the nation’s objective and most likely be focused on the area of “Strategic Strengthening of the Small and Medium Enterprises (SME) Support System”.

### **Capacity Building of the NPCC**

Strengthening of core mentors to promote the quality of BDS is essential. The capacity of NPCC as a core mentor ought to be developed to contribute to the SMEs’ development with other stakeholders. It is necessary to continue building capacity for NPCC consultants to be skillful in company diagnosis to ensure its effectiveness and efficiency in providing BDS for SMEs. Green Productivity is fundamental in building the management foundation for SMEs to convince them to acquire more productivity tools and techniques, and to ensure the sustainable development requirement. KAIZEN, with the APO’s Business Excellence manual, is essential for NPCC to meet the demands of SMEs. The NPCC’s skill in providing consultancy on knowledge management is also highly necessary to promote BDS.

### **Reinforcement of Government-Industry-Academia Collaboration**

It is important for the NPCC to work with the academia and BDS facilitators as well as other departments in MIME in the areas of innovation. Possible collaborations with academia and NGOs in regional areas also need to be pursued to meet regional demands for improvement in productivity. Training of trainers' activities through collaboration with BDS facilitators such as Cambodia-Japan Cooperation Center, and collaboration with laboratories and incubation centers such as Industrial Laboratory Center of Cambodia are also effective in promoting the quality and range of BDS.

### **Consideration of Standardized Criteria for Certification and Accreditation of Consultancy and Criteria for Business Performance**

The future role of NPCC is set to go on to the next level, which is certification and accreditation of consultancy (consultant, service, and qualification of standards). However, other possible criteria have to be considered and discussed. Some of the applicability of criteria can be verified through pilot activities and related forums organized by the NPCC. Future collaborations with JICA will look into shaping these programs.

The NPCC should be able to provide services to meet the developmental needs of the Cambodian SMEs. So far, the vision, mission, and strategies of the NPCC have been prepared by adjusting the duties, tasks, and future activities to support GDI in providing BDS to SMEs while ensuring the complement effect among ministries. Therefore, the vision, mission, and strategies of the NPCC have been aligned to the strategic direction and strategies of the APO for both medium- and long-term plans to support the industrial development strategies of GDI.

### **REFERENCES**

[1] World Bank. Cambodia: Halving Poverty by 2015? Poverty Assessment 2006. Washington DC: World Bank Printer; 2006.

- [2] World Bank. World Bank calls for renewed emphasis on agriculture for development (press release No: 2008/080/DEC). <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21513382~pagePK:64257043~piPK:437376~theSitePK:4607,00.html>, assessed in May 2013.
- [3] National Institute of Statistics, Government of Cambodia. Cambodia Statistical Yearbook. Phnom Penh: Government Printer; 2008.
- [4] Barro R., Lee J-W. A New Data Set of Educational Attainment in the World, 1950-2010. <http://www.barrolee.com>, accessed in September 2012.
- [5] Easterly W., Levine R. It's not factor accumulation: stylized facts and growth models. *World Bank Economic Review* 2001; 15 (2): 177-219.
- [6] Phnom Penh Post. SEZ growth slows down as economic crisis hits. 20 March 2013.

---

# REPUBLIC OF CHINA

DR. TSU-TAN FU

**Professor**

Department of Economics, Soochow University

**Research Fellow**

Institute of Economics, Academia Sinica  
Soochow University

**Associate Professor**

Department of Applied Economics  
National Chiayi University

DR. YIH-MING LIN

---

## INTRODUCTION

Republic of China (ROC) has experienced remarkable economic growth since the 1960s. Its rapid growth extended to the next two decades - the 1970s and 1980s. The GDP growth rate was as high as 9.48% in the 1960s, 9.27% in the 1970s, and 7.35% in the 1980s. ROC's success story on economic growth may be attributed to appropriate industrial policies taken by the government at different developmental stages. Right after World War II, the government adopted important substitution policies to promote light industries such as textile in the early 1950s. In the 1960s, the light industries grew rapidly due to the government's export promotion policy. Another round of industrialization was initiated to develop capital and technological intensive industries. Heavy industries were launched in the 1970s and became a dominant player in the following decade. In 1980, the government of ROC set up the Hsinchu Science Park for high-tech industries. Its policies in subsidizing R&D and sponsoring cooperative researches have helped to heighten the rapid technological progress in the republic's high-tech industries, which grew quickly in the 1980s and became the dominant industry in the 1990s [1].

ROC's economic growth slowed down in the late 1990s and became sluggish in the 2000s as a result of a sequence of negative impacts from the Asian financial crisis in 1997, worldwide economic recession in 2000, the Lehman financial tsunami in 2008, and the current financial debt in Europe. In addition,

strong competition from newly industrialized and emerging economies also deprived the profit margin of the Taiwanese ICT industries. The GDP growth rate of ROC dropped to 3.76% during 2000–08. In recent years, to accommodate the declining market demand and losing competitiveness, the government attempted to strengthen all manufacturing and service sectors with innovative activities to further improve its productivity.

Growth accounting can identify the source of growth for an economy. ROC's 50 years economic development has been dynamic. Thus, it will be interesting to investigate the key drivers behind ROC's diversified economic performance in the said time period. Productivity has often been regarded as the main engine for long-term economic growth. It is also equally important to examine the major factors affecting the changes in productivity growth in the past decades. Qualitative description of major productivity policies and movements taken in the ROC under different time periods is also provided before discussing the issues and challenges in improving future productivity.

## PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

The growth rates of GDP, labor productivity, and Total Factor Productivity (TFP) of ROC from the 1970s to 2000s are summarized in Table 1. The GDP growth in Table 1 indicates that ROC experienced high economic growth in the 1970s and 1980s. However, the GDP growth slowed down since the late 1990s, dropping to 6.01% in 1990s and less than 4% from 2001–08.

Table 1: Growth of GDP, Labor Productivity, and TFP of ROC from 1971–2008

Period	GDP	Labor Productivity		TFP
		Hour	Employment	
1971–80	9.27	5.75	5.75	0.93
1981–90	7.35	5.25	5.25	2.28
1991–2000	6.01	4.85	4.86	1.49
2001–08	3.76	3.24	3.24	1.14
1971–2008	6.75	4.86	4.86	1.48

Source: Asian Productivity Organization (APO) [2]

In terms of productivity change, two types of productivity measures were investigated - labor productivity and TFP. The time series data of TFP and labor productivity index (index 2000=1) is illustrated in Figure 1. One finds that both TFP and labor productivity index increased steadily over time, but the magnitude of labor productivity growth has been higher than TFP growth in the last few decades.

Further, the trend of labor productivity is similar to that of GDP growth. The average labor productivity growth rate is 4.86% for the whole sample period, which is less than the GDP growth rate of 6.75%. Similarly, the labor productivity growth rate had decreased over time. It was 5.75% in the 1970s and further

declined to 3.24% in the 2000s. The TFP growth rates also varied from period to period. In the 1970s, the average TFP growth rate was less than 1%. However, it jumped up to 2.28% in the 1980s and decreased gradually since 1990s. In summary, we find that the ROC's economy might enter into a state of convergence in terms of potential growth following the hypothesis of income convergence.

In Table 2, the GDP growth account is broken into components, labor productivity growth, capital growth, and TFP, which illustrates the growth accounting and sources of economic growth in ROC. It was found that the main driver of the ROC economic growth is capital accumulation, especially the non-IT capital accumulation.

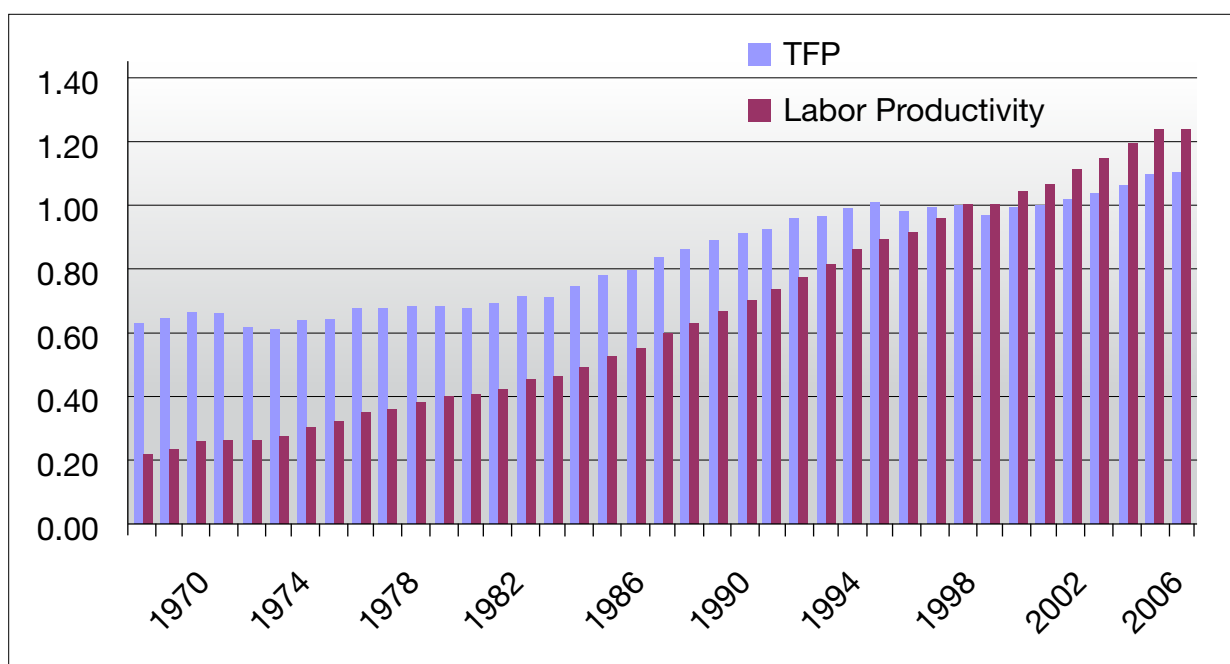


Figure 1. Trend of Labor Productivity and TFP

Table 2. Growth Accounting and Sources of Economic Growth in ROC

Period	GDP	Capital	IT Capital	Non-IT Capital	Labor	TFP
1971–80	9.27	6.32	0.46	5.86	2.03	0.93
1981–90	7.35	3.81	0.35	3.46	1.26	2.28
1991–2000	6.01	3.82	0.56	3.25	0.70	1.49
2001–08	3.76	2.35	0.41	1.94	0.27	1.14
1971–2008	6.75	4.16	0.45	3.72	1.10	1.48
Contribution (%)						
1971–80	100.00	68.11	4.94	63.14	21.84	10.06
1981–90	100.00	51.85	4.69	47.12	17.12	31.04
1991–2000	100.00	63.54	9.36	54.13	11.66	24.80
2001–08	100.00	62.56	10.98	51.65	7.08	30.35
1971–2008	100.00	61.72	6.61	55.09	16.37	21.91

Source: APO [2]

The contribution of capital input to GDP growth has been over 60% for the last 40 years, except in the 1980s when it was recorded at 52%. The contribution of non-IT capital accounts for 55% of GDP growth, whereas IT-capital accounts for 6.61% during 1971–2008. However, the contribution of IT-capital to GDP growth was found to be increasing over time.

The contribution of TFP to GDP growth was 21.91% during 1971–2008. Table 2 shows that TFP contribution became much more important since 1980, which compensated the decrease of labor input contribution. Therefore, it can be concluded that the main source of the republic's economic growth in the past decades came from capital accumulation, and the contribution of TFP to growth has shown to be increasingly important.

Table 3 shows the breakdown of labor productivity growth in ROC. During the whole sample period, the labor productivity growth rate was 4.774%, of which capital deepening accounts for 70% and TFP for the balance 30%. Among capitals, non-IT capital accounted for the largest accumulation. This is consistent with the results in Table 2.

Figure 2 shows the trend of labor productivity growth, TFP growth, and capital deepening. The labor productivity growth rate and capital deepening were positive, but they decreased gradually. Some specific periods showed negative TFP growth such as the oil crises in the 1970s and 1980s as well as the SARS outbreak beginning 2003. The capital deepening was also smoother and steadier than the TFP growth rates. Furthermore, the TFP growth is also smaller than the capital deepening in average.

#### FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGE

In order to understand the productivity growth for the past several decades in the ROC, the driving forces or policies affecting productivity performance using regression analysis were identified. TFP growth rate and labor productivity growth rate were the two main productivity measures employed in this regression analysis. Education attainment (EDUyear), R&D intensity (R&D/GDP\_1), export intensity (Export/GDP), share of FDI to GDP (FDI/GDP), share of governmental consumption to GDP (GOV/GDP), and the ratio of population with college or higher education (EDUratio) are



Table 3. Growth of Labor Productivity, Capital Deepening, and TFP of ROC from 1971–2008

Period	Labor Productivity	Capital Deepening	IT Capital Deepening	Non-IT Capital Deepening	TFP
1971–80	5.755	4.820	0.397	4.423	0.935
1981–90	5.248	2.965	0.305	2.663	2.281
1991–2000	4.855	3.365	0.532	2.831	1.492
2001–08	3.240	2.060	0.434	1.627	1.298
1971–2008	4.774	3.303	0.417	2.886	1.501
Contribution (%)					
1971–80	100.00	83.76	6.90	76.86	16.25
1981–90	100.00	56.50	5.81	50.75	43.47
1991–2000	100.00	69.31	10.96	58.31	30.73
2001–08	100.00	63.58	13.40	50.22	40.06
1971–2008	100.00	69.17	8.74	60.45	31.45

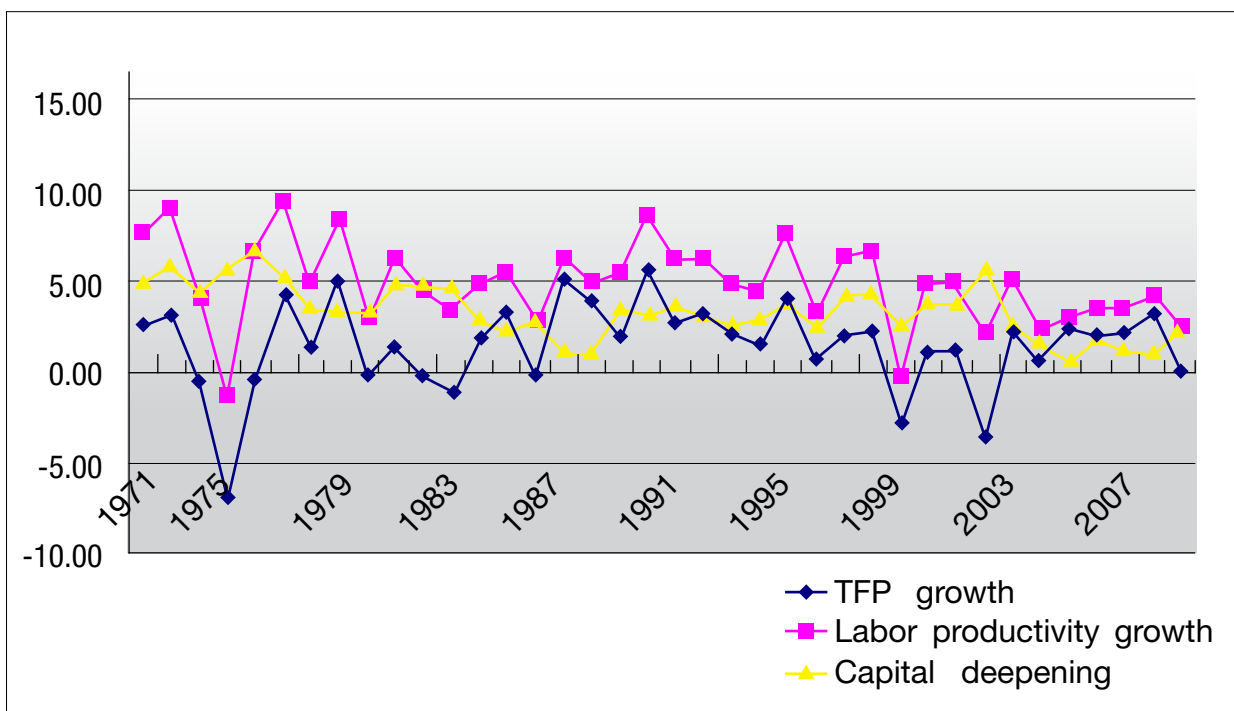


Figure 2. Trend of Labor Productivity Growth, TFP Growth, and Capital Deepening

explanatory variables. Since R&D has lagged impact on productivity changes, it was used as an explanatory variable was used. Due to the availability of R&D data from 1980, the sample period for this regression is from 1980 to 2008. The estimation results are illustrated in Table 4.

As shown in Table 4, the estimates of coefficients of R&D intensity (R&D/GDP\_1) and export intensity (Export/GDP) were positive and statistically significant. The estimated results indicate that the R&D and export intensity were the main driving forces affecting TFP

Table 4. Regression Analysis of TFP and Labor Productivity Growth in ROC from 1981–2008

Item	TFP Growth	Labor Productivity	TFP Growth	Labor Productivity
Export/GDP	43.550** (18.426)	16.094 (17.011)	39.944** (18.285)	12.881 (16.934)
Ln(FDI/GDP)	-0.945 (1.343)	0.291 (1.240)	-1.487 (1.380)	-0.192 (1.278)
Ln(GOV/GDP)	0.121 (4.485)	1.647 (4.141)	-0.904 (4.469)	0.734 (4.139)
Ln(R&D/GDP_1)	14.570* (7.240)	8.810 (6.684)	20.031** (8.207)	13.676* (7.601)
EDUyear	2.285 (5.177)	-0.120 (4.779)	2.658 (5.088)	0.213 (4.713)
EDUratio	-1.133 (0.756)	-0.523 (0.698)	-1.225 (0.745)	-0.605 (0.690)
Dummy_80	-	-	3.388 (2.549)	3.019 (2.360)
Constant	-27.514 (41.480)	8.605 (38.295)	-34.990 (41.094)	1.944 (38.059)
R <sup>2</sup>	0.292	0.290	0.352	0.346
OBS	27.000	27.000	27.000	27.000

Note: The numbers in parentheses are the standard errors of the estimates. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% confidence levels, respectively. Export/GDP: share of export to GDP; FDI/GDP: share of foreign direct investment to GDP; GOV/GDP: share of government consumption to GDP; EDUratio: population with college or higher education ratio; EDUyear: average schooling year adopted from Barro and Lee [3]; Dummy\_80: dummy variable for period of 1980s

growth rate. Table 4 also showed that the share of governmental consumption to GDP (GOV/GDP) and education attainment (EDUyear) were positively related to TFP growth rate but not statistically significant.

Table 4 highlights that R&D intensity is the most important determinant of labor productivity growth rate, in which the estimate of R&D intensity coefficient is positive and statistically significant. The other explanatory variables such as the education attainment (EDUyear), export intensity (Export/GDP), and share of governmental consumption to GDP (GOV/

GDP) are positively related to labor productivity growth but not statistically significant.

In summary, it can be concluded that the R&D intensity and export intensity are the most important driving forces to ROC's productivity growth. The results indicate that R&D investment is an effective tool to improve productivity. Export or trade opening promotion also helps international technology diffusion, which results in productivity growth. These results are consistent with ROC's government policies, encouraging firms to pay more attention to R&D and promote openness of the world trade market.

## PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

### Science and Technology (S&T) Development Organizations and Policy Formation

Most of the productivity movements in ROC have been closely tightened with government policies or plans related to scientific and technological development. The S&T development organizations take the lead in initiating industrial development policies, strategies, and plans, whereas policy implementation is undertaken by the government, S&T organizations as well as assisted by the China Productivity Center (CPC) for the private sector. ROC's S&T development organizations consist of promotion agencies, implementation agencies, and planning and assessment systems.

#### *Promotion Agency*

The primary mission of the National Science Council (NSC) consists of drafting scientific and technological development policies, strategies, and programs for mid- and long-term plans. The NSC is responsible for planning and implementing basic research and pioneering applied research. The organization is also involved in improving the research environment, training, recruiting, and utilizing manpower as well as being in charge of coordinating, delivering, controlling, and evaluating major S&T projects performed by other government agencies.

#### *Implementing Organizations*

The central implementation agencies for fundamental and pioneering applied research are Academia Sinica (academic institution), other domestic universities, and academic institutions. The chief research institute for applied research and technology development is the Industrial Technology Research Institute. Product development and commercialization research is primarily done by public and private companies.

#### *Planning and Assessment System*

To make effective use of the limited resources

in S&T development, the government has not only established S&T development policies and key points, but has also assessed mid- to long-term projects under planning and implementation, and completed evaluations of R&D performance. The three stages - planning and review, implementation and control, and result evaluation - have become important functions, which sees to the application of S&T project planning and assessment systems into national development.

#### **Nonprofit Productivity Organization: CPC**

Established in 1955, the CPC is a private nonprofit productivity organization. The service provided by CPC focuses mainly on the promotion of productivity-related concepts, practices, and trainings to firms in the private sector. As CPC's mission is to bridge the government and firms by implementing the government's industrial policies and development plans, the services provided by CPC also vary at different developmental stages of ROC. The main productivity movements promoted by the CPC in the last few decades can be briefly described in the following chronological order.

In the 1950s, the government implemented the first four-year economic plan to transform ROC from an agrarian society to an industrial economy. In the 1960s, the government's development strategy was to promote export-oriented and import-substitution industries. To facilitate its development goals, CPC offered various types of quality control and product promotion courses and services to help companies raise their productivity.

In the 1970s, with the successful industrialization practice in place from the previous decades, the ROC government shifted its main strategy to promote automation production technology. The focus of CPC in this period was to promote the concept of cost reduction, and foster good techniques and training in automation.

In the 1980s, ROC established the Hsinchu High-Tech Park in 1980 in its effort to promote the ICT industry and become an industrialized nation

by 2002. Pursuing these goals, CPC undertook the government's National Quality Promotion projects and dedicated its efforts to assisting companies to raise quality comprehensively. In its 15 years of quality promotion movement, CPC had successfully cultivated over 25,000 quality control professional experts; about one-third of its total experts are found in industries, and the organization had consulted and advised about 1,500 private enterprises.

In the 1990s, the industries entered the fiercely competitive era of globalization, and CPC helped companies achieve thorough improvements in their competitiveness. In addition to the manufacturing industries, CPC also assisted in promoting service quality and improving business operational technology to enhance the competitiveness of service industries.

With the advent of the knowledge-based economy of the 21st century, CPC had assisted the government in introducing and diffusing new knowledge management concepts and technologies to firms, and led enterprises in creating value and raising their capacity for knowledge innovation. The promotion of knowledge innovation and R&D investment also extended to traditional industries by CPC to enhance the firm's technology improvement as well as to adjust the firm's production technology and structure to improve competitiveness of whole industries.

## **ISSUES AND CHANGES IN IMPROVING PRODUCTIVITY**

The drivers of economic performance and productivity growth will depend upon the development stage of each country. ROC has become a knowledge-based economy since 2000, and will rely on innovation as the major driving force for sustainable productivity growth in the coming decades. To ensure ROC becomes an innovation-driven economy, several conditions must be fulfilled in order to develop a suitable operational environment so as to facilitate the capacity of its many

drivers. Among them, investments poured into knowledge capacity, including R&D and human capital, as they are the key for innovation development.

Declining labor force has become one of the major factors that affect productivity growth of ROC, confronting a rapidly declining trend in birth rate and the predicted negative employment growth in the next 10 years. Therefore, the economic growth in the next few decades will depend upon the increase of labor productivity. However, as discussed earlier, ROC's labor productivity growth rate was found to decrease over time. One of the country's challenges is to find ways to improve labor productivity in the future. The labor productivity regression results have indicated that R&D investment is crucial to its growth. Thus, investments on R&D and human capital, especially on higher education, will be important to foster the capacity for innovation and improve labor quality and productivity.

ROC's R&D intensity the last decade was found to exceed the OECD average, but the foreign share of R&D found to be much lower than some small, advanced countries. Therefore, effectively attracting foreign R&D with advanced technologies to invest in ROC is an important challenge. As for human capital investment, in recent years, ROC has also confronted a serious outflow of high-quality labor, which may result in a decrease in innovation capacity and industrial competitiveness. To avoid such deterioration of manpower in knowledge creation and capacity for innovation, ROC needs to provide effective incentives such as high-wage compensation and good working and living environments to keep and attract top- and world-class quality domestic and foreign labors to stay in ROC.

Another issue faced by labor productivity is that service is a dominant sector in ROC, but labor productivity in the service industry has shown to be significantly lower than those in other sectors, which caused low labor productivity

at the national level. So, the challenge is to increase labor productivity in the service industry. It would be important to develop effective business or management models to improve productivity in the service sector. Since ROC has a well-known advantage in ICT, one way to improve labor productivity in the service sector is to assimilate and enhance ICT software applications. The contribution of ICT-employed sectors in total industries in ROC's labor productivity (21.43%) has been much lower than that of the USA (34.94%) and Japan (48.48%) during 2002–08. Therefore, ROC has a large capacity to improve its labor productivity by promoting ICT applications in the service industry.

Last, but not least, the challenge is how to succeed in seeking international or regional trade and investment cooperation, and avoid the negative impacts of international and regional trade blocks on ROC's product trade. For an international trade-oriented economy such as ROC, becoming a member of the international, regional trade blocks, or organizations will be crucial to its economic and productivity growth in the future.

## REFERENCE

- [1] Chu W-W. Productivity growth and industrial structure: The case of Taiwan. Paper presented at the Pacific Economic Outlook specialist meetings, Osaka, Japan, 1999.
- [2] Asian Productivity Organization. APO Productivity Data Book 2011. Tokyo: Asian Productivity Organization; 2011.
- [3] Barro R.J., Lee J-H. A new data set of educational attainment in the world, 1950–2010, NBER Working Paper No. 15902; 2010.

**INTRODUCTION**

Fiji has been a member of the Asian Productivity Organization (APO) since 1984 and has continually restructured to be effective as a national productivity organization (NPO). Over the years, the approaches used to promote productivity have evolved and continue to be reviewed on an annual basis.

The APO is commended for reviewing its thrust areas and the programs offered, ensuring that the resources available are sufficient and in line with the needs of the NPO. The NPO values the outstanding contributions the Technical Expert Services programs and the Observation Study Missions have been making in the development of productivity in Fiji.

Fiji has a relatively high level of human resource development. Its multiethnic population of approximately 800,000 is growing slowly due to a moderately low level of fertility and a high level of emigration. The economy rests primarily on tourism, but is becoming more diverse with manufacturing, now an important sector of employment.

**PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS**

Fiji's GDP at constant prices of 2005 grew at 0.3% in 2010. This was an absolute increase of 1.6% from 2009 when the growth was -1.3%. GDP was approximately at FJD4,372.8 million for the calendar year 2010. Of this, FJD381.9 million or 8.7% was contributed by nonmonetary production - that is, from the own account activities in the agriculture, fishing and forestry sector, construction sectors, and the notional-owner occupied dwellings in the real estate sector. When compared to 2009, GDP in 2010

showed an increase of FJD13.9 million. Per capita GDP at constant prices for 2010 was FJD5,156.2 compared to FJD5,168.2 in 2009 [1].

The GDP growth rate fluctuated from 1970 to 2010 and slowed in recent years, but looked promising in the 2010. The economy grew in 2010, from a -1.3% growth in 2009 to a 0.3% growth. However, the consumer price index was high for the same period. The inflation rate was at 5% in December 2010. The GDP growth of Fiji from 1970 to 2008 was mainly attributed to the growth rate of capital and labor. Table 1 shows that labor was the major driver of GDP growth from 1970–95, whereas capital (especially non-IT) growth played a major role in GDP growth in the period after 1995.

Transport, storage, and communication sector contributed most to the GDP. In 2010, it accounted for 15.6%, followed by manufacturing sector at 15%, and wholesale and retail sector at 11% of the GDP.

Reference is made to the period between 1970 and 1980 (Table 1), where the output was found to be quite strong even when Total Factor Productivity (TFP) was negative, signifying that other factors may have had a role in boosting the output. In 1975, Fiji signed and agreed upon the bilateral long-term agreement, the Sugar Protocol of the Lomé Convention. Due to this, the growth rate trend averaged around 5.62%.

The major devaluation of the Fiji currency by nearly 30% in 1987 rejuvenated the export market due to the fact that internationally Fiji's commodities were cheaper to buy. This trend is evident as the TFP and output grew significantly.

Table 1. Output Growth and Contributions of Labor Capital and TFP from 1970–2008

Period	Output	Labor	Capital		TFP
			IT	Non-IT	
1970–75	5.62	4.15 (74%)	1.11 (2%)	2.15 (38%)	-0.79 (-14%)
1975–80	3.69	2.85 (77%)	0.07 (2%)	2.41 (65%)	-1.63 (-44%)
1980–85	0.71	1.47 (207%)	0.09 (13%)	1.79 (252%)	-2.65 (-373%)
1985–90	3.76	1.72 (46%)	0.14 (4%)	0.28 (7%)	1.62 (43%)
1990–95	2.65	1.55 (59%)	0.19 (7%)	0.24 (9%)	0.67 (25%)
1995–2000	2.05	0.51 (25%)	0.19 (9%)	1.29 (63%)	0.06 (3%)
2000–05	1.99	0.24 (12%)	0.35 (17%)	1.29 (65%)	0.11 (5%)
2005–08	0.43	1.03 (239%)	0.30 (70%)	1.43 (332%)	-2.33 (-542%)
1970–2008	2.73	1.72 (63%)	0.17 (6%)	1.36 (50%)	-0.53 (-19%)

Source: APO [2]

Unit: Average annual growth rate (%)

It was also found that the relationship between TFP and trade was positive and significant. Although there may be other significant factors such as bilateral agreement, weather, and political instability playing a role in trade, it can be concluded that TFP played a key role in trading.

Although there is no guarantee of long-term bilateral agreements, productivity is a tool of constant improvement that can be controlled, and unlike bilateral agreements, can be enduring. Focus was shifted in both improving

the capital and labor efficiencies so that goods are of high quality. In this regard, various productivity tools were introduced at sectoral levels.

This strategy has been favorable for the export market, which improved the level of competitiveness. The quest for success encouraged a focus on improving labor productivity.

However, the average growth rate of labor productivity of Fiji from 1970–2008 was 0.23%

Table 2. Role of TFP and Capital Deepening in Labor Productivity Growth from 1970–2008

Period	Labor Productivity	Capital Deepening		TFP
		IT	Non-IT	
1970–75	-0.48	-0.06 (12%)	0.37 (-78%)	-0.79 (166%)
1975–80	-0.53	0.01 (-1%)	1.09 (205%)	-1.63 (307%)
1980–85	-1.22	0.08 (-6%)	1.36 (111%)	-2.65 (217%)
1985–90	1.38	0.11 (8%)	-0.35 (-25%)	1.62 (117%)
1990–95	0.25	0.15 (60%)	-0.57 (-230%)	0.67 (270%)
1995–2000	1.38	0.17 (13%)	1.14 (83%)	0.06 (5%)
2000–05	1.61	0.34 (21%)	1.16 (72%)	0.11 (7%)
2005–08	-1.03	0.27 (-26%)	1.03 (-100%)	-2.33 (225%)
1970–2008	0.23	0.13 (54%)	0.64 (274%)	-0.53 (-228%)

Source: APO [2]

Unit: Annual average growth rate (%)

(Table 2). This growth average was significantly low, indicating poor efficiency of labor and skills. The overall impact of this low productivity had a considerable effect on the quality of goods and services.

The NPO had a significant contribution to the development of human capital through workshops, training, and skills motivation programs. However, the challenge to replace the skilled workforce lost through migration was still contributing to the overall slow catch-up factor.

Development of labor for economic growth required institutions to restructure its policies in line with productivity improvement accessing niche markets. In this regard, institutional strengthening such as Investment Fiji is important to reform trade openness, as it encouraged the flow of technology to business sectors and organizations.

## **FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES**

Fiji's life expectancy is high for both women (71 years) and men (67 years). Infant, child, and maternal mortality rates have been reduced since the 1970s and are now low. There was a 97.6% literacy level - almost universal primary school enrollment - and around 81% of adolescents completed tertiary education in 2010, up from a small minority a generation ago.

These achievements have come about through the combined efforts of the whole community. NGOs and other community bodies operate most of the schools and many of the welfare and community development organizations. Since independence in 1970, successive governments have given priority to equal development, economic growth, and developing human resources through expanded health and education services.

The government introduced a very crucial scheme to encourage skills enhancement and improve labor productivity. In 1973,

the government, through the parliament, established the Fiji National Training Council (FNTC) and introduced a Levy and Grant Scheme. Under this scheme, all employers were required to pay a levy of 1% to FNTC. The fund is to be utilized to provide training to employees nominated by employers. An organization is eligible to claim grants up to a maximum of 90% of their levy contribution each year for training their employees. Grant calculation is based on each organization's extent of compliance to the criteria set by FNTC.

Over the years, the criteria have been continuously reviewed to ensure that the assessments are aligned to the changing industry training needs. At the same time, there were changes in the administration body for the scheme. In 2002, FNTC was reorganized as the Training and Productivity Authority of Fiji (TPAF), and then in 2010, it merged with the Fiji National University (FNU). Currently, the National Training and Productivity Centre (NTPC) administers this scheme for the FNU. The composition of the NTPC board is tripartite in nature.

A number of other policies have also been introduced by the government to enhance productivity. One significant contribution was the acceptance of the Millennium Development Goals. This declaration was ratified by 189 heads of states in 2000, aimed at making globalization a more positive force for the world's population. The following eight goals were undertaken:

- i. Eradicate extreme poverty and hunger
- ii. Achieve universal primary education
- iii. Promote gender equality and empower women
- iv. Reduce child mortality
- v. Improve maternal health
- vi. Combat HIV/AIDS, malaria, and other diseases



- vii. Ensure environmental sustainability
- viii. Develop a global partnership for development

From the 1970s, education facilities expanded and improvement in the literacy rate contributed significantly toward labor productivity growth over this period. Table 3 reflects a significant relationship between the level of education and labor productivity. The government introduced subsidized bus fares to needy students in addition to its free education program initiated earlier.

Health services have also significantly improved with an expectation of continuous growth. Over the recent decades, there has been a fundamental shift in lifestyles, and the decrease in deaths from infectious diseases has been diametrical to the increase in deaths from noncommunicable diseases. There was an increased vulnerability to poverty due to a decline in economic growth and high levels of inflation. Rural population migrated to urban centers and many skilled people left for other countries.

Fiji, as a small country with an open economy, is highly dependent on international trade. Any changes in foreign trade, either through recession, international demand, and internal fiscal and monetary policies will greatly affect exports, imports, and economic growth. Trade has become an integral part of Fiji's economic growth and any improvement would raise the standard of living [3]. The relationship between exports and labor productivity growth is significant (Table 3). In strengthening the existing labor productivity, it would be prudent to monitor and control foreign technology transfer due to trading.

In September 2007, the interim government of Fiji decided to launch a national initiative to Build a Better Fiji for All through the Peoples Charter for Change, Peace and Progress (PCCPP), with a recommendation to the president for an establishment of a National Council for that purpose. The president officially launched the Peoples Charter initiative on 10 October 2007 and took steps to establish a 45-member National Council for Building a Better Fiji (NCBBF).

Table 3. Regression Tests for Labor Productivity

Variable	Coefficient	Standard Error	T test
Intercept	65.1788	2.0171	32.31*
Average School Year	-5.9494	0.2671	-22.27*
Export	0.2061	0.0490	4.20*
FDI	-0.1601	0.0609	-2.62*
Government Expenditure	0.0890	0.0876	1.01
Adjusted R <sup>2</sup>	0.95	-	-
Observation	40	-	-

Source: Barro-Lee [4], Fiji Bureau of Statistics [5], Reserve Bank of Fiji [6], and Investment Fiji [7]

- Note: i. Average School Year is defined as: average years of schooling among the total population aged 15 years and above; Export is defined as: total domestic exports and re-exports as a percentage of GDP; FDI is defined as: FDI as a percentage of GDP from 2000–10 and investment prior to 2000; Government Expenditure is defined as: the central government final consumption expenditure as a percentage of GDP
- ii. \* means estimated coefficient to be significant at 5% statistical level

Table 4. Regression Tests for TFP

Variable	Coefficient	Standard Error	T test
Intercept	-2.7071	0.9315	-2.91*
Average School Year	0.6840	0.1234	5.54*
Export	0.0306	0.0227	1.35*
FDI	-0.0355	0.0282	-1.26*
Government Expenditure	-0.1629	0.0405	-4.02
Adjusted R <sup>2</sup>	0.56	-	-
Observation	40	-	-

Source: Barro-Lee [4], Fiji Bureau of Statistics [5], Reserve Bank of Fiji [6], and Investment Fiji [7]  
 Note: i. Average School Year is defined as: average years of schooling among the total population aged 15 years and above; Export is defined as: total domestic exports and re-exports as a percentage of GDP; FDI is defined as: FDI as a percentage of GDP from 2000–10 and investment prior to 2000; Government Expenditure is defined as: the central government final consumption expenditure as a percentage of GDP  
 ii. \* means estimated coefficient to be significant at 5% statistical level

The NCBBF membership consisted of representatives and leaders of all major organizations (community, social, civic, religious, business, political) in the country and were to work independently of the interim government. The NCBBF resolved to prepare a comprehensive, fact-based, diagnostic, forward-looking report on the State of the Nation and the Economy (the SNE Report).

- To strengthen institutional arrangements by centralizing decision making and decentralizing the delivery of health care
- To merging various educational institutions for efficient utilization of resources
- Government to provide school fees and bus fares for needy students
- Budget announcements were aligned to PCCPP to boost the economy

The forward-looking SNE Report provided a list of recommendations for changes to the system of government, constitution, laws, economic and resources development policies, leadership values, community relations, and institutional reforms. The NCBBF also prepared a draft of the Peoples Charter drawing upon the findings and recommendations contained in the SNE Report and also the feedback obtained through the NCBBF's outreach activities and consultations undertaken throughout the country.

Total government expenditure increased significantly over the years with specific attention given to primary education, rural and public health, and rural water supplies. The government reduced its operating expenses significantly by restructuring the public-service reform and putting emphasis on the quality of services. Table 4 shows a significant relationship between TFP and government expenditure and the level of education.

Based on the PCCPP, some of the following measures and actions were taken:

- Electoral systems were reformed to include reducing the voting age from 21 to 18 years
- To increase financing as a proportion of GDP by 0.5% annually to 7% within the next 10 years

Fiji is affected by the lack of TFP growth due to the concentration of advancements in the manufacturing sector. The introduction of incentives for investment in the service sector that can capitalize on the technological advancements would bring significant gains.

## PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

Since 1973, the FNTC and TPAF have been responsible for promoting productivity in the country. However, in a later development, the government of Fiji formed the FNU, merging six state-funded tertiary institutions: The Fiji Institute of Technology, Fiji School of Medicine, Fiji School of Nursing, Fiji College of Advanced Education, Lautoka Teachers College, and Fiji College of Agriculture. At the end of November 2010, the TPAF (former NPO) also merged with FNU and a new centre, the NTPC, was formed.

The NTPC is the national productivity organization (NPO) of Fiji and is an important centre of the FNU that administers the Levy and Grant Scheme to encourage employers to develop human resource and promote continuous improvement. Over the years, FNU has managed the National Apprenticeship Training and National Trade Testing schemes. At the same time, NTPC also developed the capacity to offer training and consultancy services in various disciplines targeted at improving productivity, performance, and competitiveness of all businesses in Fiji.

FNU is oriented toward technical and vocational training, with a focus on opportunities for entrepreneurship and self-employment, and the NTPC's training departments are strategically located at various sites. The NPO is tripartite in nature governed by an NTPC board comprising the government, employers, and employee representatives. The NPO serves the industry, government as well as civil society through its range of services.

Fiji has been a member of the APO since 1984 and has since has been able to seek expertise from various member countries under their respective programs. The APO's contribution has been noted in the development of the Productivity Charter in 1995 (revised in 2005 and 2012 through the Round Table Conference). Appendix 1 shows the program of action in the charter and achievements.

FNU coordinated various programs in the last 10 years (Appendix 2). In addition, a number of other programs were organized via e-learning services.

There are a multitude of players involved in promoting the economic development of Fiji as well as those that impact SMEs. These include invariably all governmental departments, statutory authorities, trade promotion agencies, economic development agencies, financial institutions, SME promotion agencies, development and commercial banks, etc. [8].

In addition to the NPO, the Ministry of Labour, Industrial Relations and Productivity has been very instrumental in the promotion of productivity. The permanent secretary for the ministry is the liaison officer for Fiji. The ministry has established a productivity section, which is involved in promoting and measuring productivity for public service. At present, the ministry is working on the implementation of productivity-based wage system.

Some of the key governmental institutions include:

- Investment Fiji
- Ministry of Trade and Commerce
- Ministry of Agriculture, Fisheries and Forestry
- Ministry of National Planning
- Ministry of Local and Regional Development
- Ministry of Tourism
- Ministry of Lands and Mineral Resources
- National Centre for Small and Micro Enterprises Development
- National Employment Centre
- Ministry of Cooperatives and Small Business Development
- National Handicraft Centre
- Fiji Development Bank
- Reserve Bank of Fiji
- Commercial banks

The government ministries and institutions are assigned with delivering their designated mandate and help motivate, incentivize, and provide assistance to the SMEs in promoting

economic development as well as to regulate the market and facilitate the creation of an enabling environment for business and economic development. The government is embarking on inclusive development for attainment of sustained economic development that can be achieved through redirecting resources to productive areas.

The Ministry of Finance and National Planning in collaboration with other ministries coordinate the development, implementation, and monitoring of the Strategic Development Plan. SMEs are mostly assisted by the Ministry of Trade and Commerce. However, this responsibility is spread throughout several government ministries, which communicate with specific constituencies regarding financial and technological support. The government also provides a platform for sustainable development by improving security and maintaining law and order. It also ensures that structural reforms are undertaken to promote competition.

Banks, through the provision of funding, play a crucial role in promoting the economy by creating various products and services to foster the economic development agenda of the government. These include mobile money services, SMS banking services, financial literacy programs, and the setting up of the National Financial Inclusion Taskforce (NFIT) with the support of the Reserve Bank of Fiji in strengthening microfinance through appropriate policies.

Several regional and multilateral agencies are also actively engaged in promoting economic development through funding, research, outreach, entrepreneurship, training, SME development, and supporting productivity and innovation. All donor programs and projects focus on areas that reflect the defined sectors and national priorities: education and training, health, community development, economic reform and governance, law and justice, ICT, and infrastructure.

The universities in Fiji provide for and facilitate innovation. They are involved in promoting economic development through human resource and skills development by providing the faculties and facilities for innovation and business incubation. Through collaborative arrangements, universities assist in product development, testing, packaging, preservation, and logistics. The NPO also complements this role by providing training and promoting quality, standards, and innovation.

## **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

A number of projects and productivity movements did not do well due to many challenges. In early 2002, a study mission on productivity measurement was sent to Malaysia and participants were expected to be involved in the ongoing project. A committee was established, involving the Reserve Bank of Fiji, Bureau of Statistics, Ministry of National Planning, and other agencies to commence the task of data collection. Teams were established using various staff from these institutions to commence the development of productivity measurement at national and sectoral levels. Experts from Malaysia were engaged to train the teams in their work. However, the teams failed to complete the work due to lack of data, loss of personnel, and secretariat staff turnover [9].

Five pilot companies were taught how to measure their own productivity. These companies were to become role models for others in Fiji. Representatives from four out of the five companies were sent on a mission to Malaysia to see how productivity was measured there. On their return, they participated in the training exercises and were to have commenced with the measurement of productivity within their own companies. However, to date, only one company has continued with the exercise and one was not willing to share its results because of the confidentiality of the data involved, and as a result, the project has waned.

A Green Productivity Demonstration Project (GPDP) located at the Fiji Sugar Corporation's Labasa Mill was to be expanded into a countrywide waste management project. This would have realized the waste from one organization being utilized as raw material for another. The first phase of the project was to develop natural chicken farming at a local integrated agro-based farm (Yaqara Pastoral Company Limited). The APO deputized experts to Fiji to develop the first of action plans for waste management.

The following phases of the project included commissioning of an organic waste treatment plant, where bagasse is decomposed and mixed with other solid waste to produce green animal feed and biofertilizer for organic farming at Yaqara Pastoral Company Limited. Unfortunately, this project did not eventuate due to lack of resources.

Despite the attention that successive governments have given to fostering development, employment and investment have not grown as expected. Disadvantaged areas and communities remain much the same, and the number of households in relative and absolute poverty have steadily expanded. Many of the aims of the development plans have not been met.

One reason for this is that planners and formal policies are fairly weak forces in the wide system of national and international linkages. The Fiji economy is too small to influence international economic trends to its benefit. Moreover, national plans have rarely taken into account domestic setbacks such as hurricanes and other natural disasters, bank collapses, and political instabilities. Yet, such events have changed the face of Fiji's economy and society overnight.

Another reason is that the government has rarely had sufficient data to objectively design, monitor, and assess social policy. Since the early 1980s, the quality and quantity of social data provided through government agencies have steadily declined. Apart from the annual national

population census, the Bureau of Statistics has not maintained its production of social statistics.

The deregulation of the telecommunications market, together with the incentives in the establishment of call centers and back-office operations, would be instrumental in the development of the country. The government's aim of capitalizing on technological advancements and providing incentives in this sector will contribute significantly to the growth of the economy. Fiji's literacy rate and medium of communication are ideal for such services.

## REFERENCES

- [1] Fiji Bureau of Statistics. Fiji's Gross Domestic Product (GDP) 2010, Press Release No. 55, 22 August 2011. Suva, Fiji: 2011.
- [2] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [3] Gosai R. Does total factor productivity affect how we trade in Fiji? Unpublished document of Fiji National University; 2011; pp. 1–22.
- [4] Barro R.J., Lee J. Educational Attainment Dataset. <http://www.barrolee.com>, accessed on 5 May 2012.
- [5] Fiji Bureau of Statistics. Fiji Statistics at a Glance. <http://www.statsfiji.gov.fj/2011>, accessed on 9 January 2012.
- [6] Reserve Bank of Fiji. Investment Fiji. <http://www.reservebank.gov.fj/2012>, accessed on 9 January 2012.
- [7] Investment Fiji. The Reserve Bank of Fiji estimates. <http://www.investmentfiji.org.fj/2013>, accessed on 3 October 2013.
- [8] Prakash K. Fiji Country Paper. Paper presented at the 52nd Workshop Meeting of Heads of NPOs; October 2011.
- [9] Ministry of Labour, Industrial Relations and Employment. Productivity measurement in Fiji (Cabinet Memorandum – ML 1/37/12). Unpublished document of the Government of Fiji; October 2004, pp. 1–3.

**APPENDIX 1**

<b>Program of Action in the Charter</b>	<b>Achievements</b>
<p>A review and restructure of the NPO to allow it to undertake the full range of activities expected of an NPO.</p>	<p>The review of the NPO was undertaken in 1996 and implemented in 1997. It led to the creation of a department specifically tasked with implementing components of the charter that dealt with the NPO.</p> <p>The structure of the NPO was strengthened after the review of the charter in 2005 to allow it to undertake the full range of activities expected of an NPO.</p>
<p>The government to take the lead in the development of productivity culture by supporting the NPO through:</p> <ul style="list-style-type: none"> <li>• providing of resources</li> <li>• supporting awareness initiatives</li> <li>• providing national leadership</li> <li>• creating an industrial relations climate that would foster better labor management relations</li> <li>• collaborating with the private sector in the introduction of appropriate technology</li> <li>• promoting the importance of quality in the supply of goods and services in adherence to international standards</li> <li>• developing productivity targets in public-sector strategic plan</li> <li>• creating an environment conducive to industry competitiveness</li> </ul>	<p>In conferring upon the FNTC the status of NPO for Fiji, the government has provided a portion of the training levy to promote productivity.</p> <p>In 2001, the government for the first time included productivity as part of the portfolios of one of its ministries. The NPO now comes under the purview of the Ministry of Labour, Industrial Relations and Productivity.</p> <p>Awareness initiatives are actively supported by the government as the prime minister has been closely associated with the launching of the annual productivity awareness campaign. The president has been the chief guest at all Fiji Business Excellence Award functions.</p> <p>The government continues to enter into dialogue with its social partners in an effort to continually improve upon the industrial relations climate.</p> <p>Collaboration with the private sector in introducing appropriate technology is an area that requires more concerted attention.</p> <p>Promoting the importance of quality in the provision of goods and services has been done on an ad hoc basis and requires a more systematic approach.</p>

<p>Implementation of a national awareness campaign designed to motivate all sections of the community toward the continuous improvement of quality and productivity.</p>	<p>This campaign has been conducted on an annual basis since 1998 and the prime minister or his representative has always inaugurated the campaign.</p> <p>The National Convention on Quality features a competition among practicing Quality Circles operating in Fiji that showcases the benefits they have derived from using the Quality Circle concept.</p> <p>In order to assist productivity growth and the quality of improvement in rural areas, the NPO has assisted the Ministry of Regional Development in Integrated Community Development, as part of the Ministry's Community Capacity Building Project.</p> <p>A demonstration project on Energy Efficiency and Greenhouse Gases Emission Reduction was successfully completed for Fletcher Pacific Steel (Fiji) Limited.</p>
<p>Development of a quality awards system for Fiji.</p>	<p>The Fiji Business Excellence Awards was inaugurated in 1998 and the first applicants undertook the assessment process in 1999. The president has been closely associated with the awards.</p>
<p>The Tripartite Forum addresses the issue of wage systems and how they could impact the improvement of productivity by breaking down barriers that hinder productivity growth.</p> <p>Fostering a favorable employment relations climate.</p>	<p>The Tripartite Forum did not exist for a number of years and was revived in 2002 to ensure a stronger linkage between productivity growth and wage increase.</p> <p>A number of private-sector organizations and statutory authorities have already put in place wage systems that are linked to productivity and profitability.</p>
<p>Activities relating to productivity and quality are encouraged as part of education and training at all levels, including technical, vocational education, and workplace-based training.</p>	<p>A special program on quality promotion was conducted on a pilot basis at three secondary schools in the country.</p> <p>Other programs have included oratory and essay competitions for school children.</p> <p>A Fiji National Qualifications Framework has been developed to provide quality assurance mechanism to train workers and to establish more orderly systems and procedures to conduct vocational training.</p>

## APPENDIX 2

### APO Programs 2001–2010

<p><b>2001</b></p> <ol style="list-style-type: none"> <li>1. Seminar on Hotel and Catering Management</li> <li>2. Workshop on Environmental Impact Assessment (EIA) and Green Productivity</li> <li>3. Symposium on Quality and Business Excellence Awards</li> </ol>	<p><b>2002</b></p> <ol style="list-style-type: none"> <li>1. Training Course on Participatory Project Cycle Management for Community Development</li> <li>2. The Asia-Pacific Regional Eco-tourism Conference: The Sustainability Challenges and Green Productivity</li> <li>3. Seminar on Evaluation of Training Effectiveness</li> <li>4. Visit Fiji and Japan</li> </ol>
<p><b>2003</b></p> <ol style="list-style-type: none"> <li>1. In-country Training of GP Specialists</li> <li>2. Intensive GP Workshop for Consultants</li> <li>3. Workshop on Green Productivity</li> <li>4. Seminar on Emerging Trends in Hotel and Catering Management</li> </ol>	<p><b>2004</b></p> <ol style="list-style-type: none"> <li>1. Seminar on Emerging Concerns and Issues in Tourism Development</li> <li>2. Green Productivity Demonstration Project in Labasa Sugar Mill</li> <li>3. Feasibility Study and Review of Proposed GPDP on Energy Efficiency and Greenhouse Gases Emission Reduction at Fletcher Challenge Steel (Fiji) Ltd.</li> <li>4. Symposium on Green Productivity and Sustainable Development Governance</li> <li>5. Forum on Development of National Productivity Organizations</li> </ol>
<p><b>2005</b></p> <ol style="list-style-type: none"> <li>1. Multi-country Study Mission on Marketing Strategies for Tourism Industries</li> <li>2. Workshop on Green Productivity Approaches to Sustainable Development</li> <li>3. GPDP on Energy Efficiency and Greenhouse Gases Emission Reduction at Fletcher Pacific Steel (Fiji) Ltd.</li> <li>4. Technical Expert Advisory Service for Yaqara Pastoral Company Limited for Effective Utilization of Available Resources</li> </ol>	<p><b>2006</b></p> <ol style="list-style-type: none"> <li>1. Training Course on the Occupational Health and Safety Management System: OHSAS 18001</li> <li>2. Workshop on Biofuel</li> <li>3. Training Course on Facilitation for Community Development</li> <li>4. Workshop on Productivity Training Certification</li> </ol>
<p><b>2007</b></p> <ol style="list-style-type: none"> <li>1. Training Course on Balanced Scorecard</li> <li>2. Seminar on Green Service in the Tourism Industry</li> <li>3. DON Strategy: NPO Need Assessment Survey (Cluster B: First Meeting)</li> </ol>	<p><b>2008</b></p> <ol style="list-style-type: none"> <li>1. Workshop on Knowledge Management Implementation</li> </ol>



<p><b>2009</b></p> <ol style="list-style-type: none"> <li>1. National Training Course on Implementing and Auditing Social Accountability Management Systems Based on SA8000</li> <li>2. APO Productivity Database (Phase I): Total Factor Productivity Mission to Fiji</li> <li>3. National Dissemination Program on Green Productivity and Energy Efficiency</li> <li>4. In-country Training Program for Productivity and Quality Practitioners: DON Implementation for Fiji</li> <li>5. Training Course on Value Addition to Agricultural Products</li> </ol>	<p><b>2010</b></p> <ol style="list-style-type: none"> <li>1. Training Course on Integrated Waste Management at Resorts, Hotels, and Restaurants</li> </ol>
---	--

---

# INDIA

DR. KOLATHUPADAVIL  
PHILIPOSE SUNNY

## Group Head

Economic Services & Support Services  
National Productivity Council, India

---

## INTRODUCTION

India was an impoverished agrarian economy with very little industrialization at the time of independence in 1947. The first task of independent India was to improve the material and human conditions of life through rapid economic growth and social justice. India initiated developmental planning with the establishment of Planning Commission in 1950 [1]. The objective of the First Five-Year Plan (1950–56) was to improve domestic savings for growth and to help the economy resurrect itself. The real break with the past came with the Second Five-Year Plan, celebrated as the Nehru-Mahalanobis Plan, placing emphasis on the development of heavy industries, and envisaging a dominant role for the public sector in the economy. Realizing the importance of productivity consciousness in nation building, the government of India constituted the National Productivity Council (NPC) in 1958 as a tripartite body to spearhead productivity movement in the country.

The strategy underlying the first three Five-Year Plans was based on the assumption that the benefits of growth would trickle down to the poor. However, doubts were raised in the early 1970s about the effectiveness of the "trickle-down" approach and its ability to banish poverty. Moreover, the public sector did not live up to the expectations of generating surpluses to accelerate the pace of capital formation and to reduce inequality and poverty. The Fifth Plan (1974–79) emphasized growth and distribution with a view to alleviate poverty.

The Eighth Five-Year Plan (1992–97) was launched against the backdrop of balance of payment crisis and huge fiscal deficits, leading to the debt trap experienced in

1991. The government of India initiated a major program of economic liberalization (stabilization and structural adjustment) in July 1991. Trade and exchange controls were liberalized and structural adjustments were carried out in the industrial sector through de-licensing and accompanying measures. The reforms envisaged an expanded role for the private sector, import liberalization, disinvestment in public enterprises, and increased public investment in agriculture, physical infrastructure, and social sector.

The Ninth Five-Year Plan (1997–2002), launched during the 50th anniversary of India's independence, set an ambitious target to achieve 7%–8% annual GDP growth. This period witnessed unprecedented economic expansion, and researchers grouped India alongside Brazil, Russia, China, and South Africa as the emerging BRICS economies. India - with the advantage of having a huge English-speaking population, abundant cheap labor, and cost-effective economy - benefited substantially from outsourcing business processes, manufacturing, and service operations from developed nations [2]. GDP growth improved from an average 5.7% in the 1980s to an average 6.1% in the Eighth and Ninth Plan periods, making India one of the 10 fastest growing economies in the world.

The Tenth Five-Year Plan (2002–07) was prepared against the backdrop of high expectations. The Tenth Plan began modestly, but saw the economy accelerating steadily to achieve an average annual GDP growth of 7.8%, which was the highest ever economic growth achieved during any plan period.

The Eleventh Five-Year Plan (2007–12) aimed at achieving faster and more inclusive growth

at 9% per annum. The onset of the global financial crisis in 2008 adversely affected the growth momentum of India's economy. Real economic growth witnessed decline as compared to targets due to lower exports, capital outflow, and corporate restructuring. However, due to the strong liquidity positions in the domestic market, large corporations had access to capital in the corporate credit markets. The plan achieved an average GDP growth of around 8.2% for the first four years. However, the growth rate dipped to 7% during 2011–12 as a result of the impact of the global economic recession.

The Approach Paper to the Twelfth Five-Year Plan (2012–17) is aimed at achieving 9% average annual GDP growth for the Twelfth Plan [3]. The paper makes it clear that manufacturing must generate a large portion of additional employment opportunities against agriculture for India's increasing number of youth in the medium term. While the service sector has been growing fast, it alone cannot absorb the 250 million additional job seekers who are expected to join the workforce in the next 10 years.

Considering the importance of manufacturing in the overall economic growth in the medium term, the government of India announced the

National Manufacturing Policy (NMP) in 2011 to enhance global competitiveness, domestic value addition, technological depth, and environmentally sustainable growth [4]. NMP recognized that in the future, manufacturing will be the growth engine of the Indian economy. NMP aims at increasing the manufacturing share in GDP from the present 16% to 25% by 2022, and also to create 100 million jobs.

APO 2011 speculated that India may grow faster than any other large economy over the next 25 years [5]. The country has a favorable demography with one of the best dependency ratios in the world, and this will remain for a generation [6]. India's democracy, despite its inefficiencies, is more conducive to the flow of ideas and human capital development. This provides India an edge over other countries in the knowledge-intensive, innovation-dominated medium term.

#### PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

The most important indicator of economic performance at the aggregate level is GDP. India's GDP can further be disaggregated at its industry of origin such as agriculture, industry, and services. GDP at constant prices had grown more than 15 times during the last 60 years of development planning (Table 1).

Table 1. GDP at Factor Cost by Industry of Origin from 1951–2010 (INR'crore at 1999–2000 constant prices)

Period	Agricu- lture	Share in GDP	Industry	Share in GDP	Service	Share in GDP	Total GDP	GDP (USD 'billion)	Per Capita Income (INR)	Per Capita Income (USD)
1950–51	127,062	0.57	30,618	0.14	66,418	0.30	224,098	517	6,206	143
1959–60	161,184	0.53	50,767	0.17	94,580	0.31	306,531	758	7,480	173
1969–70	204,555	0.45	95,024	0.21	151,613	0.34	451,192	1,093	8,640	199
1979–80	227,147	0.38	135,755	0.23	233,895	0.39	596,797	1,481	9,394	217
1989–90	353,038	0.34	236,017	0.23	440,123	0.43	1,029,178	2,501	12,802	295
1999–2000	488,109	0.27	410,647	0.23	887,770	0.50	1,786,526	4,303	18,122	418
2009–10	611,650	0.17	930,769	0.26	2,069,530	0.57	3,611,949	8,336	30,891	713

Source: India Ministry of Finance [7], National Accounts Statistics [8], and author's calculation

Note : INR1 crore = INR10 million, USD1 = INR43.33 [1999–2000]

Table 2. GDP Growth by Industry of Origin from 1951–2010 (at 1999–2000 prices)

Period	Agriculture (AGR %)	Industry (AGR %)	Service (AGR %)	Total GDP (AGR %)
1951–60	3.10	6.25	4.18	3.58
1961–70	2.37	5.58	4.75	4.00
1971–80	1.64	3.88	4.38	2.91
1981–90	3.71	5.94	6.60	5.62
1991–2000	2.84	5.70	7.32	5.68
2001–10	2.54	8.73	9.19	7.31
1951–2010	2.65	5.86	5.90	4.87

Source: India Ministry of Finance [7], National Accounts Statistics [8], and author's calculation

Note : AGR - Average Growth Rate

Growth rates computed without overlapping years

In terms of decadal average annual growth, the highest growth rate was reported during 2000–10. In USD terms, the GDP increased from USD517 billion in 1950–51 to USD8,336 billion by 2009–10. Per Capita Income (PCI) at constant prices grew about six times during the last 60 years. In USD terms, PCI increased from USD143 in 1950–51 to USD713 by 2009–10. Lower PCI growth as compared to GDP growth may be attributed to unprecedented increase in population during the post-independent era as a result of improved health care facilities, low mortality rates, better nutrition standards, etc.

It may be noted from Table 1 that the share of agriculture in GDP declined from 57% in 1950–51 to 17% by 2009–10, whereas industry share in GDP increased from 14% in 1950–51 to 26% by 2009–10. Similarly, the service sector share in GDP also increased from 30% in 1950–51 to 57% by 2009–10. Decadal annual growth of GDP exceeded 5% per annum since the 1980s. During the recent decade (2000–01 to 2009–10), GDP growth averaged about 7.31% per annum.

GDP growth in the last 60 years at the sectoral level was found to be the highest for the service sector at 5.90% per annum, while the industry sector recorded 5.86% per annum, and agriculture reported 2.65% per annum (Table 2). GDP growth rates for industry and service

sectors have reported the highest during the recent decade.

### Sources of Output Growth

Sources of output growth can be estimated from the growth accounting approach. Growth accounting method assumes that the time path of India's aggregate economic activity can be summarized from the relationship between GDP and factor inputs such as labor and capital (Capital Stock estimated based on Perpetual Inventory Method (PIM)<sup>1</sup>) [8] in the last 60 years as:

$$GDP_t = A_t \cdot F(K_t, L_t, T), \quad \text{where } t=1, \dots, T. \quad (1)$$

Rate of growth of aggregate output can be expressed as a sum of weighted growth of capital input, weighted growth of labor input, and Total Factor Productivity Growth (TFPG):

$$GDPG = s_k GK + s_l GL + TFPG \quad (2)$$

where:

- GDPG is real GDP growth. GK, GL, and TFPG are Capital, Labor, and TFP Growth rates, respectively
- $s_k$  and  $s_l$  are relative shares of capital cost and labor cost, respectively, and the shares add up to 1

By rearranging equation (2), TFPG can be estimated from the growth accounting formula as:

$$\text{TFPG} = \text{GDPG} - \text{sk GK} - \text{sl GL} \quad (3)$$

Based on the highlighted growth accounting method, the sources of output growth from the factor input (labor and capital) growth rates along with TFPG have been presented in Table 3.

Further, the results are given diagrammatically in Figure 1 and Figure 2. It may be noted that the real GDP decadal mean growth improved over the years as it was only 3.58% during 1951–60, whereas it increased to 7.315% in the 2001–10 decade. During the same period, labor and capital inputs increased at the rate of mean decadal growth of about 2%. TFP growth for the decadal mean value exhibited substantial increase as it went from -1.02% in 1951–60 to 2.47% in 2001–10. In the last 60 years, TFPG contribution in GDP growth increased from -28.38% in 1951–60 to 33.84% during 2001–10.

### (3) Determinants of Labor Productivity Growth

Assuming constant rate of substitution, the equation (3) can be rearranged as output per worker growth as follows:

$$G(\text{GDP}/L) = \text{sk } G(\text{K}/L) + \text{TFPG} \quad (4)$$

i.e., Labor Productivity Growth = Capital Deepening Growth (weighted with capital share) + TFPG

Labor productivity has been estimated as a ratio of real GDP per worker. From the growth accounting method, labor productivity can be estimated as equivalent to the sum of TFPG and weighted capital deepening growth. It may be noted from Table 4 that labor productivity growth for India exhibited secular rise during 1950–51 to 2009–10 as it increased from 1.36% mean growth during the first decade (1950–51 to 1959–60) to 4.19% mean growth during

Table 3. Decadal Growth of Real GDP, Labor, Capital, TFP, and Sources of Output Growth

Period	Real GDP (Mean Decadal Growth) (%)	Labor (Mean Decadal Growth weighted with wage share) (%)	Capital (Mean Decadal Growth weighted with wage share) (%)	TFPG (Mean Decadal Growth) (%)
1951–60	3.58	1.93	2.67	-1.02
1961–70	4.00	1.86	1.64	0.50
1971–80	2.91	1.49	1.41	0.01
1981–90	5.62	2.85	1.61	1.16
1991–2000	5.68	1.84	1.95	1.89
2001–10	7.31	2.11	2.73	2.47
1951–2010	4.87	2.04	2.21	0.62
Sources of Output Growth (%)				
1951–60	100	53.87	74.51	-28.38
1961–70	100	46.46	41.09	12.44
1971–80	100	51.20	48.32	0.48
1981–90	100	50.67	28.66	20.67
1991–2000	100	32.43	34.26	33.31
2001–10	100	28.88	37.28	33.84
1951–2010	100	41.92	45.26	12.82

Source: India Ministry of Finance [7], National Accounts Statistics [8], Goldar [9], and author's calculation

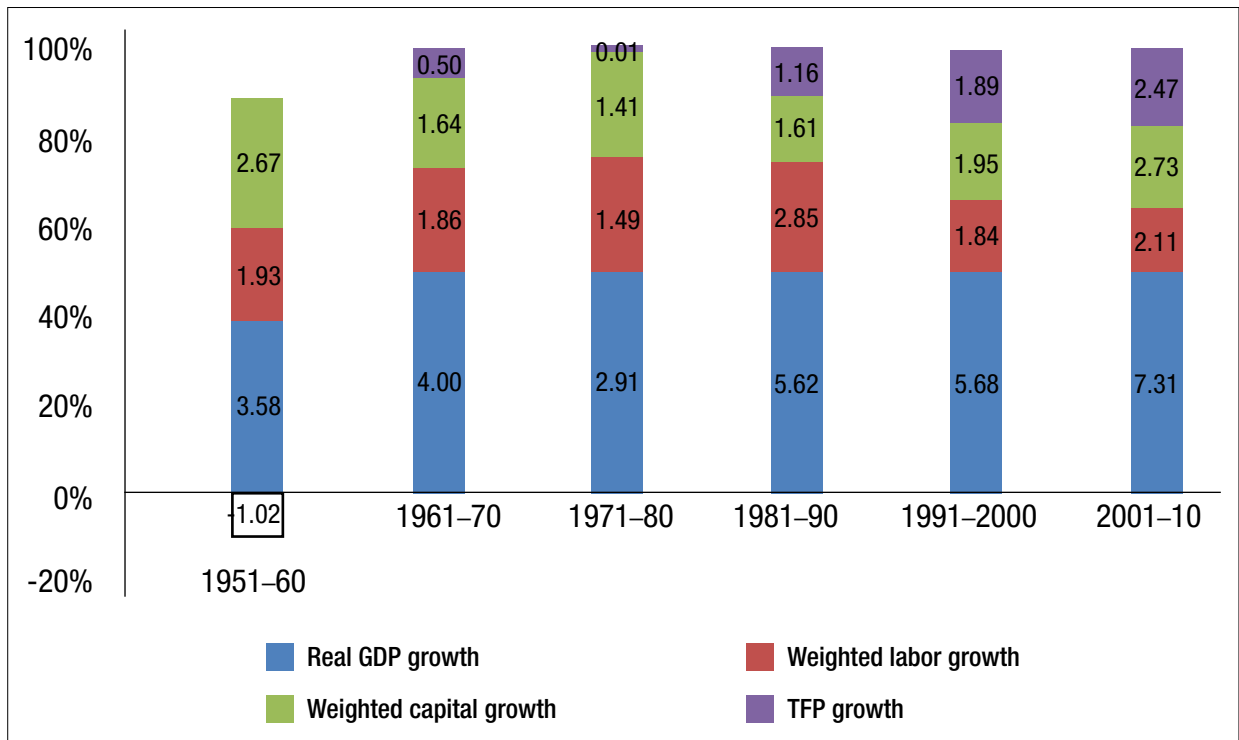


Figure 1. Sources of Real GDP Growth by Period from 1951–2010  
Source: Asian Productivity Databook 2011

the last decade (2000–01 to 2009–10). Labor productivity in real terms increased from INR19,078 in 1950–51 to INR69,859 by 2009–10. This shows that labor productivity increased over three times during the last 60 years at an

average annual growth rate of 2.27%. However, as compared to the labor productivity of major countries in the world, India's labor productivity levels are still among the lowest. Capital deepening contributed substantially

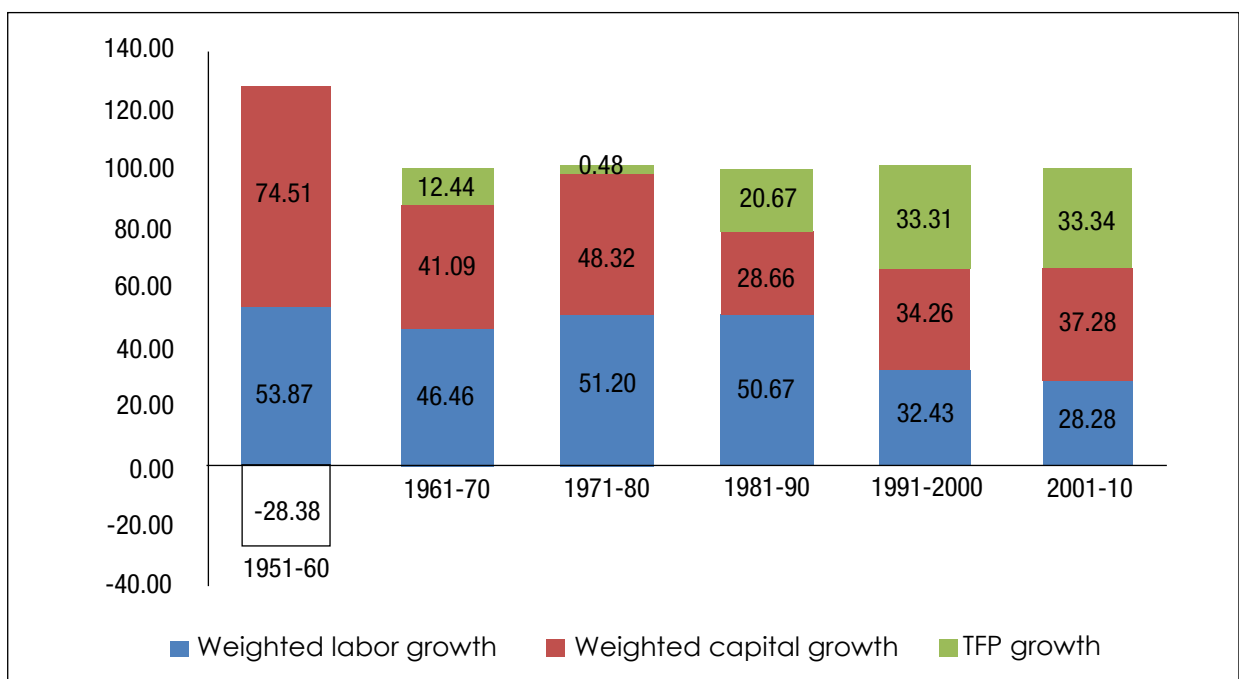


Figure 2 . Contribution Toward Output Growth by Period from 1951–2010

Table 4. Decadal Growth of Labor Productivity, Capital Intensity, and TFP from 1951–2010

Period	LP Growth (GDP/Labor)	Weighted Capital Intensity (sk.K/L)	TFPG
1951–60	1.36	2.37	-1.02
1961–70	1.80	1.31	0.50
1971–80	1.09	1.08	0.01
1981–90	2.00	0.83	1.16
1991–2000	3.21	1.32	1.89
2001–10	4.19	1.72	2.47
1951–2010	2.29	1.66	0.62

Source: India Ministry of Finance [7], National Accounts Statistics [8], Goldar [9], Jungsoo [10], and author's calculation

Note: LP = Labor Productivity, TFPG = Total Factor Productivity Growth

to labor productivity growth during the first three decades in India, whereas TFPG was the major contributor to labor productivity growth since the 1980s (Table 4). During the 2001–10 decade, TFPG contributed about 59% toward labor productivity growth. This indicates that there is an urgent need to augment capital investment in the Indian economy to maintain the present growth momentum and also to improving labor productivity levels.

### Productivity Regression

Causality between TFP growth and other important economic variables has been measured from a log linear regression estimation method for the period of 1960–2010. The regression estimates reveal the impact of independent variables on TFP growth in India (Table 5).

The functional form and independent variables used for the log linear regression estimation are given below:

TFPG = f ln (Average Years of Schooling, R&D Expenditure as percentage of GDP, Export as a ratio of GDP, Import as a ratio of GDP, FDI as a ratio of GDP, Government Final Consumption Expenditure (GFCE) as ratio of GDP, Capital Labor ratio, GDP per capita, Life Expectancy at Birth, Population) (5)

Among the 10 independent explanatory variables considered for the log linear regression

against the depended variable TFPG, four independent variables, namely Average Years of Schooling, Export/GDP, GFCE/GDP, and K/L have reported negative relationship with TFPG while the six other explanatory variables reported positive causal relationship with TFPG.

Similarly, Labor Productivity Growth can be linearly regressed against the 10 independent variables to understand the causal relationship of labor productivity with these variables. The log linear regression results are provided in Table 6 as per the following functional form:

Labor Productivity Growth = f ln (Average Years of Schooling, R&D Expenditure as percentage of GDP, Export as a ratio of GDP, Import as a ratio of GDP, FDI as a ratio of GDP, Government Final Consumption Expenditure (GFCE) as ratio of GDP, Capital Labor ratio, GDP per capita, Life Expectancy at Birth, Population) (6)

Out of the 10 independent variables regressed against the dependent variable Labor Productivity Growth, seven variables reported negative causal relationship. These independent variables are Average Years of Schooling, R&D Expenditure as a percent of GDP, Export/GDP, FDI/GDP, GFCE/GDP, K/L, GDP per capita, and Life Expectancy at Birth, while the other four variables reported positive causality to Labor Productivity Growth.

Table 5. Regression Analysis of Determinants of TFP Growth in India from 1960–2010

Dependent variable - TFPG

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	-235.079	44.500	-	-5.283	.000
Avg. Years of Schooling	-.889	.735	-.503	-1.210	.233
R & D Exp. as % of GDP	.602	1.219	.059	.494	.624
EXPORT/GDP	-.584	.330	-.304	-1.770	.084
IMPORT/GDP	.731	.220	.378	3.316	.002
1 FDI/GDP	.039	.053	.083	.736	.466
GFCE/GDP	-1.273	.629	-.208	-2.026	.049
K/L	-4.412	.833	-3.983	-5.296	.000
GDP Per Capita	1.107	.608	.577	1.819	.076
Life Expectancy at Birth	1.979	1.228	.316	1.611	.115
Population	13.217	2.430	4.534	5.440	.000

Model Summary	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	Durbin-Watson
1	.972	.944	.930	.23297	1.112

#### ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	36.860	10	3.686	67.912	.000
Residual	2.171	40	.054	-	-
Total	39.031	50	-	-	-

Source: Author's calculation

### PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

India realized the need to initiate productivity movement immediately after attaining independence for optimum use of scarce resources, and also to use it as an effective tool to eradicate poverty. In order to promote productivity culture in the country, a number of initiatives were taken up, including the creation of the NPC in 1958 as an apex body at the national level.

#### Formation of the NPC

Chartered on similar lines as the Japan Productivity Centre (presently JPC-SED), the NPC was formed on an ILO pattern as a multipartite, not-for-profit, autonomous-registered society in 1958 to spearhead the productivity movement in the country with the following objectives:

- i. Increase productivity in all spheres of industries (micro, small scale, medium, and large) as well as economic activities



Table 6. Regression Analysis of Determinants of Labor Productivity Growth in India from 1960–2010  
Dependent variable - Labor Productivity Growth

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	-244.069	60.669	-	-4.023	.000
Avg. Years of Schooling	-1.529	1.002	-1.174	-1.527	.135
R&D Exp. As % of GDP	1.750	1.661	.234	1.054	.298
EXPORT/GDP	-3.491	.450	-2.465	-7.762	.000
IMPORT/GDP	2.150	.300	1.510	7.155	.000
1 FDI/GDP	-.093	.072	-.270	-1.292	.204
GFCE/GDP	-1.577	.857	-.350	-1.840	.073
K/L	-1.577	1.136	-1.933	-1.389	.173
GDP Per Capita	-1.507	.829	-1.068	-1.817	.077
Life Expectancy at Birth	-.367	1.675	-.080	-.219	.827
Population	13.096	3.312	6.100	3.954	.000

Model Summary	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	Durbin-Watson
1	.900	.809	.762	.31762	1.699

#### ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	17.131	10	1.713	16.981	.000
1 Residual	4.035	40	.101	-	-
1 Total	21.167	50	-	-	-

Source: Author's calculation

- ii. Stimulate and promote productivity consciousness by disseminating information regarding productivity techniques and processes
- iii. Stimulate and facilitate the establishment of regional/local and industry-wise productivity organizations
- iv. Implementation of programs, including technical exchange within the country and other countries
- v. Undertake scientific research activities related to productivity

#### Mission

To develop, disseminate, and apply knowledge to promote and improve productivity in order to strengthen competitiveness of the national economy and working conditions, and quality of life.

#### NPC Contribution in the Last 50 Years

The NPC concentrated on generating awareness to improve productivity and the methods thereof through consultancy, seminars, conferences, workshops, training programs, pamphlets, publications, etc. In response to the demand by the industry, the

NPC began to demonstrate the efficacy of productivity tools and techniques through its Productivity Surveys and Implementation Services in the 1960s and 1970s.

The scope and range of the services were continuously expanded and modified to respond positively to the ever-changing needs of the vast Indian economy. With the onset of economic reforms at the beginning of the 1990s, the services of the NPC began to slowly metamorphose to the present gamut of consultancy, training, and research to become the main source of revenue, accounting for about 70% of its total budgetary requirements.

To begin with, the NPC has the Industrial Engineering and Human Resource Development as its core strengths. The pattern of India's growth in the 1970s and 1980s mandated the NPC to expand its portfolio to provide multidisciplinary consultancy, training, and research services toward Environment Management, Energy Management, Plant

Engineering, World Class Manufacturing, Total Quality Management, Benchmarking, Productivity Measurement, and Agribusiness, among others. The NPC's capacity, thus, got significantly augmented to offer total solutions as well as specific services in techno-managerial areas. Development of various services during the last 50 years of its existence is summarized in Table 7.

The NPC provides guidance and support to a network of about 40 local productivity councils that are located in various states and cities, and financially and technically supports them through its 13 Regional Professional Management Groups located at major state capitals, in addition to the training institute in Chennai and its headquarters in New Delhi.

There is increased demand for the services of the NPC in areas such as energy efficiency, pollution control, industrial engineering, e-governance, productivity, quality, competitiveness, project management, knowledge management,

Table 7. Development of Various Services of NPC India

Year	Service Category
1958	Productivity Promotion and Awareness, Industrial Engineering
1963	Productivity Survey and Implementation Services
1964	Fuel Efficiency Services
1966	Agriculture Productivity
1973	Plant Engineering and Maintenance
1978	EDP, MIS, Corporate Planning, Training Technology, and Marketing
1982	Productivity Awards
1983	Industrial Pollution Prevention and Control
1985	Human Resource Management
1991	Inter-firm Comparison, Benchmarking
1992	QM/ISO 9000, ISO 14000, Energy Audits
2002	Six Sigma, Balanced Score Card, OHSAS, Green Productivity
2008	e-Learning, Knowledge Management, Clean Development Mechanism, Energy Conservation Act 2001, Implementation Exhibitions/Trade Fairs (EPIF)
2009	Project Management, Monitoring and Evaluation of Government Projects, Lean Manufacturing, Development of SME clusters

Source: Author's compilation

business intelligence, etc. In recent years, there was also considerable demand for the NPC's expertise in the area of monitoring and evaluation of various government schemes and programs implemented by central and state governments.

The NPC works closely with the Asian Productivity Organization (APO). The government of India is a founder member of the APO. The NPC is the nodal organization to implement all APO projects and programs in India. The organization has established a uniquely networked relationship with the national productivity organizations (NPOs) of all the major Asian nations through APO projects and programs, in addition to sending experts to these countries or sourcing experts from abroad to meet local requirements. Linkages were also established with the ILO, United Nations Industrial Development Organization, United Nations Development Programme, Food and Agriculture Organization of the United Nations, World Bank, USAID, United Nations Environment Programme, United Nations Conference on Trade and Development, International Institute for Management Development (IMD), etc. For the last 10 years, the NPC has been rendering Partner Institute Services to Lausanne-based world-renowned IMD's World Competitiveness Yearbook [11].

Shortage of skilled manpower has been reported from various manufacturing sectors in recent years. However, new studies have reported the dichotomy of acute unemployment among fresh engineering graduates [12]. It was reported that about 30% of these graduates remain unemployed due to issues such as inadequate skills. In order to contribute toward skill upgrade and capacity development of technical manpower at lower, middle, and top management, the NPC organized about 100 residential training programs annually at different parts of the country.

Some of the initiatives taken up by the NPC in recent years are:

- i. Resource leveraging through corporate partnerships and alliances
- ii. Innovative and effective utilization of IT/ITES to enhance organizational competitiveness and productivity
- iii. Enabling Indian firms to become globally competitive and innovative by promoting
  - Knowledge Management
  - Business Intelligence
  - Lean Manufacturing
  - Six Sigma
  - Balanced Score Card, etc.
- iv. Propagating the latest productivity improvement concepts and techniques
- v. Bringing social dimension of productivity to make Indian firms globally reliable, ethical, and responsible business players

## ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY

Over the years, India has emerged as a vibrant economy and one of the fastest growing economies in the world. Though the initial years of developmental planning reported sluggish growth, decades later reported substantial improvement in both social and economic development parameters. The turnaround in economic growth at the macro level started in the 1980s. The economy entered into a high growth trajectory after the introduction of economic reforms in 1991.

Contribution of industry in GDP increased substantially in the last 60 years. In the first 15 years after independence (1950–65), manufacturing grew at an annual average rate of 6.5%, after which, it became somewhat sluggish. Consumer goods industry accounted for almost half the industrial production in the 1950s, whereas it now accounts for only about 20%. Capital goods constituted less than 4% during the 1950s; however, it now accounts for about 24% of the industrial production.

The Small Scale Industry (SSI) has been an important component of the industrial sector. Considering the importance of the SSI sector in employment generation, export earnings, and domestic value addition, various measures have been taken up, including reservation of large numbers of product categories (up to 1,025 products) for exclusive manufacture in the SSI sector. However, as part of globalization and liberalization policies, reservation has been systematically withdrawn since 1997. Currently, only 21 products remain under reserved category for exclusive manufacture in the SSI sector. Presently, the small-scale industry contributes over 40% of the gross turnover in the manufacturing sector, 45% of manufacturing exports, and 34% of total exports and provides employment to 15.3 million workers.

Though the major economies in the world were severely impacted by the 2008 global economic recession, India managed to insulate itself from its negative effects well. However, real economic growth witnessed a decline due to lower exports, capital outflow, and corporate restructuring. India has a favorable demography with one of the best dependency ratios in the world, and it is expected to remain for a generation. India's democracy, despite its weakness, is more conducive to the flow of ideas. This gives India an edge in the era of knowledge- and innovation-driven world.

The productivity movement spearheaded by the NPC at the apex national level, along with about 40 local productivity councils at the regional and state levels, contributed immensely to the promotion of productivity consciousness in the country. The role of the NPC in nation building in the changed economic scenario would be immense, especially to sustain the present growth momentum in the medium-term and also to maintain India's global competitiveness. Since India has one of the lowest labor productivity levels in the world, there exists considerable scope for improving labor productivity through skill upgrade of work force, technology upgrade of micro, small, and medium enterprises, improving work environment and work ethics, etc. There is an urgent need for

upgrade of infrastructure at various industrial clusters, efficient management of both private and public resources, effective monitoring and implementation of government programs and schemes, promotion of productivity and competitiveness concepts, development of productivity database and studies, etc., in making India globally competitive.

## ENDNOTES

- 1 Capital Stock has been constructed from Gross Fixed Capital Formation for the period 1950–51 to 2009–10, available from Central Statistical Organization data using Perpetual Inventory Method (PIM). It has been assumed that capital at aggregate economy level has a user life of 25 years. After deducting the corresponding depreciation, Net Capital Formation for each year was estimated. Machinery and Machine Tools Price Index with base 1999–2000 has been used for estimating the capital formation at constant prices. Further, capital stock has been estimated based on the PIM from 1950–51 to 2010–11 on a year-to-year basis.

## REFERENCES

- [1] Planning Commission Five-Year Plan Documents (Various Plans). New Delhi: Government of India.
- [2] Institute of Applied Manpower Research. India-Human Development Report 2011: Towards Social Inclusion. New Delhi: Oxford University Press; 2011.
- [3] Planning Commission. Approach Paper to XII Five-Year Plan (2012–17). New Delhi: Government of India; 2011.
- [4] Ministry of Commerce & Industry. National Manufacturing Policy, Press Note No. 2 (2011 Series). New Delhi: Department of Industrial Policy & Promotion, Government of India; 2011.
- [5] APO. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [6] United Nations Population Division. World Population Prospects: The 2010 Revision. New York: United Nations; 2011.
- [7] Ministry of Finance. Economic Survey 2010–11. New Delhi: Oxford University Press; 2011.
- [8] National Account Statistics, Central Statistical Organization, Ministry of Statistics & Program Implementation, (various years), Government of India.

- [9] Goldar B.N., Productivity Growth in Indian Industry. New Delhi: Allied Publishers; 1986.
- [10] Jungsoo P. ADB Economics: Working Paper Series, No. 227, Asian Development Bank, October 2010.
- [11] IMD. IMD World Competitiveness Yearbook 2012. Lausanne: Institute for Management Development; 2012.
- [12] Cochin University of Science & Technology. Employment scenario of technical manpower (Degree Holders) Kerala - 2008. National Technical Manpower Information System, Nodal Centre for Kerala, Cochin University of Science & Technology, Kochi, Kerala, India; 2009.

# INDONESIA

DR. NUNUNG  
NURYARTONO

**Head of Economics Post Graduate Program**

Faculty of Economics and Management

**Director**

International Center for Applied Finance and Economics

Bogor Agricultural University

## INTRODUCTION

Indonesia's economic growth has experienced ups and downs as external and internal shocks impacted the economy (Table 1). In the 1970–80s, Indonesia experienced a remarkable economic growth with an average annual GDP growth of over 8%, contributed by revenues from high oil prices. Indonesia's economy continued to be dynamic. However, after the fall of oil prices in 1981 and a global recession in 1982, Indonesia underwent a transition era, spurred by its industrialization policy, to recover its economy. In 1997–98, Indonesia again suffered from the Asian economic crisis. The country recovered, but was yet hit again by another global crisis in the middle of 2008. Though Indonesia's economy contracted, it was not as severe as the previous crises.

Despite these factors that took place during the period of 1971–2008, the economy continued to be positive. In relation to those circumstances, the following question arose - what was behind the economic growth before, during, and after the crisis? In particular, what were the sources of output growth - was input driven, or due to increase in productivity?

Technically speaking, the main sources of economic growth are capital input, labor, and total factor productivity (TFP), which is commonly known as productivity. A country's productivity growth has an important role in achieving a robust economic growth and better standards of living. In addition to these factors in determining real income, productivity influences industrial performance and microeconomic competitiveness of a country. This country report examines Indonesia's productivity performance since the 1970s and identifies the sources of productivity growth and the factors influencing productivity changes (measured as TFP growth and labor productivity growth in those periods).

During the period of 1971–2008, productivity growth in Indonesia was dominated by labor productivity growth [1]. The highest labor productivity growth occurred between 1971–80 when the oil industry was booming. However, in the subsequent decades (1981–90 and 1991–2000), labor productivity growth declined sharply. It was in those two periods that Indonesia was seriously affected by international economic and financial crises. In 2001, the nation's labor productivity growth

Table 1. Growth of GDP, Labor Productivity, and TFP in Indonesia

Period	GDP (%)	Labor Productivity (%)		TFP (%)
		Hour	Employment	
1971–80	8.04	5.75	5.72	1.80
1981–90	6.07	2.32	2.31	-0.43
1991–2000	4.16	2.79	2.77	-0.89
2001–08	5.08	3.04	3.45	1.42
1971–2008	5.88	3.50	3.57	0.43

Source: APO [1]

began to recover, although the performance from the 1971–80 was not repeated.

In the same interval decades, compared to labor productivity growth, TFP growth was relatively low. Indonesia experienced negative TFP growth in the period of 1981–90 and 1991–2000. The two global crises, particularly the Asian crisis in 1997/98 impacted the country's productivity, as indicated in Table 1, where labor productivity growth and TFP growth decreased significantly.

### PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

During the period of 1971–2008, capital input was the main contributor to economic growth

in Indonesia. In this period, the two sources of productivity - labor productivity and TFP - did not boost economic growth. As shown in Table 2, the average contribution of capital input toward economic growth during 1971–2008 reached 72%. Labor had an average contribution rate of around 20%, while TFP growth had a lower average contribution at about 7% [1]. However, when viewed thoroughly, in the periods of 1970–75, 1990–95, and 2000–05, TFP growth had contributed rather significantly toward economic growth, which was around 30%. This had impacted Indonesia's burgeoning economic growth in those periods. Indonesia had negative TFP growth in the periods of 1980–85 and 1995–

Table 2. Sources of Economic Growth and Labor Productivity in Indonesia

Source of GDP Growth (%)						Source of Labor Productivity (%)			
Period	GDP	Labor	Capital		TFP	Labor	Capital		TFP
			IT	Non-IT			IT	Non-IT	
1970–75	8.28	0.89	0.06	4.52	2.81	6.33	0.05	3.46	2.81
1975–80	7.79	1.29	0.17	5.55	0.78	4.78	0.15	3.84	0.78
1980–85	4.66	1.78	0.17	5.20	-2.49	0.85	0.13	3.21	-2.49
1985–90	7.49	2.05	0.18	3.63	1.63	3.59	0.14	1.81	1.63
1990–95	7.57	0.56	0.30	4.28	2.43	6.47	0.28	3.76	2.43
1995–2000	0.76	1.00	0.20	3.77	-4.21	-1.23	0.16	2.82	-4.21
2000–05	4.65	0.64	0.24	2.23	1.54	3.33	0.22	1.58	1.54
2005–08	5.80	1.58	0.31	2.67	1.23	2.39	0.25	0.91	1.23
1970–2008	5.88	1.20	0.20	4.05	0.43	3.36	0.17	2.77	0.43

Contribution									
1970–75	100	11	1	55	34	100	1	55	44
1975–80	100	17	2	71	10	100	3	80	16
1980–85	100	38	4	112	-53	100	15	376	-292
1985–90	100	27	2	48	22	100	4	51	46
1990–95	100	7	4	57	32	100	4	58	38
1995–2000	100	132	26	500	-558	100	-13	-230	343
2000–05	100	14	5	48	33	100	7	47	46
2005–08	100	27	5	46	21	100	10	38	51
1970–2008	100	20	3	69	7	100	5	82	13

Source: APO [1]

2000, resulting in a decrease in its economic growth.

Capital input, which was driven by capital accumulation and assimilation, had an important role in Indonesia's economic development. In terms of capital accumulation, as seen during the 1998 crisis and when investment decreased significantly, it resulted in a weakened economic growth. Investments in Indonesia posted positively with an average investment growth during the precrisis period at about 10.92%, and post-crisis average investment growth charted at 8.64%. In post-crisis periods, it was discovered that economic growth figure was not able to catch up with the growth levels of precrisis periods. This means, when compared to the precrisis periods, post-crisis Indonesia still had weak investment growth (as capital accumulation). It had not been able to move the economic growth very far.

In addition, TFP growth was not able to reach the precrisis. Krugman [2] has stated (1994) that economic growth is based on capital accumulation, not on TFP growth. This might cause a dead rate of return on capital and a slowdown of growth. TFP consists of various factors important to drive labor productivity growth and economic growth such as the degree of technology transfer and change, educational attainment, and effectiveness of governance, economic policies, political stability, entrepreneurship, and openness to trade. Therefore, in the future, Indonesia has to implement a comprehensive effort to boost productivity growth, especially TFP growth, to drive the economy with quality figures.

With differentiating capitals divided into two main groups - non-IT and IT capital - along with the period of 1971–2008, non-IT capital served as a key driver for economic growth at about 69% compared to IT capital, which was only about 3% contribution. However, IT capital showed a positive growth; as highlighted from the year 2000 and beyond, the growth is higher than previous periods.

This is partly due to the increase of services sectors. IT growth as technology can provide an important role in the economy and bring about significant production gains in, for example, progress in technology of telecommunication, transportation, banking, and finance.

Table 2 presents the decomposition of labor productivity growth and the contribution of TFP growth, non-IT capital growth, and IT capital growth. In the period of 1971–2008, capital deepening was the main source of labor productivity growth in Indonesia. Capital deepening contributed to about 87% (comprising 82% non-IT and 5% IT capital growth) and TFP growth contributed 13% to labor productivity growth.

However, in the periods of 1970–75, 1985–90, 2000–05, and 2005–08, the contribution of TFP growth to labor productivity was relatively strong that it reached 44%, 46%, 46%, and 51%, respectively. A positive trend for IT capital growth was witnessed as well in 2000–08. Beginning 2000, the contribution of IT capital growth to labor productivity increased from 7% to 10%.

## **FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES**

This segment discusses factors that influence changes in productivity, including government policies that stimulate productivity changes. The Econometric model used in analyzing the influencing factors toward productivity changes were baseline and extended regression models using Ordinary Least Square (OLS) and Error Correction Mechanism (ECM) estimation methods. However, the stationary fixed data remained a significant problem in OLS estimation, hence the ECM estimation method was more precise in elaborating the influencing factors of TFP and labor productivity growth. Further, ECM estimation provided a long-term balancing process within the model, as revealed from coefficient values of error direction, which were statistically significant.



### Analysis of Factors Influencing TFP Growth

Table 3 shows that only two variables influenced the TFP - Share Export to GDP and Share Government Investment to GDP. The extended regression model provided a better explanation for determinants of TFP growth. Share Export to GDP, share Government

Investment to GDP, and share Foreign Direct Investment (FDI) to GDP variables evidently influenced the TFP growth, as indicated by statistically significant coefficients and higher adjusted R-squared. Therefore, extended regression model was preferred in elaborating the factors that influenced TFP growth.

Table 3. Regression Analysis of Determinants of TFP Growth in Indonesia from 1980–2008

Independent Variables	Dependent Variable: TFP Growth			
	OLS Estimation Method*		ECM Estimation Method**	
	Type of Regression		Type of Regression	
	Baseline	Extended	Baseline	Extended
Constant	-1.479485	-2.484968	-0.298140	-0.693346
Average Schooling Years (year)	0.114218 (0.6645)	-0.335953 (0.7310)	-1.189352 (0.6276)	-2.003550 (0.4836)
Share Export to GDP (%)	0.041525 (0.0391)	0.045864 (0.0469)	0.021547 (0.0641)	0.036539 (0.0041)
Share Government Investment to GDP (%)	0.033296 (0.0019)	0.033981 (0.0042)	0.015258 (0.0893)	0.030384 (0.0031)
Share FDI to GDP (%)	0.662182 (0.0007)	0.644355 (0.0002)	0.250676 (0.1289)	0.283571 (0.0890)
Consumer Price Index (%)	-	0.422900 (0.7797)	-	-3.230224 (0.2292)
Ratio Employment to Population (%)	-	6.970942 (0.5438)	-	33.04052 (0.2883)
Dummy Crisis	-2.120718 (0.0041)	-2.175161 (0.0033)	-0.005928 (0.9925)	0.304191 (0.6488)
Error Correction Term	-	-	-0.013097 (0.3759)	-0.025747 (0.0124)
Adjusted R <sup>2</sup>	0.651890	0.631982	0.024915	0.026225

Note: Number in brackets shows p-value rate

\* Using level value (Y<sub>t</sub>)

\*\* Using first difference value (ΔY<sub>t</sub>)

Share Export to GDP, share government investment to GDP, and share FDI to GDP positively influenced the TFP growth, with coefficients of 0.037, 0.030, and 0.284, respectively. These coefficients can be interpreted as: 1% change in the share of export to GDP, government investment to GDP, and FDI to GDP resulted in TFP growth change by 0.037%, 0.030%, and 0.284%, respectively. All three significant variables positively influenced TFP growth in moving and boosting the Indonesian output and economy.

### Analysis of Influencing Factors Toward Labor Productivity Growth

Table 4 shows the variables that influenced labor productivity growth from baseline the regression model are Share Government Investment to GDP, Share FDI to GDP, and Dummy Crisis. The extended regression model shows that Share Export to GDP, Share Government Investment to GDP, Share FDI to GDP, and Consumer Price Index (CPI) variables were statistically significant and influenced labor productivity growth with higher adjusted R-Square.

Table 4. Regression Analysis of Determinants of Labor Productivity Growth in Indonesia from 1980–2008

Independent Variables	Dependent Variable: Labor Productivity Growth			
	OLS Estimation Method1*		ECM Estimation Method2**	
	Regression		Regression	
	Baseline	Extended	Baseline	Extended
Average Schooling Years (year)	0.907735 (0.1503)	4.632635 (0.0323)	-0.118649 (0.9806)	0.637979 (0.7955)
Share Export to GDP (%)	-0.112532 (0.2951)	-0.139588 (0.2364)	0.045479 (0.4866)	0.094691 (0.0146)
Share Government Investment to GDP (%)	0.198558 (0.0000)	0.199443 (0.0000)	0.223696 (0.0000)	0.247499 (0.0000)
Share FDI to GDP (%)	0.386308 (0.1432)	0.617478 (0.0414)	1.391209 (0.0093)	1.416399 (0.0002)
Consumer Price Index (%)	-	-5.717069 (0.0207)	-	-36.11719 (0.0020)
Ratio Employment to Population (%)	-	-33.63825 (0.1034)	-	55.47516 (0.2521)
Dummy Crisis	-2.155093 (0.1683)	-1.834288 (0.1833)	-2.929630 (0.0366)	-0.754023 (0.4524)
Error Correction Term	-	-	-0.189465 (0.0000)	-0.218932 (0.0000)
Adjusted R <sup>2</sup>	0.788557	0.798299	0.808573	0.921794

Note: Number in brackets shows p-value rate

\* Using level value (Y<sub>t</sub>)

\*\* Using first difference value (ΔY<sub>t</sub>)

Four variables showed a favorable influence on labor productivity growth, whereby three of these also played a role in influencing TFP growth - Share Export to GDP, Share Government Investment to GDP, and Share FDI to GDP. The remaining variable is Consumer Price Index, which is a proxy for inflation and represents the purchasing power of the people. CPI negatively influences labor productivity growth with a coefficient of -36.117, which means that if there is 1% change in CPI, it will cause a -36.117% decrease to labor productivity growth. Similar to the FDI variable, CPI has an elastic influence to labor productivity growth, but it moves in a different direction. A little increase to the CPI can cause a large decrease of labor productivity growth. This situation requires the attention of all productivity stakeholders. The government needs to implement policies to manage the inflation rate. Companies must balance inflation in order to avoid a decrease in their productivity.

### PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

The economic development since the era of the new order government emphasized the implementation of Pelita, a five-year

development plan for the country. The pattern of the policy was adopted from Rostow to target the process of economic development and provide a broad implication for increasing productivity. The defined sequential of every five years with a different focus in each period gives an indication of the process on how Indonesia will grow into a developed country.

The new order government's long-term economic development goal is to improve the welfare of communities through the process of industrialization on a large scale. It was implemented to create job opportunities in order to absorb the increase of labor force. Infrastructure construction in the industrial sector was encouraged. However, it was still heavily concentrated on Java Island. With a development paradigm applied to the nation, it was hoped that the development progress in Java would provide a trickle-down effect to other areas in Indonesia. However, studies show that the dynamics of the Indonesian economy is still focused on the island of Java, causing disparity among its wide regions. Rapidly growing industrialization in Java is supported by adequate infrastructure. So far, the government of Indonesia still encourages development in all parts of the country by building infrastructure

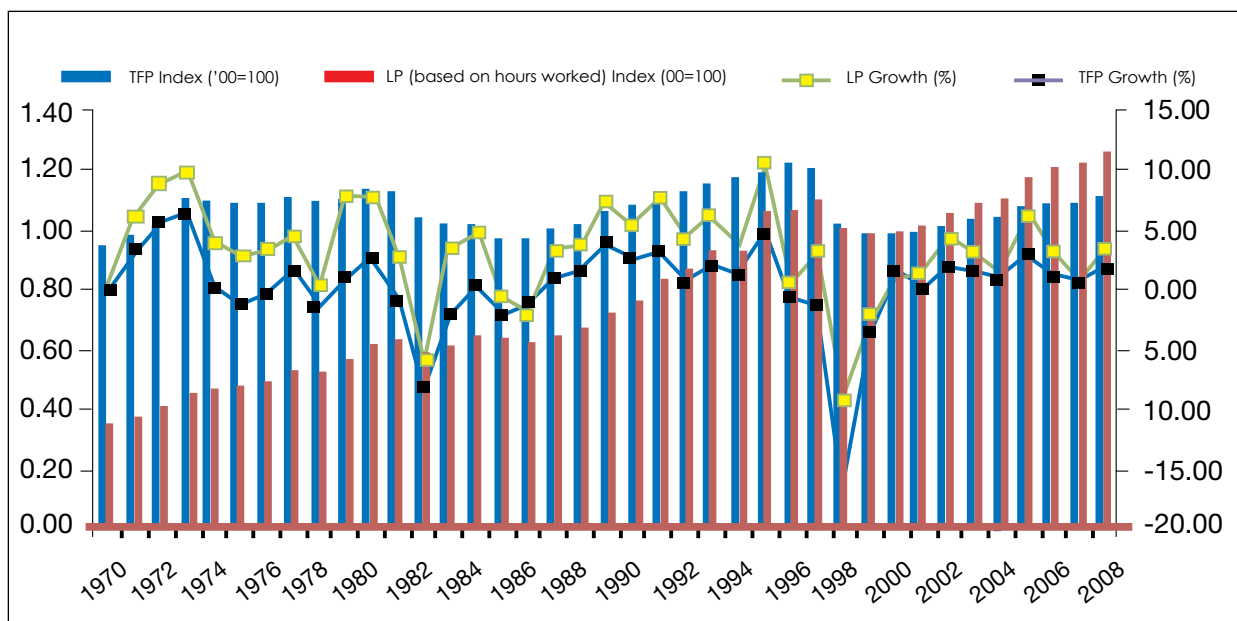


Figure 1. Trend of Labor Productivity and TFP in Indonesia  
Source: APO [1] and APO Productivity Database

that can drive improvements in productivity and competitiveness, as reflected in the Master Plan for Acceleration and Expansion for Economic Development, or MP3EI, policy to establish connectivity among regions.

In its early development, the country focused mainly on how to meet the demands of domestic food. As an agricultural country with a large population, Indonesia should be able to meet its domestic food needs. Development of the agricultural sector in the broad sense is ultimately expected to transform Indonesia into an industrialized country. In the early 1980s, Indonesia implemented import substitution policy to encourage the development of its domestic industry, followed by the development of the agricultural sector. However, the strategy of industrialization through import substitution policy showed unsatisfactory results, as the policy was supposed to set a sequence of other supporting policies. The success of the development strategy of the new order government until 1997 in maintaining economic growth on average of above 6% was supported by at least three factors: income from oil exports (oil boom), foreign loans, and FDI.

In order to increase productivity in the country, productivity movement programs were endorsed by the government since 1968. The productivity movement was kick-started by the Presidential Instruction number 15/1968, which assigned the Minister of Manpower, Transmigration and Cooperation to establish the National Productivity Council and the Minister of Manpower, Transmigration and Cooperation Decree number KEP-1000/MEN/1968. Along with its needs and challenges, in 1984, the Ministry of Manpower established the National Productivity Council, with the main task of providing advice to the government on establishing a policy to improve Indonesian productivity. Along with the progress of productivity achievement and a change in the nomenclature, based on the Presidential Regulation number 50/2005, the council transformed into the National Productivity

Institute (LPN). The main task of LPN is to provide recommendations directly to the president concerning development and improvement of national productivity. LPN is now the engine and central network for National Productivity Movement.

The National Productivity Movement is a part of the national strategy, which is directed to be a movement and to organize activities undertaken by all national components. The vision is to improve national productivity in a planned, sustained, coordinated, and integrated way. The goal of National Productivity Movement is to achieve and increase economic growth, competitiveness, and prosperity of the nation.

The basic strategies to enhance productivity, formulated under the LPN are:

- i. Improvement of the management system. This is a necessary condition at the macro level, which consists of the main agenda such as deregulation, debureaucracy, transparency, and improved public services. At the micro level, improvement of management is implemented through the concept of good governance
- ii. Development of technological innovation and engineering. The essence of this strategy is to increase the level of efficiency at every step of production activity and therefore, increase the quality of products
- iii. Improve the quality of human resources in order to increase productivity, which relies on the competency and professionalism of human resources to implement production activity
- iv. Development of productive culture

Indonesia is actively involved in various activities alongside other APO member countries, which were directed to improve national productivity. In the last 10 years (2000–10), numerous activities were conducted in

the country. These activities can be divided into trainings, workshops, seminars, promotions, and study meetings. As an agricultural-based country, Indonesia benefited from joint activities with other APO member countries, as focus was given to a variety of issues related to agriculture such as improving agribusiness value chain for Small Medium Enterprises, food safety management system, green productivity, agriculture and rural development, agro-processing enterprises, etc.

### **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

As an archipelagic country, Indonesia has unique characteristics that require special strategies to connect between and within the region. This condition must be observed; otherwise, the disparity between its regions will widen. The disparity may be caused by differences in the availability of infrastructure facilities such as education, health, roads, electricity, and clean water. Infrastructure is essential as the driving wheels of economic growth. The existence of infrastructure leads to an increase in productivity of production factors, and vice versa.

Studies by Prasetyo, Nuryartono, and Walujadi [3] showed that the infrastructure index calculated from the infrastructure of roads, water supply, and electricity between provinces in Indonesia indicate that the inequality is very high. Provinces in Java Island have higher index as opposed to other provinces with an index range of 50–85. The highest index was obtained by Jakarta. As the capital city, the availability of adequate infrastructure to support the economic and social activities is very important. However, the provinces in eastern Indonesia have low infrastructure index.

Quality human resource is a challenge for Indonesia. Currently about 50% of workers in Indonesia have primary school education, and only 8% have attained a formal diploma. The quality of human resources is affected by access to quality education and health facilities as well as access to basic infrastructure.

Facing the challenges ahead as well as an increasingly dynamic world economy, the government of Indonesia launched the Master Plan for Acceleration and Expansion of Indonesia Economic Development in 2011. With the implementation of the Master Plan, it is hoped that Indonesia is able to accelerate the development of various existing programs, especially in boosting value to prime economic sectors, increasing infrastructure development, and energy supply as well as the development of human resources, and science and technology [4].

The implementation strategy of Master Plan for Acceleration and Expansion of Indonesia Economic Development integrates three main elements:

- i. Develop the regional economic potential in six Indonesia Economic Corridors: Sumatra Economic Corridor, Java Economic Corridor, Kalimantan Economic Corridor, Sulawesi Economic Corridor, Bali-Nusa Tenggara Economic Corridor, and Papua-Kepulauan Maluku Economic Corridor
- ii. Strengthen national connectivity locally and internationally
- iii. Strengthen human resource capacity, and national science and technology to support the development of main programs in every economic corridor

These policies were combined in order to create an effective, efficient, and integrated national connectivity. Indonesia's national connectivity is part of the global connectivity. Therefore, the strengthening of national connectivity has to consider Indonesia's connectivity with the regional and global economic growth centers in order to enhance national competitiveness and optimize the advantages of Indonesia's regional and global connectivity (Coordinating Ministry for Economic Affairs, 2011).

## REFERENCES

- [1] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [2] Krugman P. The Myth of Asia's Miracle. *Foreign Affairs* 1994; 73 (6): 62–78.
- [3] Prasetyo R.B., Nuryartono N., Walujadi D. Impact of infrastructure and agglomeration on regional economic growth in Indonesia. Unpublished working paper of InterCAFE-Bogor Agriculture University; 2010.
- [4] Coordinating Ministry for Economic Affairs and National Development Planning Agency. Masterplan for Acceleration and Expansion of Indonesia Economic Development 2011–2025. Jakarta: Coordinating Ministry for Economic Affairs; 2011.

---

# ISLAMIC REPUBLIC OF IRAN

MOHAMMAD  
KAZEM EBRAHIMI  
KHORRAMABADI

## Managing Director

Iranian Lean Production and Services Company

---

## INTRODUCTION

### Islamic Republic of Iran (IR Iran) At a Glance

IR Iran is a country in southern and western Asia, and is the 18th largest country in the world with a total land area of 1,648,195 km<sup>2</sup> (636,372 sq mi). It has a population of about 75 million people and is of particular geopolitical significance owing to its location in the Middle East and central Eurasia. Tehran is the capital, the country's largest city, and the center of politics, culture, commerce, and industry. IR Iran holds an important position in international energy security and world economy as a result of its large reserves of petroleum and natural gas.

The Persian Constitutional Revolution established the nation's first parliament in 1906 within a constitutional monarchy. Growing dissent with foreign influence culminated during the Iranian Revolution, which led to the establishment of an Islamic republic on 1 April 1979.

IR Iran is a founding member of the UN, the Non-Aligned Movement, the Organization of the Islamic Conference, the Organization of the Petroleum Exporting Countries, and an early member of the Asian Productivity Organization (APO).

IR Iran spans an area roughly the size of the UK, France, Spain, and Germany combined, or somewhat bigger than the state of Alaska, USA.

### Economy of IR Iran

The economy of IR Iran is the 18th largest economy in the world by purchasing power parity (PPP). IR Iran's economy is a mixture of central planning, state ownership of oil and other large enterprises, village agriculture,

and small-scale private trading and service ventures. Its economic infrastructure has been improving steadily over the past two decades but continues to be affected by inflation and unemployment. In the early 21st century, the service sector contributed the largest percentage of the GDP, followed by industry (mining and manufacturing), and agriculture. In 2006, about 45% of the government's budget came from oil and natural gas revenues, and 31% came from taxes and fees.

Government spending contributed to an average annual inflation rate of 14% during the period of 2000–04. As at 2007, IR Iran earned USD70 billion in foreign exchange reserves, mostly from crude oil exports (80%). In 2009, GDP was USD336 billion (USD876 billion at PPP or USD12,900 at PPP per capita). In 2008, IR Iran's official annual growth rate was 6%. Due to these figures and the country's diversified but small industrial base, the UN classified IR Iran's economy as semi-developed in 1998.

Iranian budget deficits have been a chronic problem, mostly due to large-scale state subsidies totaling more than USD84 billion in 2008 for the energy sector alone. In 2010, the economic reform plan was approved by parliament to cut subsidies gradually and replace them with targeted social assistance. The objective is to move toward free market prices in a five-year period and increase productivity and social justice.

## PRODUCTIVITY DYNAMICS IN THE PAST 50 YEARS

### GDP

GDP is the most important index to show the economic stature of a country. Figure 1 illustrates the GDP trend in IR Iran in the past 40

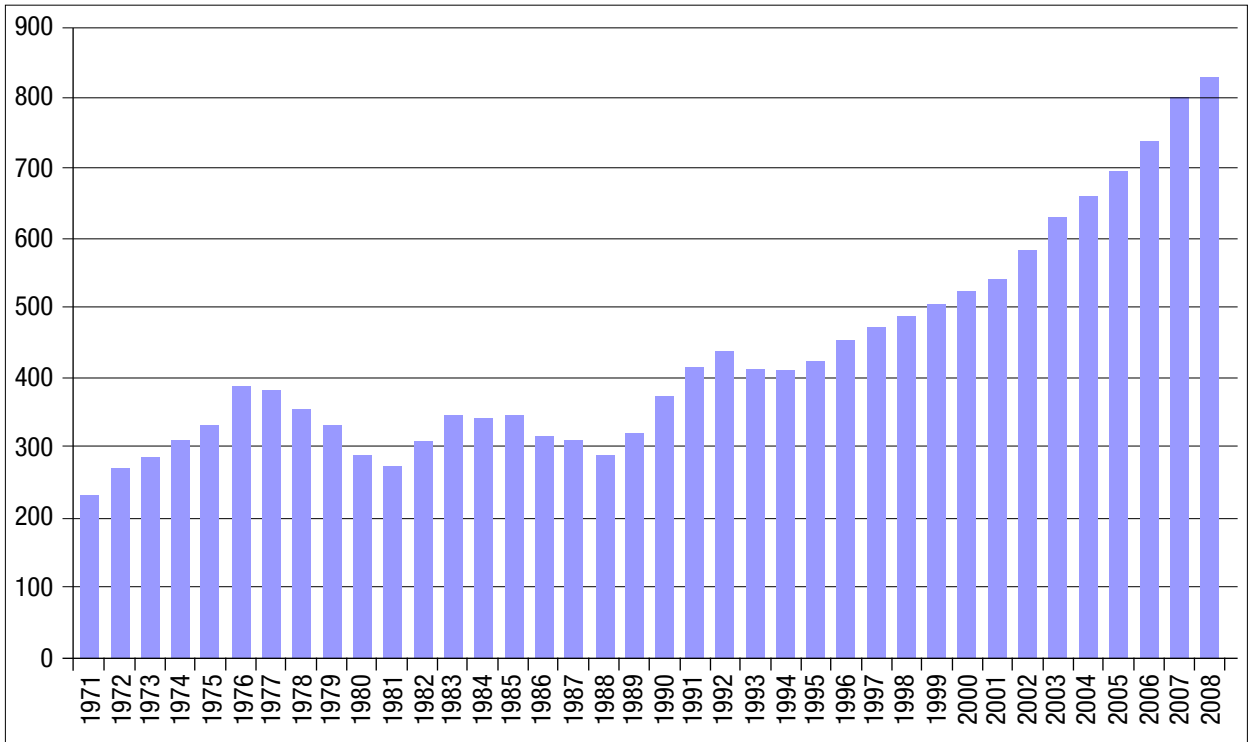


Figure 1. GDP at Constant Prices  
Source: APO [1]

years, highlighting a GDP average growth of 4% in this period. The growth was largely from capital growth and capital intensity.

In early 1979, the Islamic revolution succeeded as the Shah regime fell, and IR Iran was

established. The last phase of the revolution began in 1977. This period witnessed the start of anti-government demonstrations. The Iraq-Iran war took place in 1980 and lasted eight years. In 1988, after the war ended, the country's GDP grew continuously [1].

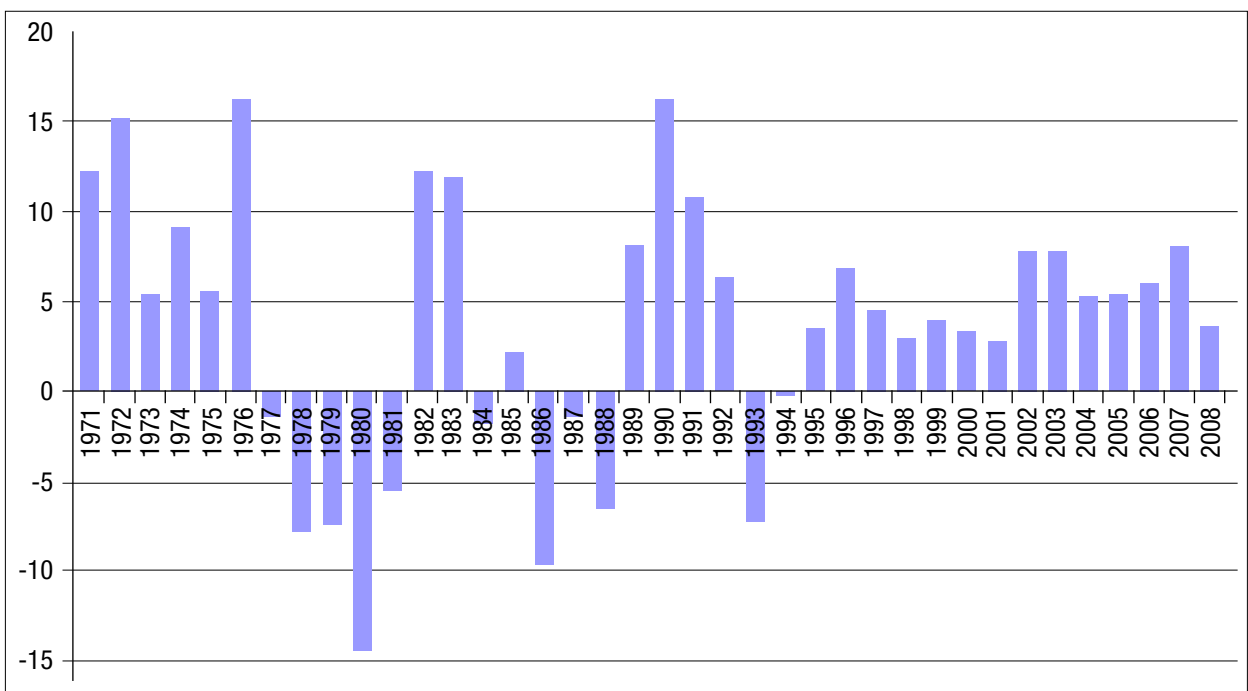


Figure 2. GDP Growth at Constant Prices  
Source: APO [1]



Table 1. Output Growth and Contribution of Labor, Capital, and Total Factor Productivity

Period	Output (%)	Labor (%)		Capital				TFP (%)	
				IT (%)		Non-IT (%)			
1970–75	9.4	1.1	(11)	0.0	(0)	4.4	(47)	3.9	(41)
1975–80	-2.9	1.6	(-55)	0.0	(-2)	5.3	(-183)	-9.7	(340)
1980–85	3.8	1.2	(31)	0.0	(1)	2.1	(56)	0.5	(12)
1985–90	1.4	1.2	(89)	0.1	(4)	0.2	(16)	-0.1	(-9)
1990–95	3.7	0.8	(23)	0.1	(2)	0.9	(24)	1.9	(52)
1995–2000	4.1	1.1	(26)	0.1	(2)	1.1	(26)	1.9	(45)
2000–05	6.8	1.6	(23)	0.2	(3)	2.4	(35)	2.6	(39)
2005–10	5.2	0.1	(1)	0.2	(3)	3.0	(57)	2.0	(39)
1970–2010	4.0	1.1	(27)	0.1	(2)	2.4	(61)	0.4	(9)

Source: APO [2]

### GDP growth

Figure 2 shows GDP growth from 1971–2008. In 1976–78, the GDP grew at a very healthy rate. In 1977, the people's anti-regime demonstration commenced, resulting in negative GDP growth, and it was consistent in the years of the Iraq-Iran war.

After the Iraq-Iran war ended in 1989, the GDP growth was positive with a high average; the country's potential shifted to the national production development [1].

The government's investment rate from 1970–76 was very high. However, 1977 onwards saw workers from various industries engaging in strikes alongside the war. Investment rate was consistently negative. The rate grew to an average of 5% from 1989 onwards.

The most important economic growth indicator at the national level is the GDP. As shown in Table 1, the average GDP growth rate over 40 years (1970–2010) was 4% with 27% contributed from labor, 61% from capital, and 9% from TFP [2].

Table 2: Role of TFP and Capital Deepening in Labor Productivity Growth from 1970–2010

Period	Labor Productivity (%)	Capital Deepening				TFP (%)	
		IT (%)		Non-IT (%)			
1970–75	7.2	0.1	(1)	3.2	(45)	3.9	(54)
1975–80	-6.0	0.0	(-1)	3.7	(-60)	-9.7	(161)
1980–85	1.4	0.0	(2)	0.9	(64)	0.5	(34)
1985–90	-1.4	0.0	(-3)	-1.3	(94)	-0.1	(9)
1990–95	1.4	0.0	(3)	-0.5	(-39)	1.9	(136)
1995–2000	1.0	0.1	(7)	-0.9	(-89)	1.9	(182)
2000–05	2.3	0.1	(6)	-0.5	(-22)	2.6	(116)
2005–10	4.9	0.1	(3)	2.8	(56)	2.0	(41)
1970–2010	1.3	0.1	(5)	0.9	(67)	0.4	(27)

Source: APO [2]

The average labor productivity growth rate from 1970–2010 was 1.3%, with a deepening in capital (IT and Non-IT) at 72% and TFP at 27% [2].

### **Import and Export**

Two of the most important indices in a country are its import and export, as they indicate the openness of its economy. IR Iran's main exports are crude oil and gas. From 1971–86, the export growth rate slowed down due to war, but from 1987–2008, it was consistently positive. Crude oil and gas made up more than 60% of the country's total export.

Import in IR Iran has a strong relationship with its oil and gas export. From 1971–1975, the rate was stable until its dip during the Islamic revolution in 1976 and the eight-year Iraq-Iran war that lasted until 1998. One of IR Iran's basic state policies during the said period was self-sufficiency, which resulted in decreased import. Oil export was also limited during these years, as the foreign currency was equally inadequate and the cost of war was high.

It was only in 1994 that the rate of import growth saw a positive increase, while from 2000–08, the import growth rate had stability [1].

### **Total Employees**

The number of total employees from 1971–2007 grew an average of 3.3% per year. In 2007, IR Iran had 22 million employees out of a total population of 70 million people. The rate of employee per total population was very low, as 30% of its people were under 15 years old [1].

### **R&D**

For a long period, no data was available for R&D cost per GDP. The Central Bank of Iran (CBI) possessed data of 10 years, and some R&D cost data were available from the bank's vice president for planning and controlling documents. The R&D cost in IR Iran consists of a governmental budget that is approved by parliament during its annual budget and allocated to different organizations. Most of these organizations spent the budget in various areas that are not related to the research templates.

In most cases, when the government was faced with a budget deficit, the R&D budget was the first to be cut. In IR Iran, there are not many multinational companies that allocate a percentage of their profits to R&D to create new products or to design new processes to produce lower cost products while increasing productivity. Most of the large companies are state companies and the market is not yet fully competitive [3].

### **Schooling**

Schooling for youth grew promptly after the revolution. IR Iran worked hard to send all its children and youth to school. The average growth rate of this index increased every year [4].

### **Students**

When the Iraq-Iran war ended, the number of university students increased rapidly. After the Islamic revolution, one of the most important policies was the development of universities in government, nongovernment, and private sectors. The policy saw the development of various universities such as Azad University, the largest nongovernment university in the world that boasts more than two million students in various branches nationwide. The higher education sector was the first to be privatized in IR Iran. Currently, there are more than 4.5 million students in the country.

Figure 3 shows the labor productivity and TFP trend for 40 years. From 1971–76, labor productivity increased, but the period of instability saw it decline until 1988 [1–5]. As highlighted earlier, the end of the Iraq-Iran war placed labor productivity on a continuous increase at a very low rate. The figures also show the trend of TFP, which is almost similar to the changes of labor productivity with a time lag. IR Iran's economy was based on crude oil and gas exports, and a high percentage of government income, annual budget, and exports came from its oil. Thus, the government was not serious about improving productivity.

In the second and fourth five-year development plans, there were articles that discussed plans for productivity improvement, but neither

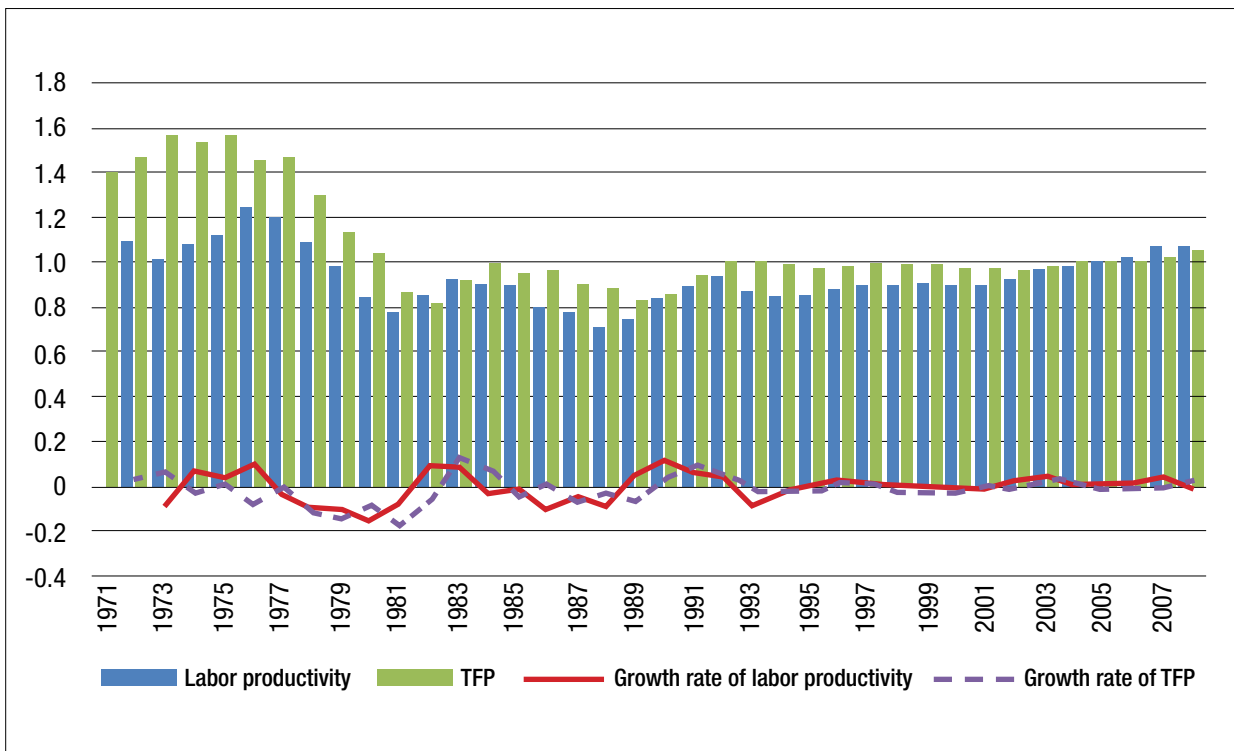


Figure 3. Labor Productivity & TFP and Growth of Labor Productivity & TFP growth  
 Source: APO [1, 2] for labor productivity; CBI for TFP

government nor parliament allocated any budget to implement them. At the end of the development plan, there were still no positive changes. There appeared to be a lack of confidence in supporting productivity.

The growth rates of labor productivity and TFP are also highlighted in Figure 3. From 1971 to 1974, the growth rate of labor productivity and TFP were positive. Since 1975, the growth rate of labor productivity and TFP experienced positive development.

### FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY

#### Result of Regression

Regression was applied to both labor productivity growth and TFP with some variables that show logical relationships between the variables and labor productivity growth as well as TFP. Table 3 highlights some conclusions as follows:

#### i. Average schooling years

The variable has had a positive influence on labor productivity growth; 1% change in this variable gives 1% change in labor productivity growth.

#### ii. R&D cost per GDP

The influence of this variable on labor productivity growth doesn't appear very high due to the government-allocated R&D budget that was not spent on the right activities.

#### iii. Export per GDP

The influence of this variable on labor productivity growth was very low, as most of the Iranian exports included crude oil and gas. Some surveys showed that 60%–70% of total exports were provided by oil and gas. In non-oil export, only 9% of total exports were manufactured products.

Table 3. Regression Analysis of Labor Productivity Growth in IR Iran from 1971–2008

Item	Model 1	Model 2	Model 3	Model 4
(Constant)	0.008 (0.746)	-0.012 (0.524)	0.021 (0.418)	0.003 (0.913)
Dln(EDU)	0.216 (0.75)	1.003 (0.088)	-0.062 (0.929)	0.204 (0.769)
Dln(RD/GDP)	0.022 (0.598)	-0.001 (0.971)	0.029 (0.489)	0.027 (0.535)
Dln(EX/GDP)	0.067 (0.573)	0.111 (0.217)	0.055 (0.638)	0.048 (0.696)
Dln(INVEST/GDP)	0.039 (0.58)	-0.027 (0.626)	0.036 (0.604)	0.023 (0.764)
Dln(GOV/GDP)	-0.25 (0.001)	-0.201 (0.001)	-0.227 (0.003)	-0.223 (0.008)
Dln(IM/GDP)	- -	0.132 (0.006)	- -	- -
Dln(k/l)	- -	- -	-0.469 (0.227)	- -
Dln(STU/EM)	- -	- -	- -	0.047 (0.476)
Adjusted R <sup>2</sup>	0.457	0.713	0.485	0.436
F	3.866	8.033	3.666	3.19
Significance	.026(a)	.002(a)	.030(a)	.046(a)
Durbin-Watson	1.367	1.374	1.429	1.343
N	36	36	36	36

Source: APO [1] and CBI for total number of students

Note: Dependent variables are Dln (labor productivity)

Description of variables:

- EDU: Average schooling year
- RD cost/GDP%
- EX/GDP: Export/GDP\*100
- IM/GDP: Import/GDP\*100
- INVEST/GDP: Government investment/GDP\*100
- GOV/GDP: Government consumption/GDP\*100
- K/L: Total investment/total employment
- STU/EM: Total students/Total employees

Table 4. Regression Analysis of TFP Growth in IR Iran from 1971–2008

Item	Model 1	Model 2	Model 3	Model 4
(Constant)	-0.024 (0.311)	-0.037 (0.123)	-0.034 (0.199)	-0.026 (0.324)
Dln(EDU)	0.92 (0.174)	1.424 (0.05)	1.129 (0.122)	0.916 (0.195)
Dln(RD/GDP)	0.047 (0.264)	0.032 (0.417)	0.042 (0.323)	0.048 (0.277)
Dln(EX/GDP)	0.015 (0.894)	0.043 (0.681)	0.024 (0.831)	0.01 (0.934)
Dln(INVEST/GDP)	0.013 (0.841)	-0.029 (0.666)	0.016 (0.814)	0.009 (0.903)
Dln(GOV/GDP)	-0.075 (0.198)	-0.043 (0.432)	-0.092 (0.141)	-0.068 (0.335)
Dln(IM/GDP)	- -	0.084 (0.098)	- -	- -
Dln(k/l)	- -	- -	0.353 (0.351)	- -
Dln(STU/EM)	- -	- -	- -	0.013 (0.842)
Adjusted R <sup>2</sup>	0.05	0.201	0.046	-0.033
F	1.179	1.714	1.136	0.911
Significance	.375(a)	.208(a)	.403(a)	.522(a)
Durbin-Watson	1.907	1.836	1.833	1.962
N	36	36	36	36

Source: APO [1], CBI, and NIPO (for TFP)

Note: The figures in parentheses in Tables 3 and 4 are significant (2-tailed)

iv. Government investment per GDP

Table 3 shows the influence of this variable on labor productivity growth was very low; 1% change in this variable resulted in 0.3% change in labor productivity.

v. Government consumption per GDP

This variable had a high influence on labor productivity growth. It was interesting to note that it was applicable to all models and its influence was negative for all as well. When government consumption was raised, it led

to a larger government, resulting in restricted private economy activities.

vi. Import per GDP

Model 3 shows the influence of this variable on labor productivity growth as meaningful and positive; this was largely because machinery and production tools were the main imports.

vii. K/L per GDP

Model 4 shows the influence of this variable on labor productivity growth. The model

features the changes of this variable that had a strong influence on labor productivity growth changes.

#### viii. Student per employee

This variable defines the number of university students in total employment. In the last 22 years, IR Iran has had a policy in place to develop the sector of higher education. Currently, IR Iran has 4.5 million university students in both state and private universities. When the number of students increases, it is logical to expect that the educated population will also increase with an eventuality that they will be employed. Thus, labor productivity growth is expected to increase too.

However, Table 3 shows that the influence of this variable was very low on labor productivity. This factor may be attributed to a large percentage of the educated population that were unable to find the right jobs, and that many were also unemployed. The rate of unemployment among the highly educated population was very high in comparison to the others, resulting in an imbalance to the development of the economy.

The regression function in Table 4 was not approved in any models as the sig(F) was very high and adj-R was very low in all models.

## PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

### Productivity Organization

The organization responsible for leading and monitoring productivity is the National Iranian Productivity Organization (NIPO), where it underwent several transformations. IR Iran reactivated its APO membership in 1985, while NIPO was established in 1992 under the supervision of the Ministry of Heavy Industries and later affiliated to the Ministry of Industries. In 1998, NIPO was attached to the Management and Planning Organization and then affiliated to the vice president of Planning and Strategic Supervision.

In 2006, after merging with the Management and Planning Organization, the National Iranian Productivity Center was established, and the mission was to develop and disseminate the application of knowledge and experience to improve productivity.

Major NIPO activities in the past years (1970–2010) were as follows:

- i. 1970–1980
  - Support the establishment of productivity institutions
- ii. 1980–1990
  - Promote productivity culture and suggest methods for improvement
- iii. 1990–2000
  - Develop national and international communication, and cooperation on productivity
  - Provide consultancy services and research studies related to productivity
  - Promotion of productivity at all levels through training, publicity, press, and publications
  - Suggest policies and guidelines on productivity improvement
- iv. 2000–2010
  - Collect data and experiences on productivity improvement
  - Promote productivity measurement techniques and develop suitable models

### Cooperation with the APO

NIPO underwent 80 training courses and three projects per year in cooperation with the APO. Most of these projects are short-term training projects [5].

## ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY

A SWOT analysis was carried out in order to improve productivity:

- i. Strengths
  - NIPO structure was approved by government

- Governmental budget
  - Vice presidency supervision
- ii. Weaknesses
- Limitation in decision making
  - Full governmental structure
- iii. Opportunities
- Fifth 5-year development plan
  - Reform on energy prices
- iv. Threats
- Industries adopting new prices
  - Income from oil export

### Issues and Challenges

Main economic challenges are:

- Government downsizing
- Developing privatization
- Changing budgeting system to zero-base budgeting
- Increasing sustainable jobs
- Decreasing inflation
- Increasing sustainable GDP growth rate

Based on the mentioned challenges, the NIPO faces the following:

- To create productive methods to facilitate said challenges
- To change the mentality of top management to focus on productivity
- Focus on productivity as a main criterion to make total policies by policy makers [5]

From 2010–14, the plan and functions of the NIPO were as follows:

- To guide, support, and supervise the promotion and dissemination of productivity related information and issues
- To generate and facilitate local expertise in the field of productivity

- To establish an information and reference center for productivity indices for the country and management systems
- To enhance and facilitate the development of human resource in productivity
- To advise, facilitate, and coordinate the implementation of programs and activities related to productivity
- To assess, facilitate, and certify supervisory productivity training and programs conducted by the private sector for the public
- To provide consultancy services relating to productivity
- To collect, produce, and publish information on productivity and other related matters
- To report annually to the government on the progress and problems of raising productivity in the economic, cultural, and social sectors, and to make recommendations on the manner in which such problems may be dealt with [5]

### REFERENCES

- [1] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [2] Asian Productivity Organization. APO Productivity Databook 2012. Tokyo: Asian Productivity Organization; 2012.
- [3] Management and Planning Organization of Iran. 25 Years (1978–2003): IR Iran Government Report (in Persian). Tehran: Management and Planning Organization of Iran; 2004.
- [4] Barro R., Lee J-W. A New Data Set of Educational Attainment in the World, 1950–2010. Available from <http://www.barrolee.com>.
- [5] Mirzaee M. Productivity change in IR Iran (In Persian). Paper presented at the National Conference on Productivity, Tehran, IR Iran, 22–23 May 2009.

# JAPAN

DR. TSUTOMU MIYAGAWA

**Professor**

Department of Economics  
Gakushuin University

## INTRODUCTION

### The Structure of Economic Activities

Young [1] and Krugman [2] argued that productivity improvement is indispensable for long-term economic growth. Japan has achieved economic recovery from the devastation of World War II and rose to become the second largest economy in the world. What roles has productivity played in the growth process of the Japanese economy?

It is believed that Japan lost approximately 20%–30% of its production facilities due to the devastation caused by World War II. As a result, Japan's GDP, immediately after the war dropped to approximately 55% from its level during the war. Japan's GDP, in 1951, converted on the basis of purchasing power parity (PPP) in 1995, was USD217 billion, and it has since started rapid economic recovery.

Japan's GDP in 2008 grew to approximately USD4 trillion, about 20 times more than 1951. During this period, the economic growth rate was 5.3% per year.

The history of Japan's postwar economic development can broadly be divided into three phases; the first phase from 1950–70, the second from 1970–90, and the last, from 1990 to the present. The first phase is widely known as a high economic growth period, with an average annual economic growth rate of 10% for the period of 1951–1970. Fueled by robust economic growth, Japan rapidly became the world's second largest economy.

At an early stage of the high economic growth period, most Japanese business leaders were already aware that productivity improvement would lead to higher living standards and were gathering information on productivity-

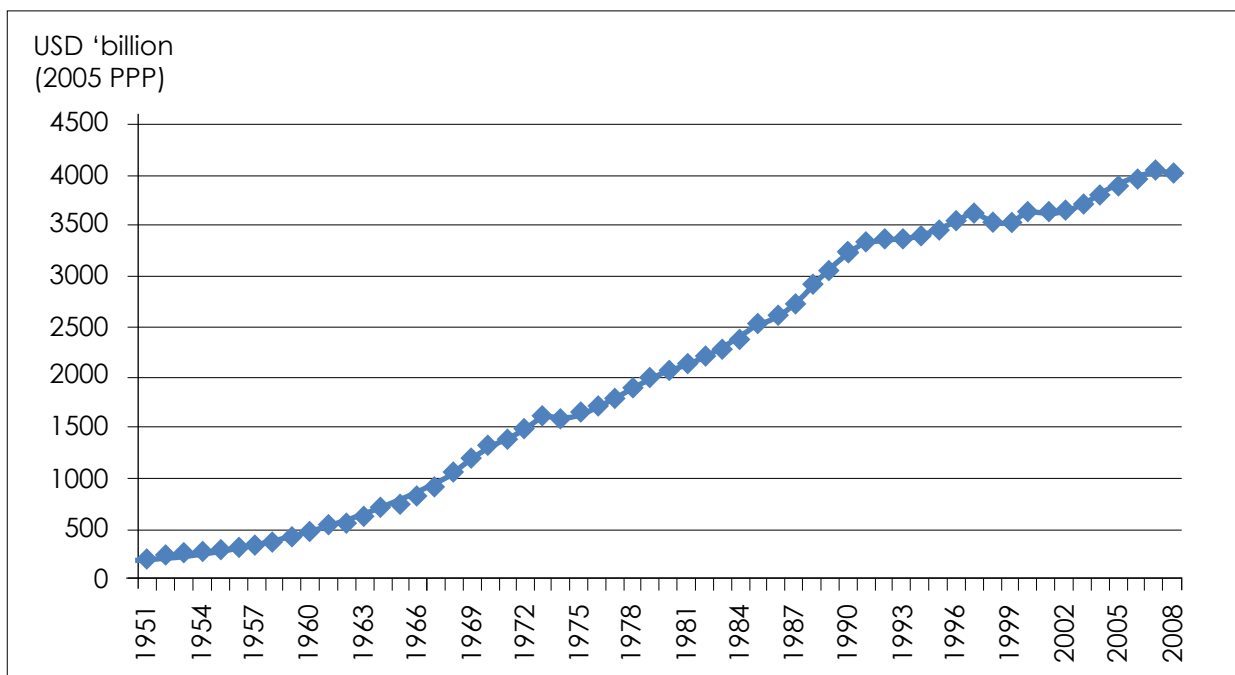


Figure 1. GDP in Japan

Source: APO Productivity Databook 2011 and SNA in Japan



improvement movements in Western countries. These movements evolved into the establishment of the Japan Productivity Center (JPC) in 1955, which allowed management and labor unions to work together toward improving productivity.

Unique features were observed during Japan's high economic growth, compared to Asian countries that later experienced similar high growth phases. First, during the high growth period, productivity growth played a much more significant role in Japan than in any other Asian country. Young [1] and Krugman [2] pointed out that high growth in Asian emerging nations from the late 1980s to the early 1990s was driven by accumulation of inputs, not by productivity growth. In Japan, on the other hand, the growth of total factor productivity (TFP) accounted for as high as 6% of the total economic growth of 10% per year for the period of 1955–1968 [3]. The other factor was that such productivity improvement was achieved by technological progress and accumulation of capital of domestic firms rather than by introduction of foreign capital. This is also different from the recent economic growth pattern, in which new technologies were introduced together with investments made by foreign firms. Such domestic capital accumulation in Japan was supported by high savings rate.

The first 10 years of the second phase saw drastic changes in economic conditions that had previously supported Japan's high economic growth. Oil crisis hit Japan twice and the country made a transition to a floating exchange rate system. As a result, Japanese firms faced the export environment less favorably than previously enjoyed with lower energy prices and under a fixed exchange rate system. Japan successfully went through structural changes in response to these challenges and continued a stable growth of 4%–6% in the 1980s. Coupled with the rapid appreciation of the yen after the mid-1980s, Japan ranked among the highest in terms of national income per capita in 1990.

The third phase began with the collapse of the economic bubble in the late 1980s. This phase of the period is called the “lost two decades”. Over the last two decades, the Japanese economy grew only at an average rate of approximately 1% per year. Compared with the accelerated economic growth in Asia and other emerging countries as well as the continued growth rate of 3%–4% in the USA that was driven by the fruits of commercialization of the IT revolution, Japan's protracted slower growth was widely viewed as an extraordinary phenomenon. However, the perception that Japan's experience over the last two decades is not something extraordinary is spreading. But the USA's economy after the Lehman shock in 2008 and the current economic crisis in Europe threatening global economy indicate how difficult it is to recover from an economic crisis that might eventually lead to the collapse of financial systems.

## **PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS**

### **GDP and TFP Growth by Periods**

The Databook published by the Asian Productivity Organization (APO) highlighted sources of economic growth between 1970 and 2008, using growth accounting framework (Figure 2). As mentioned earlier, TFP growth greatly contributed to the high economic growth in the 1950s and 1960s. In the 1970s, however, the production facilities that had been built under the assumption of low oil prices became commercially unfeasible due to the oil crisis. As a result, capital accumulation did not contribute to output growth, resulting in negative rate of TFP growth. However, as Japanese firms actively made investments aimed at saving energy and labor, Japan turned again into the economy in which TFP growth drove the economy in the 1980s.

Table 1 shows the top 10 industries in terms of growth rate (on real gross output basis) in every decade from the 1970s to 2000s, which was calculated from the Japan Industrial Productivity (JIP) database. High economic growth in the 1960s was mainly driven by the

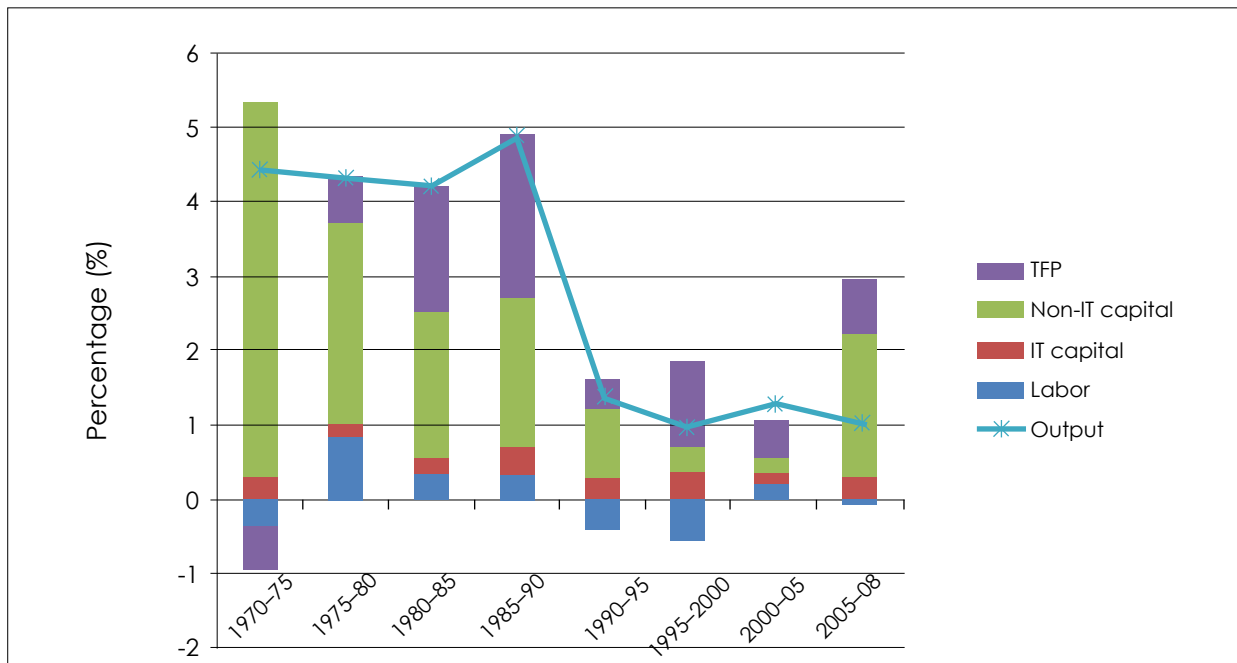


Figure 2. Growth Accounting in Japan

chemical and heavy industries such as steel and metal products. However, the growth in these industries slowed down due to soaring energy costs after the oil crisis in the 1970s. Instead, automobile and electric machinery industries began to lead the Japanese economy. The oil crisis struck a blow to industries in Japan more severely than any other industrialized nations, particularly the chemical and heavy industries, which had led Japan's high economic growth. Experiences of oil crises prompted the Japanese industries to find energy-saving products and manufacturing processes.

As a result, products made in Japan increasingly gained worldwide acceptance, recording a significant increase in Japan's trade surplus in the early 1980s. However, greater success of the Japanese industries caused trade frictions with other industrialized nations. In coping with the situation, Japanese automobile and electric machinery industries accelerated foreign direct investments in overseas markets. Such rapid expansion of the Japanese industries contributed to the growth of financial service industries, which supported the overseas expansion of Japanese firms. Insurance and finance industries came in

10th and 13th place, respectively, in the industry growth rate ranking. Fast-growing financial service sectors also aggressively invested domestically, which led to the bubble economy in the late 1980s, where asset prices of land and stock skyrocketed.

Japan's economic growth has slowed down dramatically since the 1990s. Though the collapse of the asset bubble was an immediate factor behind the slowdown, prolonged stagnation even after the adjustment of asset prices was attributable to the supply side of the economy<sup>1</sup>. One of the factors that was strikingly different between pre-1990 and post-1990 is that labor input turned negative from positive. More importantly, contributions of non-IT capital also greatly decreased and TFP growth rate declined considerably in the early 1990s.

Figures 3 and 4 focus on the productivity growth of the manufacturing sector and the service sector. In Japan, the productivity growth of the manufacturing sector has consistently surpassed that of the service sector. TFP growth rate of the manufacturing sector recovered to 2.6% in the 2000s after dropping to 1% in the 1990s. In contrast, TFP growth rate of the

Table 1. Top 10 Growth Industries in Japan

	1970s	1980s	1990s	2000s (until 2008)
1	Electronic data processing machines, digital and analog computer equipment, and accessories	Electronic data processing machines, digital and analog computer equipment, and accessories	Semiconductor devices and integrated circuits	Rental of office equipment and goods
2	Semiconductor devices and integrated circuits	Video picture, information, character information production, and distribution	Telegraph and telephone	Household electric appliances
3	Office and service industry machines	Semiconductor devices and integrated circuits	Communication equipment	Electronic data processing machines, digital and analog computer equipment and accessories
4	Information services and Internet-based services	Office and service industry machines	Electronic parts	Semiconductor devices and integrated circuits
5	Household electric appliances	Electronic equipment and electric measuring instruments	Information services and Internet-based services	Electronic parts
6	Air transportation	Communication equipment	Rental of office equipment and goods	Water transportation
7	Pharmaceutical products	Rental of office equipment and goods	Electronic data processing machines, digital and analog computer equipment and accessories	Other transportation equipment
8	Motor vehicle parts and accessories	Electronic parts	Broadcasting	Motor vehicles
9	Electronic parts	Information services and Internet-based services	Gas and heat supply	Glass and its products
10	Motor vehicles	Insurance	Other services for individuals	Motor vehicle parts and accessories

Source: JIP 2011 Database

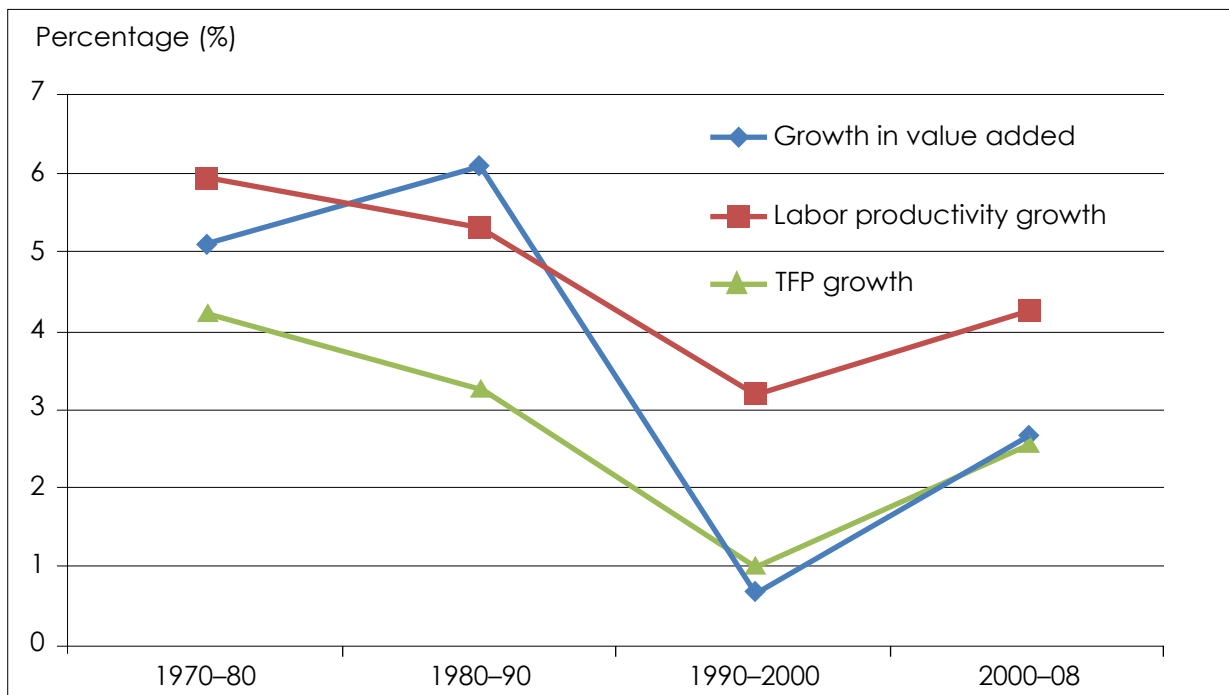


Figure 3. Productivity Growth in the Manufacturing Sector  
Source: JIP 2011 Database

service sector shows only 0.3% increase per year in the 2000s after it turned negative in the 1990s. In light of the fact that service sector accounts for more than 50% of Japan's total

value-added, it can be determined that Japan's continued low productivity growth since the 1990s is affected by low productivity growth of the service sector. For example,

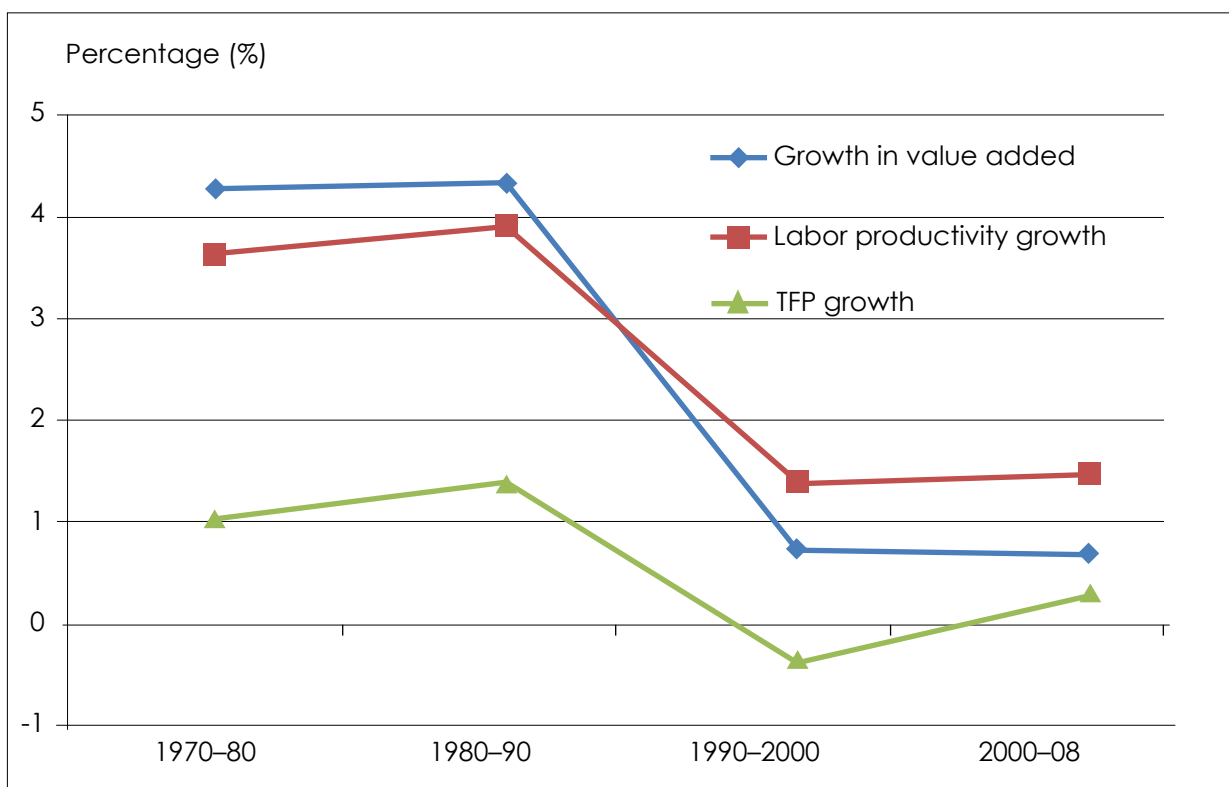


Figure 4. Productivity Growth in the Service Sector  
Source: JIP 2011 Database

although welfare service industries have been expanding after the introduction of long-term care insurance system in the 2000s, productivity growth and workers' wage of the welfare industry remained low due in part to regulatory issues and unprofessional management.

## FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES

As observed, Japan's productivity growth rose considerably in the 1980s but remained weak after the 1990s. Various factors come into play in explaining the productivity movement of the Japanese economy.

TFP growth rate, generally seen as a proxy variable of technological advancement, has been widely considered to be raised by an increase in the ratio of R&D investment to GDP (RD). However, other factors in addition to the R&D ratio were added to the recent analysis. On top of the R&D investment ratio, IT Investment (IT), net export (NE), and public investment (PI) were examined as possible factors affecting productivity.

Accumulation of IT capital not only promoted economic growth through capital deepening effects, but it also improved TFP growth rate through network externalities, as shown by Miyagawa, Ito and Harada [5]. In the analysis, the ratio of IT capital to GDP was used. The IT capital figure was obtained from JIP database. Though IT capital can be defined in various ways, JIP database included computers and related machinery, communication equipment, and software in its definition of IT capital.

Increase in external trade serves as a measure of the nation's openness to the world. A highly open economy is more likely to introduce new technology that can lead to productivity improvement. In the analysis, data on net export obtained from national economic accounting was added to explanatory variables, where it was regarded as a proxy variable of economic openness.

Lastly, public investment contributed to business infrastructure that played an essential role in facilitating efficient production. In the analysis, the ratio of public investment to total investment was calculated, based on national economic accounting. The ratio was used as an explanatory variable. The equation to be estimated using these explanatory variables can be expressed as follows:

$$TFPG_t = const + \alpha_1 RD_{t-1} + 3NE_{t-1} + 4PI_{t-1} + u_t$$

As a dependent variable, in addition to TFP growth rate (TFPG), labor productivity growth was used on a man-hour basis (LPG1) as well as labor productivity growth on a per-worker basis (LPG2). A one-year lag for explanatory variables was taken to avoid a simultaneous bias (time period: 1972–2008). Computations were performed in two ways. First, by using RD only as an explanatory variable, and second, by using all the explanatory variables. Estimation methods used are the Ordinary Least Squares, and the results are summarized in Table 2.

As shown in Table 2, the regression analysis used RD as the only explanatory variable, indicating that R&D investment improved TFP, but it did not enhance labor productivity growth. In addition, the coefficient was not significant when TFP growth was a dependent variable. When the other variables were included in the regression, the results of the R&D variable were similar to the previous results.

Three possible explanations arise. First, the ratio of R&D investment to GDP fell rapidly since 1990, after it rose from 1.8% in 1970 to 2.9% in 1990. Thus, it seemed that the ratio cannot adequately capture the productivity movement after the 1990s<sup>2</sup>. The second explanation is that movement in R&D investment has become less significant in the overall productivity movement, as the weight of the service sector, which is generally less R&D-based, increased. On the other hand, the weight of the manufacturing sector, which was generally R&D-oriented, decreased as Japan's industrial structure changed over time.

Table 2. Estimation Results of Productivity Regression

Dependent Variable	TFP Growth	TFP Growth	LPG1	LPG1	LPG2	LPG2
RD	0.462 [0.476]	3.873 [2.511]	-1.450 *** [0.455]	-0.889 [2.409]	-1.494 *** [0.527]	-0.392 [2.741]
IT	- -	-1.211 [0.839]	- -	-0.271 [0.805]	- -	-0.459 [0.916]
NE	- -	0.482 * [0.266]	- -	0.647 ** [0.255]	- -	0.764 ** [0.290]
PI	- -	0.053 [0.048]	- -	0.03 [0.046]	- -	0.05 [0.052]
constant	-0.520 [1.314]	-8.455 * [4.775]	6.872 *** [1.256]	4.414 [4.582]	6.488 *** [1.453]	2.382 [5.212]
No. of observations	38	38	38	38	38	38
Adj. R~R	-0.002	-0.127	0.198	0.295	0.160	0.287

Note: i. Figures in parenthesis are standard values

ii. \*, \*\*, \*\*\* show that the coefficient is significant at 10%, 5%, and 1% levels, respectively

Thirdly, as R&D investments became more IT-related, both investments began to overlap, resulting in insignificance of coefficients of IT investment.

It is estimated that net export was found to contribute to productivity improvement significantly in any estimation. In the 1980s, machinery industries, which increased export, rapidly supported the economic growth in Japan. After the collapse of the economic bubble, Japanese firms depended on exports more than ever due to the stagnated domestic demand. These factors explain the significant effects of net export on productivity growth.

On the other hand, public investment did not show significant results, probably because infrastructure-building public investment that were heavily conducted during the 1950s and 1960s had phased out since the 1970s, and the emphasis of public investment moved to raising the living standard in rural areas to mitigate regional imbalance.

## PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

At the beginning of the recession that eventually prolonged after the 1990s, the Japanese government believed that an increase in government spending would rebound the economy. However, the financial crisis that occurred in 1997 had the government placing a bigger priority on disposal of non-performing loans than economic recovery in order to stabilize the financial system. Though the disposal of bad loans had mostly been settled in 2003, the Japanese government then faced fiscal constraints, which restricted its ability to stimulate the economy by fiscal measures, due to large budget deficits and accumulated government debt.

Against the backdrop of a decline in working-age population since the mid-1990s, greater attention was drawn to growth strategies, mainly targeted at improving productivity. Table 3 shows a list of growth strategies announced by the government since 2000. It shows that different growth strategies were announced almost every

Table 3. Growth Strategies After 2000

Strategy	Month and Year Issued	Prime Minister	Forecasting Period
Mid-term forecast of structural reforms, economy, and government budget in Japan	January 2002	Koizumi	2002–06
The vision of the 21st century	April 2005	Koizumi	2005–30
Economic growth strategy	July 2006	Koizumi	2006–16
Forecast and strategies of the Japanese economy	January 2007	Abe	2007–11
The forecast and strategies of the economic and fiscal policies in the next 10 years	January 2009	Aso	2009–18
New growth strategy	June 2010	Kan	2010–16

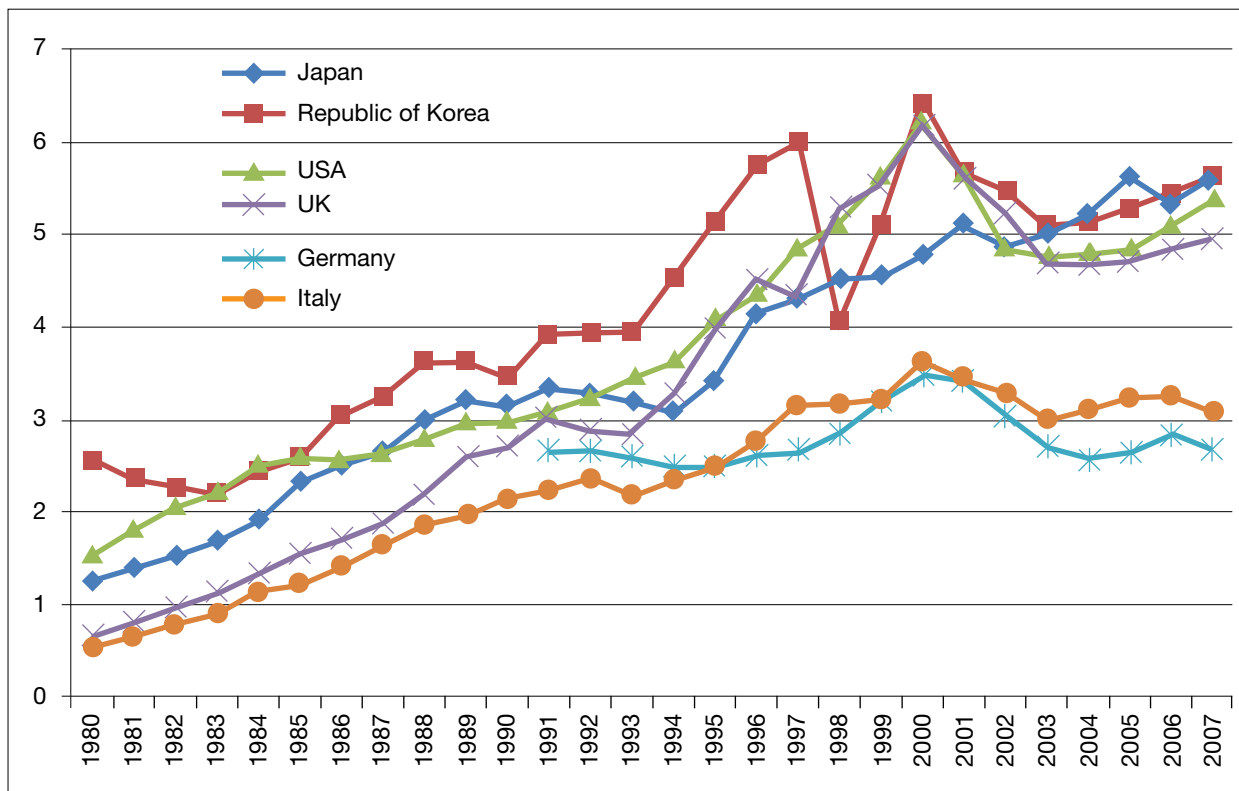


Figure 5. IT Investment/GDP Ratio in Major Developed Countries from 1980–2007  
 Source: Fukao, Miyagawa, Pyo, and Rhee [7]

year after the Koizumi administration helped the economy turn the corner of the bad loan problems. However, since prime ministers resigned almost every year after the Koizumi administration, a number of new growth strategies were created before the effects of previous mid- to long-term strategies were sufficiently evaluated.

Among such comprehensive growth strategies, Japan has particularly endeavored to promote IT investment since the late 1990s. As Jorgenson [6] argued, IT revolution is the major factor that drove the USA economic growth after the late 1990s. Tax incentives for IT investment were given between 2003 and 2006, allowing corporations to choose a tax credit (10% of the purchase) or a special allowance for accelerated depreciation (50%). Due in part to such policies, IT investment increased to 5.6% of GDP (2007), a level similar to the USA and Korea (Figure 5). Thus, as shown in Figure 2, IT capital steadily contributed approximately an annual 0.3% to the economic growth instead of being much affected by the economic cycle. The significance of IT capital was also quantitatively supported, as described in the previous section.

However, the degree of contribution of IT capital to growth differed greatly across industries. As shown in Table 4, while IT capital made significant contributions in IT industries such as electronics and communications equipment, contributions of IT capital in distribution services (including retail industry) as well as personal and social services (including medical services) remained low compared to other industrialized nations. A highly fragmented retail industry composed of many small- to medium-sized companies was less incentivized to introduce IT equipment. Medical service industry fell behind in establishing networks between service providers. These factors were considered to be responsible for stagnant productivity of the service sector.

The JPC set up a council called Service Productivity and Innovation for Growth (SPRING) in 2007 with the aim of improving productivity

in the service industry. Examples of SPRING's activities included "Japan 300 High-Service Award" to recognize the best practice firms in the service sector, as well as the development of Japanese Customer Satisfaction Index. It also held workshops designed to improve productivity in medical care and welfare.

## ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY

Continuous disclosure of internationally comparable and academically supported productivity index is critical to designing measures aimed at sustainable productivity growth. The JPC has continued to publish sectoral productivity data since 1958, shortly after the organization was founded. These statistics, which cover the longest period of productivity data in Japan, record monthly labor productivity on two-digit industrial classification level for manufacturing industries and one-digit industrial classification level for non-manufacturing industries.

As for TFP index, there are currently two databases in Japan. The first one is the KEO database compiled by the Keio Economic Observatory of Keio University, offering data that enables calculation of sectoral TFP in 43 industries. It provides valuable information for the database that the APO develops. The other is the JIP database developed by the Research Institute of Economy, Trade and Industry (RIETI), led by Professor Fukao [7] of Hitotsubashi University. TFP in 108 industries can be calculated using this database. The data including input-output table, labor input, and capital input is available at <http://www.rieti.go.jp/jp/database/JIP2010/index.html>.

This database is utilized by the EUKLEMS database in Europe as well as by OECD's STAN database, supplying useful information for international comparisons on productivity. Supported by the development of these reliable databases, as well as the increasing policy interests in growth strategy, the government is considering the possibility of developing an official database concerning productivity.



Table 4. Contributions of IT Capital Service Input Growth to Economic Growth (%)

Item	1995–2000						2000–2007						
	France	Germany	Italy	Japan	ROK	USA	France	Germany	Italy	Japan	ROK	UK	USA
Market economy total	0.54	0.68	0.43	0.50	0.73	0.95	0.26	0.34	0.13	0.37	0.36	0.56	0.57
Electrical machinery, post, and communication	0.16	0.18	0.80	1.30	0.47	2.46	0.65	0.25	0.15	0.77	0.59	0.96	0.45
Manufacturing, excluding electrical	0.33	0.20	0.28	0.32	0.95	0.46	0.09	0.18	0.06	0.21	0.39	0.21	0.31
Other goods-producing industries	0.28	0.09	0.15	0.22	0.09	0.20	0.07	0.03	0.06	0.12	0.11	0.17	0.32
Distribution services	0.54	0.49	0.46	0.16	0.69	0.81	0.19	0.21	0.07	0.08	0.23	0.55	0.54
Finance and business services	1.00	2.13	0.76	0.45	1.19	1.73	0.51	0.99	0.34	0.37	0.62	1.01	1.04
Personal and social services	0.48	0.27	0.38	0.12	1.45	0.49	0.09	0.10	0.12	0.08	0.15	0.21	0.17

Source: EUKLEMS Database, November 2009

Note: \* 2000–05, \*\*2000–06

After two decades of economic stagnation, the JPC has been engaged in making proposals and actions to promote Japan's growth policies at both the macro and microeconomic levels. At the macroeconomic level, the JPC established the Nihon Sousei Kaigi (Japan Creation Council) with the aim of revitalizing Japan's economy as it moves through the recovery from the Great East Japan Earthquake and the council-proposed new energy policies. The JPC also expressed its stance in support of taking part in the Trans-Pacific Partnership, thereby taking advantage of the growth potential of the Asia-Pacific region and achieving improvement of productivity of Japanese companies.

At the microeconomic level, based on the recognition that human capital is the most important element for productivity growth, it has supported the efforts of small- and medium-sized enterprises in developing human resources through educating management consultants through the Management Consultant Training Course since 1958. Going forward, in collaboration with productivity centers in Asian countries, the JPC will need to cultivate the talent of managers who will be capable of expanding businesses in Asia.

The lesson learnt from the collapse of Lehman Brothers in September 2008 and the economic crisis in Europe triggered by Greece's fiscal crisis is that measures to stabilize financial systems alone cannot bring economic recovery back on track, although top priority should be placed on such response measures at the beginning of the crisis. The prolonged recession that lasted over the last two decades since the burst of the economic bubble was caused by the failure to promptly carry out structural reforms to improve productivity after the financial crisis phase was over. It is the same challenge that industrialized countries in Europe and America now face. Greater emphasis is required in investigating the factors contributing to productivity improvement on a global level, including both the industrialized and emerging countries, and implementing best practices.

## ENDNOTES

- 1 Supply-side factors behind the prolonged slowdown of Japan's economic growth were first identified by Hayashi and Prescott [4].
- 2 When TFP growth on the R&D ratio is regressed, the coefficient of R&D ratio is positive and significant.

## REFERENCES

- [1] Young A. Lessons from the East Asian NICs: a contrarian view. *European Economic Review* 1994; 38 (3/4): 964–973.
- [2] Krugman P. The myth of Asia's miracle. *Foreign Affairs* 1994; 73 (6): 62–78.
- [3] Kosai Y., Ogino Y. *Nihonkeizaitenbou (Perspectives on the Japanese economy)* (in Japanese). Tokyo: Nihonhyoronsha; 1980.
- [4] Hayashi F., Edward C.P. The 1990s in Japan: A lost decade. *Review of Economic Dynamics* 2002; 5 (1): 206–235.
- [5] Miyagawa T., Yukiko I., Nobuyuki H. The IT revolution and productivity growth in Japan. *Journal of the Japanese and International Economies* 2004; 18 (3): 362–389.
- [6] Jorgenson D. Information technology and the U.S. economy. *American Economic Review* 2001; 91 (1): 1–32.
- [7] Fukao K., Miyagawa T. Hak K.P., Keun H.R. Estimates of total factor productivity, the contribution of ICT, and resource reallocation effects in Japan and Korea. In: Mas M., Stehler R., eds. *Industrial Productivity in Europe Growth and Crisis*. Cheltenham: Edward Elgar Publishing Ltd.; 2012, pp.264–304.

# REPUBLIC OF KOREA

DR. KEUN HEE RHEE

**Senior Researcher**  
Korea Productivity Center

## INTRODUCTION

The Korean economy has experienced at least two points of inflection in its productivity growth during 1970–2008 (Figure 1) [1]. The first inflection was in 1980, due to the second oil crisis, while the second inflection was in 1998, due to the Asian financial crisis. The economic crises were challenges for the Korean economy and have impacted it negatively. The characteristics of the Korean economy can be understood

from the trend of its productivity changes seen during the period of high economic growth from 1970s–80s, the period of economic “slowdown” in the 1990s, and the period of stagnancy in the 2000s. To be more specific, the growth of GDP was at 8.59% in the 1970s and 9.26% in the 1980s. However, the growth of the Korean economy saw a downward trend at 6.35% during the 1990s and 4.25% in the 2000s, as highlighted in Table 1 [1].

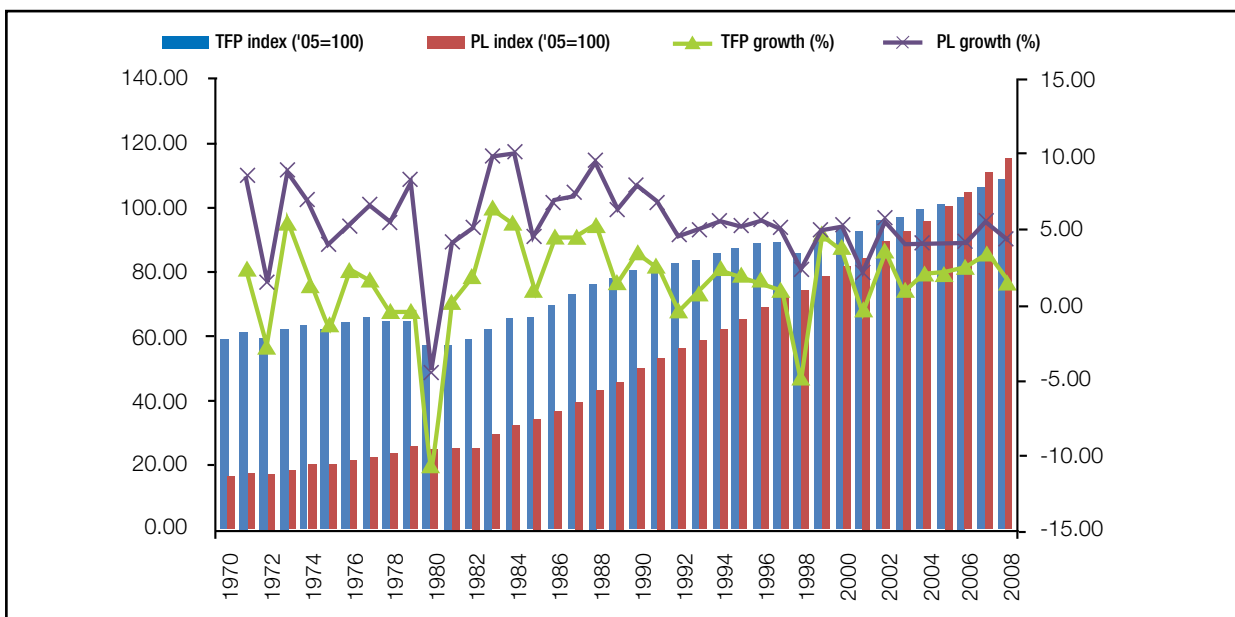


Figure 1. Trends of Labor Productivity and TFP in ROK

Table 1. Growth of GDP, Labor Productivity, and TFP in ROK

Period	GDP (%)	Labor Productivity (%)		TFP (%)
		Hour	Employment	
1971–80	8.59	5.07	5.06	-0.24
1981–90	9.26	7.16	6.47	3.41
1991–2000	6.35	5.01	4.78	1.39
2001–08	4.25	4.27	2.89	1.94
1971–2008	7.26	5.43	4.90	1.61

Source: APO [1]

Following the hypothesis of productivity convergence, the Korean economy has the potential to converge in terms of growth, employment, investment, etc. Thus, the Korean economy needs solid strategies and policies to enhance productivity. This means, innovative activities for firms must be amplified to advance technology and market efficiency, which in turn foster these firms' creative ventures. Meanwhile, industrial strategies that emphasize ICT-fusion technology between the manufacturing and service sectors have to be developed due to the competitive advantage the Republic of Korea (ROK) enjoys in ICT.

### PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

The Korean economy was dynamic in terms of productivity in the 1970s, as the country was forced to deal with three economic crises - the oil crisis, the Asian financial crisis, and the global financial crisis. The growth of productivity was volatile, and it fluctuated before and after every economic crisis. Though the Korean economy was vulnerable at these times, it was able to overcome the crises quickly. The growth of labor productivity in the Korean economy followed a similar trajectory as that of the country's GDP by periods, owing to the productivity's procyclical nature. This growth

was 5.07% in the 1970s and 7.16% in the 1980s, while lower rates were recorded in the 1990s and 2000s (Table 1) [1]. Likewise, total factor productivity (TFP) growth had also followed a cyclical path, with the exception of the 1970s, where TFP recorded negative growth.

As a result of growth accounting, it was discovered that the main driver of the Korean economy was capital input, particularly during the beginning of the Korean economic growth in the 1970s (Table 2) [1]. In the same period, the contribution of capital input to GDP growth was 80.9%. In addition, non-IT capital among capital input played an important role in economic growth.

With the boom of IT, the growth of IT capital has steadily contributed to output growth since the 1990s. The contribution of non-IT capital to the GDP was 58.5%, while IT capital recorded 5.3% from 1971–2008.

TFP and labor input have also contributed to the Korean economic growth by 22.1% and 14%, respectively, from 1971–2008. In summation, the total contribution of both capital and labor input to GDP growth is larger than that of TFP growth. Therefore, it is reasonable to assume that the source of ROK's economic growth

Table 2. Growth Accounting and Source of Economic Growth in ROK

Period	GDP (%)	Labor (%)	Capita (%)	K(IT) (%)	K(Non-IT) (%)	TFP (%)
1971–80	8.59	1.88	6.95	0.26	6.69	-0.24
1981–90	9.26	1.21	4.64	0.40	4.24	3.41
1991–2000	6.35	0.80	4.16	0.47	3.69	1.39
2001–08	4.25	-0.02	2.33	0.41	1.91	1.94
1971–2008	7.26	1.02	4.64	0.38	4.25	1.61
Contribution						
1971–80	100.0	21.9	80.9	3.0	77.9	-2.8
1981–90	100.0	13.1	50.1	4.3	45.8	36.8
1991–2000	100.0	12.6	65.5	7.4	58.1	21.9
2001–08	100.0	-0.5	54.8	9.7	45.0	45.7
1971–2008	100.0	14.0	63.8	5.3	58.5	22.1

Source: APO [1]

may be characterized as input-led growth, not productivity-led, as espoused by many other productivity studies.

## **FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES**

To analyze productivity changes, TFP growth [1] and labor productivity growth [1] were basically employed in the form of log difference as dependent variables, while educational attainment [2], R&D intensity [3], export intensity [1], share of FDI to GDP [1, 4], and share of governmental consumption to GDP [1, 5] were adopted in the form of log difference as independent variables. Further, additional independent variables were considered such as import intensity [1], capital-labor ratio [4, 6], initial constant GDP per capita [1, 6], initial population [1], and initial life expectancy [7] in 1970, 1980, and 1990.

The result of estimation using Ordinary Least Squares (OLS) is shown in Tables 3 and 4. First, the coefficient of educational attainment as a proxy variable of human capital accumulation was negative but significant, even if the reading was positive. In ROK, compulsory education until middle school began in 1985, so the average education attainment reached 10.4 years from 1985–2008. Moreover, the enthusiasm for education in ROK has always been high. So educational attainment in terms of period of schooling may not affect TFP growth positively, but capital-labor ratio increase has affected TFP growth positively and significantly, as shown in Model 3 of Table 3.

Second, it is well known that R&D intensity may have a positive effect on TFP growth. Even if the sign of coefficient was positive in each model, the statistical significance was not obtained. Third, in terms of export intensity, the learning effect of export on productivity was not fully confirmed, owing to the fact that the coefficient of export intensity was almost negative in each model. However, the coefficient of import intensity was estimated as positive in the Korean economy. The better

quality imported intermediates of capital goods or the technological transfer embodied in imports of capital goods from developed countries may be the possible mechanism affecting TFP growth. Export growth was not a sufficient condition but a necessary one to enhance productivity [8].

Fourth, in trade openness, the share of inbound FDI to GDP had a negative effect on TFP growth, and its statistical significance was not assured except in Model 3 of Table 3. Thus, no concrete evidence was found that FDI contributes significantly to the Korean economic growth. Fifth, the government's consumption had a consistent negative and significant effect on TFP growth. This is a reflection of the government's shortcomings, which had diminished the competitiveness of private economy and crowding out according to the increase of government consumption [9].

The final estimation is that initial conditions such as GDP per capita, life expectancy, and population had a negative relation to TFP growth without any statistical significance. On the other hand, the regression results that were highlighted earlier were similar to the case of using labor productivity growth as a dependent variable in Table 4. Therefore, factors such as R&D intensity, import intensity, and capital-labor ratio had positively affected TFP growth. Others such as educational attainment, governmental consumption, export intensity, share of FDI, and initial conditions had negatively affected TFP growth in the Korean economy. However, no reasonable significance was found on the variables of R&D intensity, export intensity, share of FDI, and initial conditions.

## **PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS**

The Korea Productivity Center was established in 1957 to fortify the growth of the Korean economy via enhancing productivity as a nationwide project. Its main activities since 1960 have been focused on goals such as

Table 3. Regression Analysis of Determinants of TFP Growth in ROK from 1980–2008

Item	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	0.044*** (0.004)	0.041*** (0.340)	0.028*** (0.004)	0.046*** (0.012)	0.079 (0.340)	0.063 (0.195)
Dln(EDU)	-1.492*** (0.305)	-1.387*** (0.289)	-1.165*** (0.238)	-1.485*** (0.315)	-1.489*** (0.314)	-1.489*** (0.314)
Dln(RD/GDP)	0.025 (0.030)	0.038 (0.028)	0.025 (0.022)	0.022 (0.034)	0.024 (0.033)	0.024 (0.033)
Dln(EX/GDP)	-0.040* (0.020)	-0.064*** (0.022)	0.028 (0.022)	-0.039* (0.022)	-0.039* (0.022)	-0.039* (0.022)
Dln(FDI/GDP)	-0.004 (0.003)	-0.003 (0.002)	-0.006*** (0.002)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)
Dln(GOV/GDP)	-0.521*** (0.060)	-0.508*** (0.056)	-0.341*** (0.061)	-0.518*** (0.063)	-0.519*** (0.063)	-0.519*** (0.063)
Dln(IM/GDP)	- -	0.059* (0.028)	- -	- -	- -	- -
Dln(KL)	- -	- -	0.103*** (0.023)	- -	- -	- -
ln(y)	- -	- -	- -	-0.000 (0.004)	- -	- -
ln(POP)	- -	- -	- -	- -	-0.003 (0.031)	- -
ln(Life)	- -	- -	- -	- -	- -	-0.004 (0.045)
Adj. R <sup>2</sup>	0.78	0.81	0.88	0.77	0.77	0.77
D/W	1.64	1.86	2.12	1.64	1.64	1.64
F(pr >F)	20.96 (0.000)	20.79 (0.000)	34.90 (0.000)	16.70 (0.000)	16.68 (0.000)	16.68 (0.000)
Obs.	28	28	28	28	28	28

Note: \*, \*\*, \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively. Dependent variable is dln(TFP)

#### Description of variables:

- EDU: total schooling interpolated
- RD/GDP: R&D expenditure/GDP\*100
- EX/GDP: Export/GDP\*100
- IM/GDP: Import/GDP\*100
- FDI/GDP: FDI investment/ GDP\*100
- GOV/GDP: Government consumption/ GDP\*100
- K/L: Total investment/ Total employment
- y: Initial Constant GDP per capita in 1980, 1990, 2000
- Life: Initial Life expectancy in 1980, 1990, 2000
- POP: Initial population in 1980, 1990, 2000

Table 4. Regression Analysis of Determinants of Labor Productivity Growth in ROK from 1980–2008

Item	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	0.065*** (0.006)	0.066*** (0.007)	0.053*** (0.009)	0.119*** (0.015)	1.583*** (0.420)	0.937*** (0.241)
Dln(EDU)	-0.627 (0.480)	-0.664 (0.497)	-0.375 (0.487)	-0.433 (0.386)	-0.491 (0.387)	-0.492 (0.387)
Dln(RD/GDP)	0.007 (0.047)	0.002 (0.049)	0.074 (0.045)	-0.063 (0.042)	-0.056 (0.041)	-0.056 (0.041)
Dln(EX/GDP)	-0.018 (0.032)	-0.010 (0.038)	0.034 (0.045)	0.014 (0.027)	0.013 (0.027)	0.013 (0.027)
Dln(FDI/GDP)	-0.001 (0.004)	-0.001 (0.005)	-0.004 (0.004)	-0.010** (0.004)	-0.009** (0.004)	-0.009** (0.004)
Dln(GOV/GDP)	-0.364*** (0.095)	-0.369*** (0.097)	-0.226* (0.124)	-0.300*** (0.077)	-0.301*** (0.078)	-0.301*** (0.078)
Dln(IM/GDP)	- -	-0.020 (0.049)	- -	- -	- -	- -
Dln(KL)	- -	- -	0.079 (0.048)	- -	- -	- -
ln(y)	- -	- -	- -	-0.022*** (0.006)	- -	- -
ln(POP)	- -	- -	- -	- -	-0.142*** (0.039)	- -
ln(Life)	- -	- -	- -	- -	- -	-0.203*** (0.056)
Adj. R <sup>2</sup>	0.33	0.30	0.37	0.57	0.56	0.56
D/W	1.11	1.11	1.25	1.58	1.57	1.57
F(pr >F)	3.66 (0.014)	2.97 (0.029)	3.74 (0.011)	7.06 (0.000)	6.90 (0.000)	6.90 (0.000)
Obs.	28	28	28	28	28	28

Note: \*, \*\*, \*\*\* denote significant at the 10%, 5%, and 1% levels, respectively. Dependent variable is dln(LP)

good management consulting, education and training, productivity research, and international cooperation with the Asian Productivity Organization (APO) [1].

In addition, there are other special activities such as publication services in the 1960s, audio-visual education services in the 1970s, and automation projects (Factory Automation, Office Automation) linked with training, management consulting, research, etc., in the 1980s. The center released the National Consumer Satisfaction Index (NCSI, 1998) in

the 1990s, measuring both the National Brand Competitiveness Index (NBCI, 2004), the Dow Jones Sustainability Index (DJSI, 2009), and developed the human-centered productivity movement in the 2000s [10].

Major activities by the Korea Productivity Center have been carried out. As seen in Figure 2, the management consulting performance by the Korea Productivity Center since 1960 showed a slowdown during the 1970–80 oil crisis. However, the organization's performance increased over 10% on an annual average after the 1990s [10].

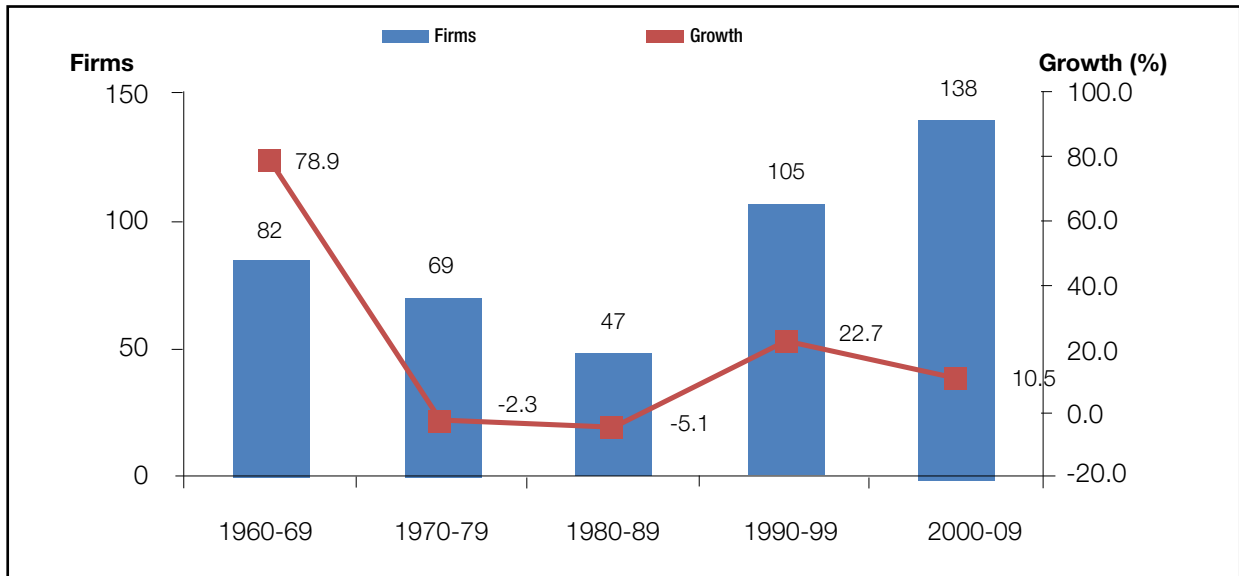


Figure 2. Korea Productivity Center's Performance on Management Diagnosis and Guidance  
Source: Korea Development Institute [10]

Figure 3 shows the performance of education and training of the Korea Productivity Center that increased consistently since the 1960s. The number of trainees averaged 1,705 persons in the 1960s, 3,122 persons in the 1970s, 9,825 persons in the 1980s, 32,630 persons in the 1990s, and 96,187 persons in the 2000s [10].

Meanwhile, the number of firms surveyed for the NCSI increased consistently with 213 firms in 2000, 218 firms in 2005, and 245 firms in 2009 [10].

Research at the Korea Productivity Center embodied four levels - firms, regions, industries,

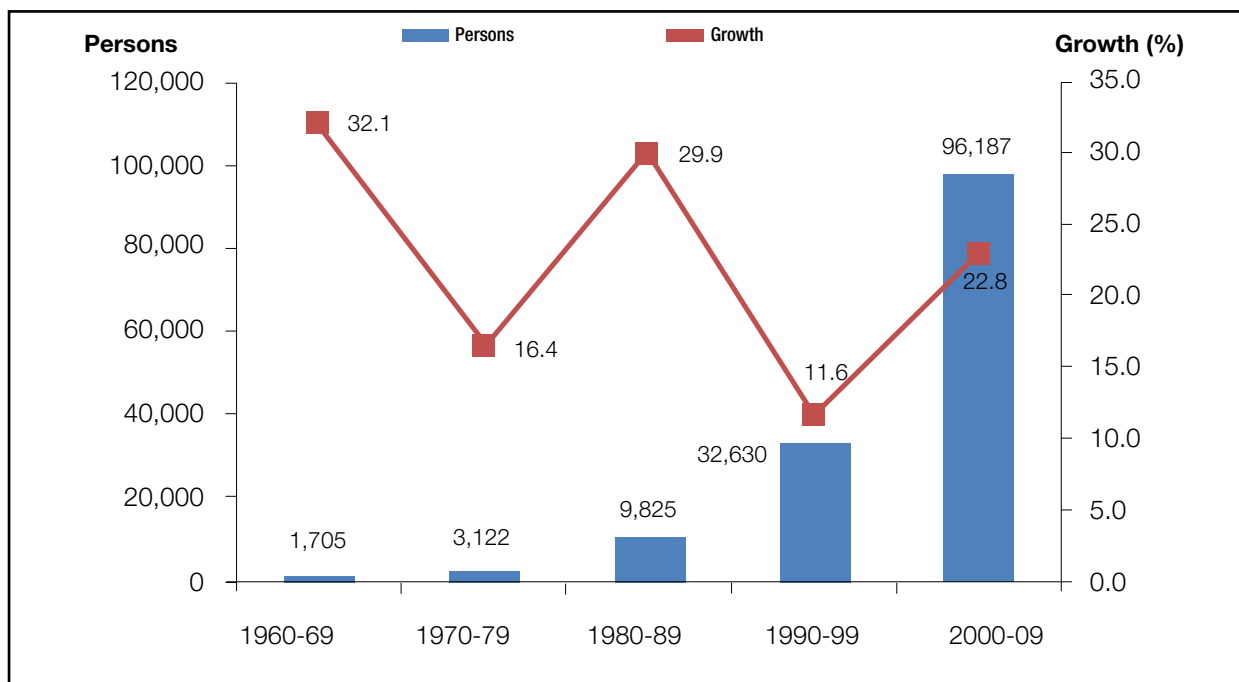


Figure 3. Korea Productivity Center's Performance on Education and Training



and international comparisons. Annual research was carried out to seek the value analysis of listed firms, and TFP analysis by firms (or establishments) and regions. The research also incorporated international comparison of labor productivity among OECD countries as well as TFP between EU, USA, and Japan through the KLEMS database, and quarterly analysis of labor productivity in the mining, manufacturing, and service sectors.

## **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

With regard to the challenges faced by ROK in improving productivity, the first element to be considered is the green growth accounting that manages the sustainable economic growth and emission of greenhouse gases (GHG). In other words, CO<sub>2</sub> emission has to be taken into account as a new measurable input factor. Growth accounting can be estimated while considering GHG and exploring new sources of economic growth for sustainability, unlike the traditional growth accounting method.

The second element is to look into the issues of welfare and productivity. In general, the ultimate purpose of improving productivity is to enhance national welfare. Productivity as the measurement of efficiency has now expanded to incorporate the concept of effectiveness. Thus, output is measured not only in traditional values (GDP, gross output, etc.), but also in welfare. Previous studies have emphasized Gross National Happiness and not GDP.

Another factor to focus on is the issue of free trade agreement and productivity. One of the trends in connection with globalization is the economic cooperation among blocked economies. In this aspect, Asian countries that possess abundant natural and human resources are suitable for a counterpart in free trade agreement. The improvements in price competitiveness through free trade agreement may directly impact the economic growth and productivity growth. The economic benefit and loss between concerned countries should

be discussed and agreed upon. However, free trade agreement is an economic system that diffuses technological innovation from an advanced nation to the non-advanced at a low cost. So it may be worthwhile to investigate the impact of free trade agreement on productivity.

A few vulnerable areas in the Korean economy in terms of productivity are the service sector and SMEs. Following the international comparison of productivity, the service sector growth in Korea, especially in trade, has not been any more competitive than other advanced countries. The comparison is from the angles of labor productivity level and TFP. In addition, SME productivity has been lower when compared to large businesses in the Korean economy.

Fortunately, the competitiveness of the ICT infrastructure in ROK has been known to be globally solid. So there is a need to enhance and reinforce the progress of fusion-technology linked with ICT and service activities such as u-Health, u-Market, u-City, etc., in order to find the high-value niche market.

In addition, it is useful to manage the effects of regulation on productivity by developing the regulation index because its issues have been frequently pointed out as one of the constraints of enhancing productivity in the service sector. Further, the Korean government had installed the "Commission on Shared Growth for Large Corporations and SMEs" to accelerate growth by sharing the know-how of innovative activities between large businesses and SMEs, and lessening the growth gap between them. By selecting suitable sectors, large businesses are advised not to enter into markets that are far suited for SMEs.

In short, some issues such as green growth accounting, welfare, FTA, etc., are directly related to productivity in ROK, so they should be investigated. Today, the Korean economy is confronted by challenges to enhance productivity in the service sector as

an alternative to economic growth and to bolster the potential growth of SMEs in terms of creative destruction.

## REFERENCES

- [1] Asian Productivity Organization. APO Productivity Database 2011. [http://www.apo-tokyo.org/about/measurement.html#apo\\_database](http://www.apo-tokyo.org/about/measurement.html#apo_database), accessed on 11 October 2011.
- [2] Barro R.J., Lee J-W. Barro-Lee. Educational Attainment, Dataset, Version (1.2), September 2011. <http://www.barrolee.com>, accessed on 12 October 2011.
- [3] National Science & Technology Information Service. Survey of Research and Development in Korea. <http://www.ntis.go.kr>, accessed on 15 September 2011.
- [4] Bank of Korea. Balance of Direct Investment (1980-2008). <http://www.ecos.bok.or.kr>, accessed on 17 October 2011.
- [5] Bank of Korea. National Accounts (1980-2008). <http://www.ecos.bok.or.kr>, accessed on 17 October 2011.
- [6] Statistics Korea. The Economically Active Population Survey (1980-2008). <http://kosis.kr>, accessed on 17 October 2011.
- [7] Statistics Korea. Life Tables (1980-2008). <http://kosis.kr>, accessed on 17 October 2011.
- [8] Rhee K.H., Pyo H.K. Financial crisis and productivity dynamics in Korea: evidence from firm-level data (1992-2003). *Journal of Productivity Analysis* 2010; 34 (2): 111–131.
- [9] Kim S., Lim H. Dynamics determinants of Korean productivity changes: with Emphasis on trade (in Korean). *Journal of International Economic Studies* 2005; 9 (2): 3–47.
- [10] Korea Development Institute. 2010 Modularization of Korea's Development Experience: Productivity Improvement. Seoul: Korea Development Institute; 2011. e-Book.

---

# LAO PDR

SOMDY INMYXAI

**Director General**

National SME Promotion and Development Office

SAYASITH KHAMPHASITH

**Director for Productivity, Quality and Standard Division**

Small and Medium Enterprise Promotion and Development Office

---

## INTRODUCTION

Lao People's Democratic Republic (Lao PDR) is the only landlocked country in Southeast Asia, bounded on the north by PR China, on the south by Cambodia, on the west by Myanmar and Thailand, and on the east by Vietnam. As such, its economy has been affected immensely not only by internal but also by external factors. Since the time of its independence from France in 1956, the country has been drawn into the Vietnam War and, thereafter, a civil war that ravaged the country's economy immensely.

With the change in government and the country's liberation in 1975, came the period of reconstruction and rehabilitation of its economic assets. The political stabilization of the country and the reforms toward more market-oriented economy ushered in a new era of economic development. From a country torn by war and civil strife, the Laotian economy has emerged as one of the most stable in the region. It has weathered global financial crises quite well. Its GDP growth has been faster than those of other low-income countries in the region. Much of the growth was boosted by the contribution of natural resources, in particular mining and hydropower. In 2011, the World Bank raised the country's income categorization from a low-income economy to a lower middle-income economy [1].

Despite the high growth, the country's infrastructure, particularly in rural areas, remains underdeveloped. The country needs to improve further the performance of its industries, including agriculture, to make them more competitive in light of the opening of the

economy under the ASEAN Free Trade Area in 2015. A critical factor in achieving this is through improvement in productivity and sustainable management of its natural wealth.

The limited data available was a big constraint for the authors in undertaking an in-depth analysis of the productivity dynamics and trends in the country over the last 50 years. Much of the data used in this paper were derived from the National Development Plans and the APO Productivity Databook 2011.

## PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

The development of the national economy was marked by turbulent years in the initial stages of the new nation in transition. The liberation of the country in 1975 and establishment of Lao PDR marked the beginning of serious efforts of the government toward socialist transformation and reconstruction. Within the first two years after the liberation of the country, some significant socioeconomic changes were noted. Production systems were restored and population increased by 10%. The Central Committee of the Lao People's Revolutionary Party prepared the Three-Year Government Plan for Socio-Economic Development (1978–80), charting a new development path for the country. The implementation of the plan was substantially supported by the donor community [2].

This was followed by the First Five-Year Plan (1981–85), which set the goals of increasing industrial activity, trade, and self-sufficiency in food production. This plan marked the initial steps toward market-oriented economy.

Under this plan, the country achieved substantial progress, with GDP growth averaging 7.3% from 1981–85 [3]. From the standpoint of most aggregate macroeconomic indicators, the country attempted to achieve a very costly high growth. During that period, the country's current account remained heavily in deficit of GDP at around 13.6%, inflation was high at around 49% with a severe budgetary imbalance, and fiscal deficit reached around 14.5% of GDP in the year 1986 [4]. Since there were no domestic savings, the country resorted to external borrowing to finance its investment. From 1982–85, the government faced a rapidly growing debt service ratio from 13.5% to 22.1% [3].

The Second Five-Year Plan (1986–90) introduced a new national development strategy, the New Economic Mechanism (NEM). Under the NEM, the government sought to improve the use of the country's resources and limited external borrowing. The key measures taken during this period included setting official prices and wages, improving the management of selected state enterprises, removing restrictions on domestic trade, allowing increased private-sector activities in trade and retailing, and devaluing the commercial exchange rate by 171% in late 1986 [4–6]. The NEM resulted in the increase of the dollar value of merchandise exports by 47% in 1987. Furthermore, output increased in sectors where growth was previously slow (non-rice crops, transport, retailing) or negative (manufacturing). Overall, GDP growth accelerated in 1986 by 4.7%, but fell in 1987 (-1.1%) and 1988 (-1.8%) mainly because of sharp decline in rice output due to severe drought. Many reforms were carried out during the late 1980s, but the Second Five-Year Plan ended with the economic performance lagging behind planned targets, with the population still heavily impoverished and the country still highly dependent on foreign aid [4].

The Third Five-Year Plan (1991–95) espoused strategies aimed at improving infrastructure, promoting exports, and encouraging import substitution to continue the progress made under the previous two plans. A landmark policy was set in August 1991 when the

Supreme People's Assembly (SPA) approved a new constitution with provisions affirming the right to private ownership [7].

The Third and Fourth Five-Year Socio-Economic Development Plans (1991–95 and 1996–2000) were very instrumental in setting the economy on a steady growth despite the severe financial crisis in the Asian region. The government adopted effective measures to contain inflation within the 6.5% range and keep the exchange rate stable. The Fifth Five-Year Socio-Economic Development Plan (2001–05) successfully kept the economy on the right track. The GDP growth rate ranged between 5.6%–7.1% during this period [7].

The various policy initiatives of the government and the programs of the recent Five-Year Socio-Economic Plan manifested positive impact on the national economy more than a decade later. The country's performance was among the most vibrant in the whole of Asia over the last three decades, with average annual GDP growth rates ranging from 6.6% (1990–2010) to 7.5% (2005–10) compared to 3.7% and 4.0% for APO20 during the same periods. Labor productivity also improved at very progressive rates: 3.6% (1990–95), 3.7% (1995–2000), 4.1% (2000–05), and 5.2% (2005–08).

The poverty ratio was reduced from 46.0% in 1993 to 33.5% in 2003. The population below the absolute poverty line also decreased from more than 2 million to less than 1.85 million people. The poor population decreased by 10% during this decade. The Human Development Index (HDI) ranking of the country improved from 137 in 2007 to 130 in 2008 [8].

### **Productivity Trend**

Performance of the economy consistently improved over the period of 1990–2008, where growth was registered at an average 6.4%. This growth was higher than the average for the APO20 with 3.7% and the ASEAN region with 5.0%. Remarkable growth was achieved in 2005–08, where the economy grew by an average 7.7%. Again, this was much higher

Table 1. GDP and Labor Productivity Growth Rate for Lao PDR and APO20 from 1990–2008

Economy	1990–95	1995–2000	2000–05	2005–08	1990–2008
<b>GDP Growth</b>					
Lao PDR	6.2	6.0	6.2	7.7	6.4
APO20	3.9	3.0	3.9	4.4	3.7
ASEAN	7.2	2.6	5.0	5.6	5.0
<b>Labor Productivity Growth</b>					
Lao PDR	3.6	3.7	4.1	5.2	-
APO20	1.8	1.1	1.4	2.1	-
ASEAN	5.3	0.6	3.1	3.1	-

Source: APO [8]

than the average for APO20 at 4.4% and the ASEAN at 5.6%, as reflected in Table 1. Likewise, labor productivity consistently improved from 1990 to 2008, and this was a much better performance than the average for APO20 and the ASEAN. Such performance meant that the government policies and programs as provided for in the development plans were effective in charting the national economy toward a more sustainable path [8].

### Output Growth by Industry

Agriculture in Lao PDR is the biggest sector in the economy among all APO members. Its contribution to total value added in 2008 was 44%, followed by manufacturing at 20%. For the period of 2000–08, the agriculture sector had the highest contribution to the national economic growth among all Asian countries, accounting for an average of 4.6%, as reflected in Table 2. This growth rate is higher than the average for APO20 with 2.8% and the ASEAN countries with 3.8%.

It is interesting to note that with the exception of electricity, gas, water supply, finance, real estate, and business activities, the average annual growth rate of all industry groups in Lao PDR was much higher than the average for APO20 and ASEAN during 2000–08 [8]. The mining sector also registered an impressive 32.1%, which was the highest in all of Asia.

### FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY

The right mix of government policies and other factors such as donor support has contributed immensely to the improvement of productivity and overall economic performance.

The country has been recognized in the region and globally as having a dynamic economy within a stable political situation, and a safe destination for investment and tourism. Sociopolitical stability is an important foundation and an essential precondition for socioeconomic development, which is an advantage that Lao PDR enjoys now. The full membership of the country in regional and global political, economic, and monetary organizations, including ASEAN and the WTO, will boost the dynamism of the economy and accelerate the country's development.

The World Summit in September 2005 at the UN headquarters in New York reiterated the commitment of the community of nations to eradicate poverty and achieve the Millennium Development Goals (MDGs) [9]. The Summit also emphasized the need to increase aid to the least developed countries (LDCs) and assist them in implementing the Brussels Program of Action for LDCs (2001–10). Accordingly, bilateral and multilateral relations would widen

Table 2. Output Growth by Industry from 2000–08

Economy	Agriculture	Manufacturing	Mining	Electricity, gas, water supply	Construction	Wholesale and retail trade, hotels, restaurants	Transport, storage, communication	Finance, real estate, business	Community, social, personal services
Lao PDR	4.6	32.1	9.2	2.1	10.5	8.0	7.7	-1.3	5.6
APO20	2.8	2.6	4.7	3.3	2.5	4.0	6.0	4.1	3.3
ASEAN	3.8	1.4	5.4	5.9	4.7	5.7	7.8	6.5	4.8

Source: APO [8]

Note: Average annual growth rate of industry GDP at constant prices

and strengthen among nations, and between nations and international organizations. These developments in the international arena would help Lao PDR take advantage of increased opportunities to push forward with its development, reduce poverty, and successfully implement the industrialization and modernization strategy, narrowing the gap with neighboring countries in the region while improving the country's status in the global community of nations.

The Ten-Year Socio-Economic Development Strategy (2001–10) [10] for the country included improving and building the economic infrastructure to ensure fast and sustainable economic growth, with emphasis on agricultural production, elimination of forest fires and deforestation, reduction of the number of poor households, and promotion of industrialization and modernization. The country's human resources are to be developed step-by-step, both in quality and quantity to cater to emerging needs and make the country a regional center for exchange of goods and services. The strategy encourages a socialist-oriented industrialization and modernization with infrastructure development to prepare the nation for graduation from an LDC status by 2020 and to achieve improved well-being for all the Lao people [11].

The Sixth Five-Year Socio-Economic Development Plan covering the period of 2006–10 played a crucial role in implementing the

socioeconomic development policy guidelines set out by the 7th Party Congress. It was the vehicle for facilitating the implementation of the second half of the Socio-Economic Development Strategy (2001–10) approved by Congress [12]. Thus, the Sixth Five-Year Plan institutionalized and solidified directives and tasks that will be carried out further during the five-year period of 2006–10 to ensure that the overall targets outlined in the Ten-Year Plan Strategy (2001–10) were achieved.

The directions set in the Sixth Five-Year Socio-Economic Development Plan (2006–10) were to achieve the highest outcomes and make general changes along the following lines:

- i. Turn from underdevelopment to fast and stable development, producing high value-added goods both in quantity and quality step-by-step in order to meet domestic market demand and increase exports
- ii. Increase competitiveness and utilize comparative advantages to implement effectively international economic commitments in the frameworks of ASEAN and other bilateral and multilateral commitments, including the WTO
- iii. Strengthen links between economic development and social development, and protect natural resources and the environment. Social problems should

be solved first, with attention paid to such issues as the reduction of poverty, unemployment, and social evils, and keep the social and political situations stable

- iv. Accelerate the building of a comprehensive socioeconomic infrastructure and finalize the establishment of a market-oriented economy with socialist orientation to form the basis for industrialization and modernization

The 7th Party Congress identified the general goals of the Socio-Economic Development Strategy for the ten-year period of 2001–10 as follows:

“Improve and establish the basis for the economy to progress in firm steps, especially to strongly develop the agriculture sector; entirely eliminate the slash-and-burn cultivation practices; complete the tasks in solving the problem of poverty of people; create the foundation for industry and prepare the quality and quantity of human resources to be ready for industrial development and gradually turn to industrialization; develop our country to become the central point of transit of the region in the future” [10].

The Party Congress identified key expectations: GDP in the ten years (2001–10) to increase on average at least 7.5% per annum; GDP per capita in 2010 to be USD700–750; the population growth rate in 2010 to be reduced to about 2% per year.

The main goals of the Sixth Five-Year Socio-Economic Development Plan (2006–10) were to maintain all targets and views that have been set in the ten-year strategy (2001–10). Therefore, the goals were as follows:

“Accelerate economic growth and improve the people’s quality of life by restructuring the economy and employment in building a market economy based on the country’s rich resources and international integration. Further build the market economy with a

socialist orientation. Continue to enlarge and develop effective external economic relations. Create breakthrough changes in education and training in terms of quality and quantity by utilizing the advances in science and technology, protecting the environment, and taking human, scientific, and technological players as vehicles for development. Develop culture and society in synchrony with economic growth. Continue poverty reduction, create jobs, and eliminate social evils. Continue strengthening the socioeconomic infrastructure as fundamentals for development in the Sixth Five-Year Plan and for the next (Seventh) five-year plan. Maintain political stability and social security, and protect sovereignty, territorial integrity and national security” [10].

The goals coincided with the MDGs and those in the Brussels Program of Action for LDCs (2001–10).

“The total GDP in 2010 should be 1.95 times (or about two times) that in 2000. GDP at current prices in 2010 is projected to be LAK59.5 thousand billion, equivalent to USD4.97 billion. The average GDP per capita will reach USD827, which will meet and exceed the target set in the plan (USD700–750). The GDP annual average growth rate should reach 7.5%–8%, with agriculture and forestry increasing by 3%–3.4%, industry by 13%–14%, and services by 7.5%–8%.”

In particular, the growth rate in industry was expected to accelerate considerably, as there will be more industrial opportunities, especially hydropower dams and cement factories, which was expected to begin operation at the end of the Sixth Five-Year Socio-Economic Development Plan. Therefore, the GDP growth rate was expected to accelerate from approximately 7.2% in 2006 to perhaps 8.2%–9% in 2010 [10] (depending on the progress in implementing large-scale projects to meet prioritized plans, particularly in the mining sector and the construction of hydropower dams).

The total budget revenue in the five years (2006–10) was expected to be LAK34.6 thousand billion. The ratio of budget revenue to GDP would average 14.8% and the total budget expenditure was expected to reach LAK49.6 thousand billion, averaging at 21.5% of GDP over the five years. The budget deficit was expected to reduce from 7.8% of GDP in 2005 to 5.8% in 2010. The total exports in the next five years would reach USD3.48 billion, with an annual average growth rate of 18.1%. The total imports in the next five years was expected to reach USD4.5 billion, with an annual average growth rate of 8.8%. The rate of inflation (consumption prices) would average at about 6%–6.5% per year [12].

## PRODUCTIVITY ORGANIZATION AND MOVEMENT

On 18 June 2002, Lao PDR was approved to be the 19th member of the APO during the 44th session of the APO Governing Body Meeting (GBM) in Malaysia. The government appointed the APO director, alternate director, liaison officer, and head of National Productivity Organization (NPO) for Lao PDR under the Ministry of Industry and Handicraft, then the Ministry of Industry and Commerce.

A National Roundtable Conference on Productivity was organized with support from the APO from 12–13 January 2004 [13]. The conference was chaired by Prime Minister Bounngang Vorachith and facilitated by Vice Minister of Industry and Handicrafts and APO Director for Lao PDR Dr. Nam Viyaketh. APO Secretary-General Takashi Tajima and several APO resource persons from Japan, Malaysia, Singapore, Thailand, and Vietnam also participated. Several cabinet ministers and more than 100 prominent individuals from national and provincial government agencies, the Lao Trade Union, private enterprises, international organizations, and the diplomatic missions were also part of the conference.

Several recommendations evolved to support and promote the productivity movement in Lao PDR. These included [13]:

- Strengthening the HRD by various means to meet the needs of the industrial and agricultural sectors
- Assisting local enterprise development organizations to implement quality and productivity improvement programs
- Promoting excellent organizations through employee involvement
- Promoting entrepreneurship development
- Strengthening capacity for productivity improvement programs, including ICT, standards, and quality
- Promoting Green Productivity and Cleaner Production
- Formulating policies to promote and strengthen the National Innovation Systems
- Strengthening the roles and competencies of Lao National Chamber of Commerce and Industry and its sectoral groups
- Strengthening socioeconomic development through women and youth contribution in productivity and quality initiative
- Promoting productivity awareness through campaigns both at national and organizational levels

To support the capacity building of Lao National Productivity Organization (LNPO), the APO implemented a demonstration project from August 2005 to January 2006, where LNPO staff were trained on 5S and Kaizen consultation services. From 2006–08, LNPO also benefited from the Agricultural Productivity Enhancement in Asian LDCs, a program of the APO supported by the Ministry of Agriculture, Forestry, and Fisheries of Japan. Through this program, LNPO staff were trained via national workshops and training courses. Its successor program, Food Supply Chain Management in Asian Least Developed Countries, continued to support capacity building of LNPO and other stakeholders. The APO also supported the LNPO under the Member Country Support Program from 2006–08. In this project, officials of the government and private sector were



oriented and trained on various aspects of productivity.

In line with the effort to promote the productivity movement, several materials were published such as *Manual on 5S & Kaizen*, *Manual for Executive Guidelines for Self Improvement*, *Diagnosis for SMEs Manual*, and *Basic Training Manual Reusing of Waste in Industrial Boilers*.

Since joining the APO, LNPO has sent officials from various government and nongovernment organizations, academia, and private and public enterprises to various APO multicountry projects such as Bilateral Cooperation Between NPOs and Observational Study Missions. In addition, LNPO has also participated in all the video conferencing e-learning courses of the APO. All these activities are important in building the capacity of the LNPO as well as all other stakeholders to advance the productivity movement in various sectors in the country.

#### **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

As a young NPO in a young country emerging from years of conflicts, LNPO faces a lot of challenges in spearheading the productivity movement. Its limited resources in terms of funding and number of staff pose great challenges for it to effectively reach out to the various stakeholders in the different sectors. The productivity knowledge and consciousness is not yet well embedded in the mindset of the majority of the people, especially those in the business sector. Many of the domestic companies are weak and are uncompetitive in the international markets. Foreign companies, notably from PR China and Vietnam, are gaining significant grounds at the expense of local companies. The implementation of the ASEAN Free Trade Area in 2015 and the imminent accession of Lao PDR to the WTO can only contribute to the heightening of challenges. This scenario makes the productivity movement in the country imperative to sustain its economic gains and further enhance the competitiveness of the various enterprises and the entire economy.

#### **REFERENCES**

- [1] World Bank. Country Economic Memorandum. Report No 7188-LA; 1988; 5–7.
- [2] Central Committee of the Sixth Party Congress, Government of Lao PDR. 10-year perspective on the Lao Economy (in Laotian). Vientiane: Government Printer; 1996.
- [3] Lieber L. First Five-Year Socio-Economic Development Plan. National Economic Research Institute, Government of Lao PDR; 1981–1985.
- [4] Lieber L. Second Five-Year Socio-Economic Development Plan. National Economic Research Institute, Government of Lao PDR; 1986–1990.
- [5] Lieber L. Third Five-Year Socio-Economic Development Plan. National Economic Research Institute, Government of Lao PDR; 1991–1995.
- [6] Lieber L. Lao PDR faced arduous difficulties, especially the significant negative impacts of the Asian Economic Crisis. National Economic Research Institute, Government of Lao PDR; 1997–1999.
- [7] Phomvihane K., Government of Lao PDR. New Economic Mechanism (in Laotian). Vientiane: Government Printer; 1986.
- [8] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [9] UN headquarters in New York has reiterated the commitment of the community of nations to eradicate poverty and achieve the Millennium Development Goals (MDGs); 2005.
- [10] Lieber L. Ten-Year Socio-Economic Development Plan National Economic Research Institute, Government of Lao PDR; 2001–2010.
- [11] 7th Party Congress identified the general goals of the Socio-Economic Development Strategy; 2001–2010.
- [12] Lieber L. Sixth Five-Year Socio-Economic Development Plan. National Economic Research Institute, Government of Lao PDR; 2006–2010.

[13] National Roundtable Conference on Productivity. Recommendations were presented at the conference in Vientiane, Lao PDR, 12–13 January 2004.

---

# MALAYSIA

DATO' MOHD. RAZALI  
HUSSAIN

**Director General**  
Malaysia Productivity Corporation (MPC)

LOK LEE LEE

**Manager**  
Publication House  
Global Competitiveness Department, MPC

RAUZAH ZAINAL  
ABIDIN

**Director**  
Knowledge Management Department, MPC

ZAFFRULLA HUSSEIN

**Manager**  
Knowledge Research Unit  
Knowledge Management Department, MPC

---

## INTRODUCTION

Productivity growth has always been an important aspect of Malaysia's economic policy. Inclusive growth has been a key objective since the 1960s. The high growth rates achieved over the last four decades can be attributed to sound macroeconomic policies, investment in infrastructure, and human capital.

Going from a policy of import-substitution industrialization in order to broaden the industrial base and diversification of the economy, to an export-oriented trade policy has enabled Malaysia to enjoy increased exports, imports, investments, and a rise in labor productivity. The introduction of free-trade zones further contributed to efficient export industries, technology transfer from multinational companies, and the upgrade of skills of Malaysian workers and management. Thus, in the early phase, economic growth was stimulated through investments with capital accumulation, contributing more than 50% to the productivity growth.

The liberalization of foreign direct investment (FDI) policy, heavy industrialization in the early 1980s, and the "Look East Policy" as a campaign to inculcate hard work and discipline, coupled with deregulatory measures

and the Privatization Policy, also helped boost productivity. This was further complemented by the policies contained in the New Economic Policy (1971–90), the National Development Policy (1991–2000), the National Vision Policy (2001–10), and the National Mission (2006–10). The aspirations culminated in the launch of Vision 2020, outlining the aim of achieving a developed nation status by 2020.

In line with the expansion of ICT, efforts were undertaken to accelerate the development of the Multimedia Super Corridor (MSC) to facilitate the rolling out of MSC flagship applications. R&D was further encouraged through joint research between industry and public-sector institutions as well as commercializing R&D findings and technological activities through the provision of fiscal and financial incentives, and appropriate infrastructure facilities.

The implementation of two Industrial Master Plans in the last two decades had laid a firm foundation and contributed to the dynamic acceleration of industrial development.

The Third Industrial Master Plan (IMP3) 2006–20 further positioned Malaysia's long-term industrial competitiveness with strategies aimed at facilitating the development of knowledge-intensive technologies, innovation, and creative human capital. The service

sector is seen as a major source of growth, and a more competitive business-operating environment was created through effective institutional support and efficient government delivery system.

Productivity continues to be the integral component in Malaysia's quest to become a high-income economy by 2020 - a national agenda. To move the country forward, the Malaysian government has crafted a framework comprising four pillars, namely 1Malaysia, Government Transformation Programme (GTP), Economic Transformation Programme (ETP), and the 10th Malaysia Plan to drive the transformation.

The New Economic Model [1] is to be achieved through the ETP, which is driven by eight strategic initiatives, while the GTP moves forward with its six National Key Result Areas, identified to create an impact on the prioritized six National Key Economic Areas. The objective is to build a foundation for a stronger and more inclusive mechanism to provide a quantum-leap impact on productivity and innovation.

## PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

### Malaysia's Labor Productivity Performance

Total Factor Productivity (TFP) assumes a pivotal role in enhancing competitiveness and productivity in the Malaysian economy. The focus of the Seventh Malaysia Plan (1996–2000) [2] was to promote a shift from input-driven to productivity-driven.

It was further emphasized in the Eighth Malaysia Plan (2001–05) [3], the Third Outline Perspective Plan (2001–10) [4], and the Second Industrial

Master Plan (1996–2005) [5], which focused on the development of dynamic industry clusters to enable industries to move to higher value-added activities to enhance productivity and growth.

Malaysia's labor productivity performance over the past 40 years has been reasonably good by international standards, coinciding with the opening up of the economy since the late 1960s (Table 1).

Malaysia's labor productivity measured as GDP per worker increased from MYR17,174 (1971–80) to MYR45,459 (2001–10). While Malaysia recorded lower labor productivity growth rate during the 2000 period, a higher growth rate recorded in the earlier period was largely driven by substantial FDI from the USA, EU, and selected Asian countries. Sectoral change in industry, i.e., a continuing shift of capital and labor from agriculture to high-technology sectors (including electrical and electronics, and petrochemical sectors), along with a shift in relatively low productivity from manufacturing, also attributed to macro and microeconomic policies and favourable international economic developments.

Nevertheless, the prospect for future labor productivity growth remains reasonably optimistic, provided appropriate countermeasures are developed to overcome the economic conditions and changes. These include sound macroeconomic environments, flexible labor and product markets, well-developed financial markets, institutional structures, and policies supportive of the accumulation of physical and human capital, entrepreneurship, and R&D activities.

Table 1. Real Output Growth in Selected Periods

Real Output Growth	1971–80	1981–90	1991–2000	2001–10	2011
Per capita income (MYR'000)	5,811	8,400	13,391	16,326	19,108
Labor productivity (MYR'000)	17,174	22,889	34,424	45,479	54,027
Per capita income (% change)	5.70	3.25	4.57	2.80	9.70
Labor productivity (% change)	3.89	2.64	4.27	2.76	4.55

The development of Malaysia's economic transformation has been remarkable. The government has been able to transform the nation from an agro-mining primary producer to a vibrant broad-based economy and become one of the economic miracles of East Asia. The country's development has been holistic, encompassing capacity building with heavy investments in social infrastructure, education, and basic needs. Equally important, the government has always been aware of the need to ensure a socio-economic environment, where Malaysians from all walks of life can benefit from the rapid expansion of the economy.

6.7% during the period of 1970-90, with 7.5% growth in the 1970s, 6% in the 1980s (despite being subjected to two recessions), and 7.1% in the 1990s.

After the 1997 financial crisis, the nation was blessed with seven years of steady economic growth, sustaining an average GDP growth of 5.4% - commendable by international standards. It also reflected a common phenomenon that major transitory shocks seemed to have large permanent costs when it occurs in high-growth economies. In the first decade of the new millennium, GDP growth was strengthened by 4.4%.

Table 2. Output Growth and Contribution of Labor, Capital, and TFP from 1970–2008

Period	Output	Labor (% Contribution)	Capital		TFP (% Contribution)
			IT (% Contribution)	Non-IT (% Contribution)	
1970–75	7.68	1.35 (18)	0.08 (1)	5.67 (74)	0.57 (7)
1975–80	8.20	1.31 (16)	0.12 (1)	5.79 (71)	0.98 (12)
1980–85	4.99	1.15 (23)	0.11 (2)	7.14 (143)	-3.41 (-68)
1985–90	6.64	1.18 (18)	0.19 (3)	3.70 (56)	1.57 (24)
1990–95	9.07	0.91 (10)	0.33 (4)	6.72 (74)	1.12 (12)
1995–2000	4.70	1.22 (26)	0.58 (12)	5.70 (121)	-2.79 (-59)
2000–05	4.66	0.49 (10)	0.80 (17)	2.14 (46)	1.23 (26)
2005–08	5.56	0.61 (11)	0.85 (15)	1.67 (30)	2.44 (44)
1970–2008	6.49	1.05 (16)	0.36 (6)	4.98 (77)	0.10 (1)

Source: APO [6]

The New Economic Policy was introduced in 1970, with its implementation stretched over 20 years to 1990. During this period, Malaysia achieved much progress, particularly in terms of poverty eradication as well as restructuring of society. Now in the new millennium, Malaysia needs to look forward with a high degree of optimism toward achieving Vision 2020 and beyond.

Malaysia has achieved a rapid rate of economic expansion with a strong growth in GDP spanning over a period of more than three decades. Malaysia's GDP growth averaged

### Sources of Economic Growth

As shown in Table 2, capital accumulation was the dominant factor, typically explaining two-thirds to three-quarters of economic growth achieved in all the periods. Looking at the breakdown of the periods, Malaysia had negative TFP growth in two periods: -3.41% and -2.79% in 1980–85 and 1995–2000, respectively. The period of 2005–08 was the golden era of TFP growth, contributing 44% to GDP growth of 5.6%, while its main engine was an expansion of capital input, contributing about 45% (15% by IT capital and 30% by non-IT capital).

Table 3. Role of TFP and Capital Deepening in Labor Productivity

Period	Labor Productivity	Capital Deepening		TFP (% Contribution)
		IT (% Contribution)	Non-IT (% Contribution)	
1970–75	3.97	0.06 (2)	3.35 (84)	0.57 (14)
1975–80	4.51	0.10 (2)	3.43 (76)	0.98 (22)
1980–85	1.86	0.09 (5)	5.18 (278)	-3.41 (-183)
1985–90	3.29	0.16 (5)	1.56 (47)	1.57 (48)
1990–95	6.39	0.29 (5)	4.98 (78)	1.12 (17)
1995–2000	0.85	0.49 (57)	3.16 (371)	-2.79 (-328)
2000–05	3.05	0.73 (24)	1.09 (36)	1.23 (40)
2005–08	3.59	0.75 (21)	0.40 (11)	2.44 (68)
1970–2008	3.43	0.31 (9)	3.02 (88)	0.10 (3)

Source: APO [6]

Table 3 presents the decomposition of labor productivity growth and the contribution of TFP growth, non-IT capital growth, and IT capital growth for the past four decades. Looking at the trends, overall labor productivity was commendable during the period of 1975–80, with a growth rate of labor productivity at 4.51%. The contribution of non-IT capital was 3.43% as compared with 0.98% TFP growth and 0.10% IT capital growth. In 2005–08, TFP growth contributed 68% of labor productivity growth, while the contribution of IT capital and non-IT capital was at 21% and 11%, respectively. It is interesting to highlight the increasing contribution of IT capital to labor productivity growth, especially since 1995, as during the period of 1970–75, its contribution was 0.06% but thereafter rose to 0.29% (1990–95) and 0.75% (2005–08).

#### FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES

This section highlights the estimating equation using the augmented production function approach in investigating the interaction of macroeconomic policy, institutional factor, and human capital on labor productivity growth in Malaysia during the period of 1970–2010.

Recent economic growth literature emphasizes the role of labor productivity growth as the main driver of long-term per capita growth (Hall and Jones) [7]. The analytical framework provided by Edwards [8], Barro [9], and Acemoglu et al. [10] highlight the importance of good institutions to promote productivity and long-term growth, as efficient institutions enhance the business environment, and hence, boost investment and productivity. Based on this framework, which examined the factors for cross-country differences in labor productivity growth, the key roles of macroeconomic stability, institutional factors, trade openness, human capital, and social-economic factors in increasing labor productivity growth can be expressed as:

$PG = f(R\&D, Trade, FDI, GovtC, Pop, Edu, PI)$  (representing Model 1), where:

PG = labor productivity growth, R&D = research & development, Trade = trade openness, FDI = foreign direct investment, GovtC = government consumption, Pop = population, Edu = education attainment, and PI = income per capita. Labor productivity growth (PG) is the GDP per total employment, R&D is the ratio of Research & Development expenditure to GDP, FDI is the ratio of Foreign

Table 4. Results of Labor Productivity Growth and TFP Equation Estimates from 1970–2010

Variable	Parameter Estimate (Model 1: Growth Rate of Labor Productivity)	Parameter Estimate (Model 2: Growth Rate of TFP)
Constant	-5.950 (0.039)***	-5.470 (0.035)***
Edu	0.188 (0.104)****	0.070*** (0.067)
Trade	-4.487 (0.020)***	3.871 (0.260)
R&D	13.006 (0.027)***	7.12 (0.147)*
FDI	0.681 (0.006)***	0.061 (0.058)***
GovtC	5.69 (0.048)**	0.236 (0.003)**
Per capita	0.579 (0.000)**	0.656 (0.000)**
Pop	0.990 (0.129)	-0.990 (0.698)
N	41	41
R <sup>2</sup>	0.617	0.645
Adjusted R <sup>2</sup>	0.527	0.572

Note: i. The dependent variables are Growth Rate of Labor Productivity and Growth Rate of TFP

ii. \*, \*\*, \*\*\*, \*\*\*\* refers to significance at 15%, 10%, 5%, and 1%, respectively

Direct Investment to GDP, Trade is ratio of trade (exports plus imports) to GDP, GovtC is a ratio of government consumption to GDP, Pop is the total population, Edu denotes the level of education attainment of Malaysian employment, and per capita is per capita income of Malaysia.

The results obtained using the Ordinary Least Squares (OLS) method showed that for both dependent variables of labor productivity and TFP growth, there were positive and significant correlations between education and per capita income. Education attainment and per capita income were critical to enable industry to adopt and adapt foreign technology, and create positive impact on productivity. The results from pooled data regression showed

1% increase in education attainment, and per capita income in Malaysia will improve labor productivity growth by 0.2% and 0.6%, and TFP growth by 0.1% and 0.7%, respectively.

Positive and significant correlations exist between R&D expenditure and labor productivity, indicating the significant impact of R&D toward achieving an innovation-led economy. These increasing trends in the ratio of R&D expenditure to GDP from 0.1% in early 1990 to 0.6% in 2010 support the critical importance of the government for R&D investment in Malaysia. The significant correlation of R&D expenditure to TFP growth at 15% and the significant impact of TFP growth of 7% were relatively lower as compared with productivity at 13%.

Based on studies conducted among most advanced economies, the high government consumption would lead to a lower labor productivity growth rate. High government consumption is presumed to take away resources from productive activities, thus causing distortions to private decisions. However, this finding raises an interesting question. In the case of Malaysia, government consumption had a positive and significant correlation with productivity and TFP growth (Table 4). A plausible interpretation is as follows. Government consumption consisted of recurring expenditure in the public sector, which was essential to support and complement the services associated with public infrastructure. Thus, in a way, government expenditure improved the quality of services provided in the public sector, especially those associated with infrastructure, and this provision attracted more investment from the private sector.

FDI and labor productivity were significantly and positively correlated (Table 3), indicating FDI had a positive impact in enhancing Malaysia's productivity and TFP growth. The results indicated the significant role of FDI in enhancing productivity growth and TFP growth in the economy through their investment in advanced technology at significant levels of 5% and 10%, respectively.

The result also showed trade openness had no significant impact on TFP growth, while productivity indicated significant correlation and negatively impacted its growth. The possible explanation of this finding is that international trade provides access to a greater variety and quality of consumer goods, which left less room for domestic production, and, hence, domestic capital accumulation.

Another interpretation could be that trade openness had no beneficial effect on developing countries because exports may have affected an economy through conduits other than productivity growth. For example, exports provided economies-of-scale and foreign exchange to a country, possibly speeding up its growth through capital deepening.

The results indicated that macroeconomic policies, human capital, and institutional and social economic factors were key enablers to boost productivity and TFP growth. If the observations were presented in a stylized pattern of economic growth in the level of development, the potential to raise intangible capital such as ICT, R&D, and educational attainment to adopt high technology from abroad, along with indigenous creativity and innovation aspiration, will enhance the nation's endeavor to achieve a developed country status.

## **PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS**

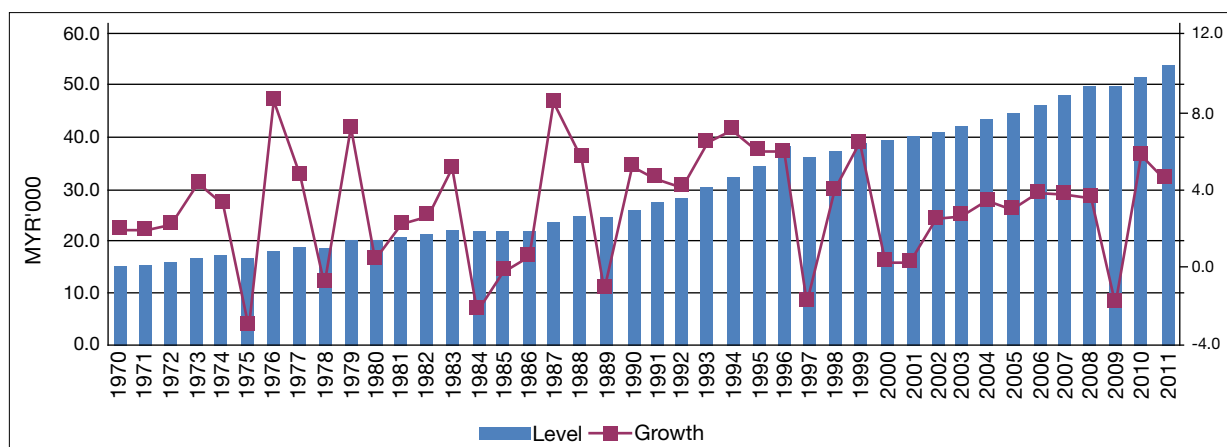
### **MPC — The Prime Mover in Driving Productivity and Efficiency for Better Quality of Life, Competitiveness, and Sustainability**

The Malaysia Productivity Corporation (MPC) was established in 1962, then known as the National Productivity Centre, to assume an important role in the enhancement of productivity and quality of the country toward higher economic growth. In the 1960s, focus was on Training and Advisory Services, particularly in the field of management and entrepreneurship, human capital development, and organization excellence. The 1980s saw a series of productivity campaigns, in particular a three-year National Productivity Enhancement Campaign that was undertaken with the theme "Productivity Drives National Development" to enrich the minds of the masses. From 1980–90s, more emphasis was given to research, systems development, and promotion. Since 1986, a photography contest was introduced to encapsulate the visual impact of beautiful images of productivity and innovation.

In the mid-1990s, in line with the shift to productivity-driven growth, the MPC provided more productivity and efficiency enhancement initiatives in the pursuit of long-term industrial competitiveness. The MPC had been publishing the Annual Productivity Report since 1994. From 2000, core activities focused on benchmarking and best practices. Currently,



Figure 1. Malaysia Productivity Growth and Level from 1970–2010



	Productivity Growth and Level: 2.8% and MYR17,538	Productivity Growth and Level: 2.6% and MYR22,889	Productivity Growth and Level: 4.3% and MYR34,424	Productivity Growth and Level: 2.8% and MYR45,479
Establishment of National Productivity Council (NPC)	Productivity growth driven by agriculture sector	Promotion of more skilled and technology-intensive industries	Productivity growth as an important determinant for long-term economic growth	Productivity and efficiency through high-impact productivity and innovation drivers
1. National Productivity Council - 1962	1. Management and entrepreneurship	1. 1986 was proclaimed as Productivity Year	1. Formation of Malaysian Benchmarking Services and Benchmarking On-line Networking Database	Launch of the Productivity Enhancement Campaign 2002
2. Parliament passed the National Productivity Council (Incorporation) Act No.19 - 1966	2. Human capital development	2. Launch of the First Productivity Enhancement Campaign (1985–1989)	2. Launch of the National Productivity Enhancement Campaign (1997–1999) - 1996	1. Launch of e-Benchmark
	3. Organization excellence	3. NPC became a member of the APO	3. Formation of NPC consultative panels	2. National Productivity Conference 2000
	4. NPC expanded regional offices to Sabah and Sarawak	4. Launch of the Productivity Campaign and National Productivity Seminar	4. Publication of the first Annual Productivity Report	3. MPC established the Consultative Panel for Innovation And Creativity
	5. NPC launched another two regional offices in Penang and Johor Bharu		5. The Company Manual for Productivity Assessment – 1991	4. MPC introduced the Malaysia Benchmarking Index
	6. NPC launched the East Coast regional office		6. Renamed National Productivity Corporation	5. MPC was renamed as Malaysia Productivity Corporation
	7. Launch of the new NPC building		7. Ministry of International Trade and Industry introduced the Industry Excellence Award -1990	6. Model Company Organizational Excellence for SMEs
			8. The Prime Minister Quality Award was first introduced	7. Introduced Innovation on e-Learning Management System
			9. Launch of the Productivity Campaign and National Productivity Seminar	8. Partner Institutes to IMD and WEF; engagement and networking activities (Collaborate to Compete)
				9. Five strategic priorities: Regulatory Review, Enterprise Innovation, Business Excellence, Global Competitiveness, and Knowledge Management
				10. Strengthening Public-Private Partnership

the MPC has expanded its function by focusing on competitiveness and innovation in line with the National Mission. Figure 1 presents a brief overview of productivity performance and related enhancement activities.

Subsequently, the MPC was revamped in October 2010 toward achieving a quantum leap in productivity and efficiency through high-impact productivity and innovation drivers. As outlined in the current Tenth Malaysia Plan, "Unleashing Productivity-led Growth and Innovation", Malaysia must be able to compete regionally and globally. This requires the MPC to intensify its efforts to drive productivity and innovation, as further growth must come from higher TFP in accordance with the nation's aspiration to transform into a high-income nation. To achieve this, Malaysia has to ensure the private sector investment grows at least 12.8% per annum with TFP growth of 2.3%, productivity growth of 4.6%, and annual GDP growth of 6% [11].

As the productivity and quality institution of the country, MPC serves as the APO secretariat in fostering relations among member countries, in addition to identifying relevant participation in the program undertaken. Malaysia has been a member of the APO since 1983, and annually participates as well as hosts programs (Appendix 1 lists the various programs hosted by Malaysia from 2001–10).

Since then, a total of 71 Technical Expert Services (TES) was deputed to provide technical assistance to various national productivity organizations (NPOs) and related organizations to strengthen their institutional capacities and upgrade their technical competencies. Malaysia hosted the 52nd (2010) and 53rd (2011) APO Governing Body Meetings. In addition, every year the Malaysian Technical Cooperation Programme, which comprises Systems Development for SMEs and Productivity Improvement Programmes through Work Study, is undertaken by the MPC in collaboration with the Economic Planning Unit and the Ministry of Foreign Affairs. The program signifies the continuity of technical sharing activities since 1984.

## ISSUES AND CHALLENGES

The contribution of TFP to Malaysia's GDP growth is anticipated to increase due to improvement in the quality of human resources. The government's emphasis on education and training through its large budget allocation will further enhance skills of workers.

In line with "Unleashing Productivity-led Growth and Innovation" under the Tenth Malaysia Plan [12], special emphasis has been given to the enablers of productivity, specifically:

- Focusing on skills development, especially in terms of upskilling the existing workforce to facilitate industries to move up the value chain
- Promoting the development of concentrated industrial clusters and supporting ecosystems toward enabling specialization and economies of scale
- Increasingly targeting investment promotion toward investment quality (as opposed to quantity), which supports higher value-added activities and diffusion of technology
- Increasing public investment to the enablers of innovation, particularly R&D and venture capital funding

Though Malaysia is the top 14th most competitive nation among 59 economies as reported in the World Competitiveness Yearbook 2012 [13] by the Institute for Management Development (IMD), and ranked 25th among 144 countries in the Global Competitiveness Report 2012–13 [14] by the World Economic Forum (WEF), much remains to be done to put the country on a more solid growth path. Continuous efforts will be undertaken to identify areas for improvement and to implement initiatives to ensure a smooth progression toward an innovation-driven, high-income economy.

As Malaysia moves into the "transition toward innovation" phase, it is important that focus is placed on technological as well as non-technological innovation. Acknowledging

that innovation is the game changer, the government has emphasised and emplaced policies and incentives to drive innovation in the country. Among them include the National Innovation Strategy, the framework vital for shaping a supportive ecosystem for innovation. This aims to create opportunities and emplace enablers and funding, which can lead to a vibrant innovation ecosystem and eventually spur progress through solutions for the nation, thus contributing to a better quality of life.

Malaysia's new ranking of 12th position among 185 economies in the World Bank Doing Business 2013 Report [15] is a significant improvement over 2011's 18th position and 2010's 23rd. The World Bank affirms Malaysia's competitiveness as an economy, which reflects the successful implementation by the government to improve the business environment and make it conducive for sustained economic growth. The World Bank has also recognised the government's reform agenda driven by the Special Taskforce to Facilitate Business (PEMUDAH) and the Performance Management Delivery Unit (PEMANDU). This is a reflection of continuous improvement in the delivery of public services and the overall efficiency of the government machinery through the ETP and GTP.

Moving forward, Malaysia remains committed to be among the top 10 nations in ease of doing business and a high-income economy. Challenges undoubtedly remain with the constant emergence of new competitors and global economic uncertainties. It is apparent that more needs to be done in the shortest time possible for Malaysia to stay ahead. PEMUDAH will continue to be a catalyst to bring about change to enhance Malaysia's competitiveness. Efforts by this public-private sector collaboration will be directed at i) finding more ways to provide a conducive and facilitative business environment, ii) reviewing regulatory changes and new regulations to facilitate businesses, iii) ensuring greater transparency, accountability, and efficiency of the public sector, iv) promoting service

liberalization, and developing, attracting, and retaining talent, and v) improving the service level of the private sector. Continuous efforts will be undertaken to identify areas for improvement and for implementing initiatives to ensure a smooth progression toward an innovation-driven, high-income economy.

## REFERENCES

- [1] PEMANDU. The New Economic Model (NEM), ETP and GTP reports. Available at <http://www.neac.gov.my> and <http://etp.pemandu.gov.my>.
- [2] Economic Planning Unit. Seventh Malaysia Plan 1996–2000. Putrajaya: Economic Planning Unit, Prime Minister's Department; 1996.
- [3] Economic Planning Unit. Eighth Malaysia Plan 2001–2005. Putrajaya: Economic Planning Unit, Prime Minister's Department; 2001.
- [4] Economic Planning Unit. Third outline perspective plan (2001-2010). Available from <http://www.epu.gov.my/en/the-third-outline-perspective-plan-2001-2010>.
- [5] Ministry of International Trade and Industry. Second Industrial Master Plan (1996-2005). Kuala Lumpur: MITI; 1996.
- [6] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [7] Hall R. E., Jones C. 1999: Why do some countries produce so much more output per worker than others. *Quarterly Journal of Economics* 114(1): 83-116.
- [8] Edwards S. Openness, productivity, and growth: what do we really know. National Bureau of Economic Research Working Paper No. 5978; 1997.
- [9] Barro R. J. Human capital and growth. *American Economic Review* 2001; 91 (2): 12–17.
- [10] Acemoglu D., Johnson S., Robinson J. Institutions as the fundamental cause of long-run growth. National Bureau of Economic Research Working Paper No. 10481; 2004.

- [11] Malaysia Productivity Corporation. Productivity Report. Petaling Jaya: Malaysia Productivity Corporation; 1998 till 2011.
- [12] Economic Planning Unit. Tenth Malaysia Plan 2011–2015. Putrajaya: Economic Planning Unit, Prime Minister's Department; 2011.
- [13] Malaysia Productivity Corporation. Malaysia In The IMD World Competitiveness Yearbook 2012. Petaling Jaya: Malaysia Productivity Corporation; 2012.
- [14] Malaysia Productivity Corporation. Malaysia In The Global Competitiveness Report 2012–2013. Petaling Jaya: Malaysia Productivity Corporation; 2012.
- [15] PEMUDAH, Malaysia Productivity Corporation. Malaysia In Doing Business 2013. Petaling Jaya: Malaysia Productivity Corporation; 2012.
12. Working Party Meeting on Application of Productivity Concept and Tools for Community Development
13. Study Meeting for Heads of National Training Institutes for Integrated Community Development

2002

1. Seminar on Application of Productivity/ Management Concepts and Tools for Community Development
2. International Symposium on Ecotourism and Green Productivity (GP) - Asia Pacific Ecotourism Conference (Apeco 2002)
3. Seminar on Productivity Measurement in the Service Sector
4. Workshop on Implementing Knowledge Management
5. Development of Productivity Specialists: Advanced Program
6. Workshop on Total Factor Productivity
7. Improvement of the Environmental Friendly Technology in Edible Oil Industry
8. Training Course on Natural Farming for GP-ICD
9. Feasibility Assessment of GDP of Urban Waste Management
10. Practicum Workshop for Trainers/ Consultants on Green Productivity
11. Workshop on Strengthening IT Capabilities of NPOs
12. Learn about Productivity Measurement in NPC Malaysia
13. Third Workshop on Best Practice Network
14. Training Course on Development of Women Entrepreneurs

## APPENDIX 1

### List Of APO Programs Hosted By Malaysia

2001

1. Seminar on Total Quality Management
2. Workshop on ISO 9000 for Supporting Industry
3. Survey on Total Factor Productivity (coordination meeting)
4. Seminar on Strategic Information Systems
5. Green Productivity Promotion Mission "Workshop on Enhancing Organizational Competitiveness through Green Productivity"
6. Technical Advisory Services for Assessment of Biogas Reactor in Sandakan, Sabah
7. NPC/INTAN Advanced Workshop on Green Productivity
8. Workshop on the Application of Total Quality Environmental Management (TQEM) Tools for Green Productivity
9. Workshop for Trainers on Natural Farming
10. Planning Meeting for a five-week Practicum Workshop for Trainers/Consultants on Green Productivity
11. Technical Advisory Services for Assessment of Biogas Reactor

2003

1. ICD DP on Natural Farming
2. Practicum Workshop on Green Productivity
3. Seminar on Benchmarking
4. Training Course on Productivity Measurement at Enterprise Level
5. Workshop on ISO 9001:2000 Series Auditor/ Lead Auditor Course
6. Study Meeting on Total Factor Productivity Measurement and Analysis: Sector-specific Measurement
7. Development of Productivity Specialists: Advanced Program

2004

1. Training Course on Development of Income-Generating Business Activities for Women
2. Workshop on Information and Communication Technologies as Productivity Tools for SMEs
3. Symposium on the Balanced Scorecard
4. Seminar on Total Factor Productivity Measurement and Analysis
5. Training Course on ISO 9001:2000 Series Auditor/Lead Auditor Course
6. Distance Learning-based Seminar on Total Quality Management
7. International Conference on Green Supply Chains and Workshop on Green Procurement
8. Eco-products International Fair 2004 in Kuala Lumpur, Malaysia, and visit to Bangkok, Thailand
9. Training Workshop on Energy Efficiency and Clean Development Mechanism
10. Steering Committee Meeting on GPDP on Solid Waste Management and Greening of Hotel Belt in Batu Feringgi and Universiti Sains Malaysia
11. Integrated Community Development (ICD-DMP) on Natural Farming
12. International Forum on Green Productivity to Enhance Competitiveness and Sustainability
13. Fourth Practicum Workshop on Green Productivity
14. Planning Meeting for Developing Collaborative Projects on Green Productivity Measurement and Corporate Social Responsibility, Accountability, and Sustainability
15. Seminar on Integrated Community Development Strategies: Kaizen and Rural Life Improvement Programs
16. Review Meeting of Development of Productivity Specialists
17. Development of Productivity Specialists: Advanced Program

2005

1. Training Course on Income-Generating Activities for Socially Vulnerable Women

2. Training Course on ISO 9001:2000 Series Auditor/Lead Auditor
3. Multicountry mission on Event Management, Tourism, and Productivity
4. Practicum Workshop on Green Productivity
5. Regional Workshop on Capacity Building for Creating an Eco-circulation Society through Biomass Utilization in the BIMP-EAGA Region
6. On-site Assessment for Solid Waste Management and Greening of the Hotel Belt in Batu Feringghi and Universiti Sains Malaysia
7. Solid Waste Management and Greening of the Hotel Belt in Batu Feringghi and University Sains Malaysia
8. Development of Productivity Specialists: Advanced Program
9. Seminar on Agricultural Niche Marketing for Enhancing Competitiveness
10. Basic Research on Social Capital and its Impact on Labor Productivity

2006

1. Training Course on Small Business Development for Women
2. Symposium on Managing NPOs' Challenges in the 21st Century
3. Training Course on ISO 9001:2000 Series for Auditor/Lead Auditor
4. Workshop on IT for Productivity Specialists
5. Practicum Workshop on Green Productivity
6. National Workshops on Capacity Building for Creating an Eco-circulation Society through Biomass Utilization in the BIMP-EAGA Region
7. Workshop on Development of Productivity Specialists: Advanced Program
8. Multicountry Study Mission on Best Practices in Rural Entrepreneurship Development

2007

1. Study Meeting on the Social Dimensions of Productivity
2. Study Meeting on Mergers and Acquisitions for Higher Corporate Value
3. Expert Roundtable Meeting Series on Innovation and Competitiveness (First Meeting)

4. Practicum Workshop on Green Productivity
5. Regional Policy Dialogue Workshop on Capacity Building for Creating an Eco-circulation Society through Biomass Utilization in the BIMP-EAGA Region
6. Seminar on Community-based Rural Tourism
7. Enhancing NPOs' Core Competence: Workshop on Knowledge Management Consultancy
8. Training Course on Development of Productivity Specialists: Advanced Program
9. Training Course on the Food Safety Management System (ISO 22000:2005) for Auditors/Lead Auditors
10. Southeast Asian Regional Conference on Agricultural Value Chain Financing

#### 2008

1. Expert Group Meeting Series on Knowledge Management: Second Meeting
2. Forum on Innovation and Competitiveness
3. Workshop on Green Productivity
4. Study Meeting on Eco-finance
5. Training Course on Development of Productivity Practitioners: Advanced Program (DPP: Advanced)
6. Training of Trainers on Good Agricultural Practices (GAP) and Benchmarking: GLOBALGAP for Fruit and Vegetables

#### 2009

1. Study Meeting on Knowledge Management in the Service Sector
2. National Dissemination Program on Green Productivity and Energy Efficiency
3. Training of Trainers in Green Productivity
4. Training Course on Development of Productivity Practitioners: Advanced Program
5. Training Course on the Food Safety Management System (ISO 22000:2005) for Auditors/Lead Auditors

#### 2010

1. Training of Trainers in Green Productivity
2. APO International Conference on Green Technology

---

# MONGOLIA

OTGONTUYA  
DORJKHUU

**Researcher**  
Mongolian Productivity and Quality Center

---

## INTRODUCTION

Mongolia is a land-locked country in Central Asia, situated between Russia and PR China. It covers an area of about 1,564,000 sq km. Population density is 1.7 persons [1] per sq km, - one of the lowest in the world. Mongolia has one significant advantage, namely, its young population. The 22 local governmental units, 21 *aimag* or province, and Ulaanbaatar city have the power to formulate policies, make decisions, and influence budgetary allocations.

Economic activity in Mongolia has traditionally been based on herding and agriculture, although development of extensive mineral deposits of copper, coal, molybdenum, tin, tungsten, and gold have emerged as drivers of industrial production. The reforms in law, banking, insurance, mining, communication, transportation and storage, trade, and service have created an enabling environment for investments and economic growth. Economic growth returned after 1990 due to reform, which embraced free-market economics and extensive privatization of the formerly state-run economy. Mongolia's economic structure had undergone significant transformation over the last two decades. The private sector had grown over a span of 20 years, from negligible levels to currently contributing over 80% of the country's GDP.

Macroeconomic indicators have improved substantially in recent years and Mongolia's real GDP growth almost doubled between 2001–10. Per capita income, which was USD384 in 1999, almost doubled to USD\$605 in 2004 [2]. GDP growth improved to 10.25% in 2007 and 8.9%, in 2008 because of a boom in the mining sector.

In 2010, Mongolia ranked 99th among 130 countries in the Global Competitiveness Report. According to the Human Development Report (HDR) 2010 [3], Mongolia had a human development index value of 0.622. It ranked 100th place in a list of 169 countries. Mongolia's recent development experience suggested many gains in the economic, social, and political spheres as well as continuing changes in the daily lives of its people. Equally significant were the roles of the private sector and nongovernmental organizations in promoting economic growth and human development. Today, there are over 5,879 [1] registered NGOs.

The Central Council of Mongolian Trade Unions joined the World Federation of Trade Unions in 1949, and Mongolia joined the ILO in 1968. Mongolia joined the World Trade Organization (WTO) in 1997 and became a member of the UN in 1961.

Mongolia joined the APO as its 18th member in July 1992. In 1993, the National Productivity and Development Center (NPDC) was established. In December 2009, the NPDC was reorganized and its name changed to the Mongolian Productivity Organization (MPO), operating under the Ministry of Social Welfare and Labour.

## PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

The growth rates of GDP, labor productivity, and total factor productivity (TFP) of Mongolia in 1970s, 1980s, 1990s, and 2000s are summarized in Table 1. Labor productivity growth rate was 4.1% during the 1970s, and since the 1980s, the growth rate decreased significantly. Furthermore, Mongolia experienced negative

Table 1. Growth Rate of GDP, Labor Productivity, and TFP in Mongolia

Period	GDP (%)	Labor Productivity	TFP (%)
		Employment (%)	
1971–80	5.95	4.10	1.83
1981–90	5.20	1.03	-2.33
1991–2000	0.90	0.59	-0.34
2001–08	7.56	4.56	3.54
1971–2008	4.70	2.36	0.52

Source: APO [4]

TFP growth in the periods of 1981–90 and 1991–2000. After the Asian crisis in 1998, the labor productivity rate recovered to 4.56% in the 2000s after it dropped to 0.59% in the 1990s. The importance of labor productivity growth was higher than TFP over the last few decades. The average labor productivity growth rate was 2.36% for the whole sample period, which was less than that of the GDP growth rate of 4.7%. The GDP growth in Table 1 indicates that Mongolia had experienced high economic growth in the 1970s, 1980s, and 2000s. However, the GDP growth rate had slowed down to 0.90% between 1991–2000.

Table 2 indicates estimation of the growth accounting and sources of economic growth in Mongolia. The results indicated that capital investment had significant and positive impact on the economic growth of Mongolia from 1971–2000. Capital accumulation, especially non-IT capital accumulation, was the key driver of the Mongolian economic growth for the last few decades. The contribution of non-IT capital accounted for 68.1% of GDP growth. Moreover, IT capital accounted for another 3.8% during 1971–90. Accumulation of IT capital improved TFP growth rate. In the future, IT capital growth is expected to be

Table 2. Growth Accounting and Source of Economic Growth in Mongolia

Period	GDP (%)	Labor (%)	Capital (%)	IT Capital (%)	Non-IT Capital (%)	TFP (%)
1971–80	5.95	0.64	3.48	0.04	3.44	1.83
1981–90	5.20	1.35	6.18	0.16	6.02	-2.33
1991–2000	0.90	0.06	1.18	0.14	1.04	-0.34
2001–08	7.56	1.14	2.88	0.43	2.45	3.54
1971–2008	4.70	0.80	3.38	0.18	3.20	0.52
Contribution						
1971–80	100.0	10.7	58.5	0.7	57.8	30.8
1981–90	100.0	26.0	118.8	3.0	115.8	-44.8
1991–2000	100.0	6.7	131.1	15.6	115.5	-37.8
2001–08	100.0	15.1	38.1	5.7	32.4	46.8
1971–2008	100.0	17.0	71.9	3.8	68.1	11.1

Source: APO [4]



more significant, as high-technology input will play a crucial role in economic growth. The contribution of TFP to GDP growth was 11.1% during 1971–90.

As a result, the impact of total factors increased positively to 3.54% during 2001–08. The reasons for the positive impact were foreign direct investment, privatization, international lump-sum grant, and other factors. Furthermore, private-sector business capacity and development affected the outcome positively. However, the contribution of TFP to GDP growth was -2.33%

during the 1980s and -0.34% during the 1990s. One of the main reasons for this negative rate was the Asian Financial Crisis in 1997/98 as well as the transformation from a centrally planned economy to a free-market economy system.

Data was derived from the National Statistical Office. Capital variables were not available or incomplete at the country level, therefore, investment variables were used instead of capital variables. The GDP deflator was also used to examine the investment indicators at constant prices.

Table 3. Regression Analysis of Determinants of TFP Growth in Mongolia from 1991–2008

Item	M1	M2	M3	M4	M5
Constant	28.1 (41.09)	28.1 (42.70)	28.07 (42.76)	-13.63 (166.3)	-161.1 (222.4)
Exp/GDP	0.61	0.62	0.61	0.57	0.6
Export/GDP*100	(0.72)	(0.75)	(0.75)	(0.77)	(0.73)
Imp/GDP	-1.7	-1.69	-1.7	-1.71	-1.74
Import/GDP*100	(0.47)	(0.49)	(0.49)	(0.49)	(0.48)
Gov/GDP	0.88	0.84	0.87	1.12	1.5
Government consumption/GDP*100	(2.06)	(2.15)	(2.14)	(2.32)	(2.2)
FDI/GDP	1.47	1.84	1.65	0.8	0.025
FDI investment/GDP*100	(1.66)	(2.53)	(2.4)	(3.12)	(2.37)
KL-Capital deepening	-	-0.003	-	-	-
Total investment/Total employment	-	(0.017)	-	-	-
GDP per capita	-	-	-0.0011	-	-
Constant price	-	-	(0.011)	-	-
Pop/initial	-	-	-	0.018	-
(1991–2008)	-	-	-	(0.069)	-
Life expectancy	-	-	-	-	3.00
(1991–2008)	-	-	-	-	(3.64)
R <sup>2</sup>	0.55	0.55	0.55	0.55	0.57
D/W	1.85	1.89	1.87	1.86	1.84
Obs	18	18	18	18	18

Note: i. Dependent variable: TFP Growth  
ii. Standard error in parenthesis

## FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES

TFP and labor productivity growth rates were used in this section. Also included are factors reflecting investment (FDI/GDP), trade openness (Exp/GDP, Imp/GDP), government intervention (Gov/GDP), and also some initial condition factors (Life Exp, Initial Pop). As shown in Table 3, the estimates of coefficients of probability were lower than 0.05% and statistically significant. As a result, the Durbin-Watson meaning was higher adjusted and

was a statistically significant influence. The estimation results showed that the contribution shares of export to GDP, the share of FDI to GDP, Initial Population and Life Expectancy were significant and positively related to TFP growth rate, with coefficients of 0.6%, 0.025%, and 3%, respectively. On the contrary, the share of import to GDP influenced the TFP growth rate with a coefficient of -1.74%.

Table 4 indicates the regression analysis of labor productivity growth from 1991 to 2008. The probability coefficient of the five factors

Table 4. Regression Analysis of Determinants of Labor Productivity Growth in Mongolia from 1991–2008

Item	M1	M2	M3	M4	M5
Const	-1.79 (8.09)	-1.75 (7.32)	-1.42 (7.57)	-78.25 (33.09)	91.67 (47.67)
Exp/GDP	0.34 (0.18)	0.31 (0.17)	0.33 (0.17)	0.38 (0.16)	0.36 (0.17)
Imp/GDP	-0.23 (0.18)	-0.23 (0.16)	-0.23 (0.17)	-0.32 (0.16)	-0.27 (0.16)
Gov/GDP	-0.18 (0.47)	-0.134 (0.43)	-0.17 (0.44)	0.28 (0.45)	0.093 (0.45)
FDI/GDP	0.7 (0.41)	0.06 (0.54)	0.68 (0.54)	-0.44 (0.6)	0.043 (0.516)
KL-Capital deepening Total investment/Total employment	- -	-0.0071 (0.0036)	- -	- -	- -
GDP per capita constant price	- -	- -	-0.0042 (0.024)	- -	- -
Pop/initial (1991–2008)	- -	- -	- -	0.032 (0.013)	- -
Life expectancy (1991–2008)	- -	- -	- -	- -	1.428 (0.748)
R <sup>2</sup>	0.39	0.54	0.509	0.58	0.53
D/W	2.14	2.03	2.11	2.07	1.95
Obs	18	18	18	18	18

Note: i. Dependent variable: Labor Productivity Growth  
ii. Standard error in parenthesis

on the regression analysis such as M1, M2, M3, M4, and M5 showed lower than 0.05% and was statistically significant. This result showed that the explanatory variables were statistically significant. The estimation results of labor productivity regression was almost the same and can be similarly explained. The contribution share of export to GDP, share of FDI to GDP, and Life Expectancy were positively related to labor productivity growth rate. The other explanatory variables such as the share of government consumption to GDP and the share of import to GDP were negatively related to labor productivity growth rate with coefficients of 0.093% and 0.27%, respectively.

## PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

In the 1970s and 1980s, the state was largely focused on enhancing productivity activities before the transformation. The growth rates of GDP, labor productivity, and TFP had positive and significant impacts in the same period. During 1990–2000, productivity movement started to drop sharply in relation to the reform of free-market economy. It increased drastically after the transformation since 2000.

Mongolia joined the APO as its 18th member in July 1992. The NPDC is a nonprofit NGO established in 1993 to promote the productivity movement in Mongolia. In December 2009, the NPDC was reorganized and its name was changed to the MPO, operating under the Ministry of Social Welfare and Labour. The MPO's directions include:

- i. Managing, measuring, and ensuring that “learning for productivity” occurs
- ii. Organizing activities that promote productivity consciousness not only among top-level officers but also among the society at large
- iii. Developing productivity trainers and establishing guidelines for training courses while encouraging trainees to share their experiences

- iv. Preparing a record of Mongolian innovations as part of research activities

Jointly, the MPO and APO have implemented over 500 projects on improving operational management. As of 2011, over 1,200 participants have attended training courses, seminars, workshops, study missions, and other activities implemented by the APO. During 2001–08, a number of special international programs were organized and attended by over 350 participants from APO member countries. The Member Country Support Program also witnessed development in Mongolia, aided by technical expert service, observational study missions, publication of training materials, and demonstration projects organized by the APO and Japan Productivity Center.

The MPO maintains a website at <http://www.mpo.mn>, providing comprehensive information on the MPO and its activities, current and past issues of the Productivity News, press releases, and other special announcements and linkages to the websites as well as addresses of national productivity organizations and MPO-related bodies.

The MPO has collaborated with the APO and its member countries, the ILO, the World Bank's Global Development Learning Network, the World Confederation of Productivity Science, the International Productivity Service (USA), the World National Productivity Organizational Network, and the Colombo Plan Secretariat. In addition to the MPO, many NGOs have also been contributed to improve productivity movement at the country level. These include the Mongolian National Chamber of Commerce and Industry, the Mongolian Employer's Federation, the ADB, the World Bank, the European Bank for Reconstruction and Development (EBRD), and the United Nations Development Programme (UNDP).

In 2008, the government of Mongolia launched the National Development Strategy to run until 2020, identifying productivity reforms as a priority for the country's long-term

competitiveness. The government sought to establish a higher productivity system that is globally competitive, conforming to international standards to propel Mongolia into a high-technology and knowledge-based economy. In the near future, many projects will incorporate labor market programs by providing skills training to increase productivity as well as economic growth.

**ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

The following are some of the issues and challenges faced since 1970 in improving productivity movement nationwide.

i. Government macroeconomic policy

In the 1970s and 1980s, the state was largely focused on enhancing productivity activities in order to encourage transformation. Simultaneously, education, knowledge, and work skills were developed. However, improving productivity and organizing productivity movement nationwide proved difficult because of low finance, advanced technology and innovation, and complex government macroeconomic policies. Government intervention was positively correlated with productivity and economic growth.

In addition, the country promoted accountability and strengthened the rule of law to instill greater confidence in the private sector and its people to invest in productivity development.

Most of the developed countries in the Asian region such as Japan, Republic of China, Malaysia, and Thailand, obtained financing and long-term investment from their respective governments, enabling them to improve productivity movement broadly and sustain their development.

ii. Bilateral cooperation

Many international organizations such as ADB, World Bank, UNDP, GTZ, APO, EBRD,

and Mongol Japan Center implemented projects to improve human resource contribution to economic growth. With the results of these projects, the growth rate of TFP and GDP performed better during 2001–08.

iii. Real measures of productivity and economic growth

Measures are needed to accelerate economic growth by stimulating additional investments, encouraging industrial and trade expansion, and improving infrastructure. Since 1990, many NGOs, national consultant services, and foreign experts have organized a number of training courses and workshops for managers to improve knowledge, skills, and experience. However, the actual result of productivity and economic growth of the trainings were not measurable. It is still weak to measure the productivity data and analyse activities in Mongolia.

iv. Highly educated human resource

Between 2000–10, the growth rate of TFP increased. However, the contribution rate of labor productivity to TFP was 17% during 1971–2008. Surprisingly, the growth amount of wages did not correlate with productivity and economic growth of the country.

As highlighted, the reason was possibly related to unskilled workers in all sectors. In other words, highly educated and better-skilled workers can improve productivity and the economy.

v. R&D, new technology and innovation

Investment in R&D and high technology and innovation is the best way to improve labor quality, production quality, and productivity. However, in the face of global environmental restrictions and growing globalization, as well as the

dramatic development of information technology, these investments were inadequate for impacting productivity growth in the last 20 years. The state had failed to effectively invest and support R&D for improving productivity at the national level according on its action plan.

### Challenges for Mongolia

Mongolia needs to strengthen its productivity policy at the national level in order to compete globally. The country now faces a number of challenges such as economic transition, labor force, environmental management, innovation, productivity growth, and economic growth. The following aspects of the productivity and economic growth were identified.

#### i. Development concept of productivity

According to the productivity and economic result of the last 50 years, it was found that Mongolia lacks long-term development strategy and a master plan for improving productivity and economic growth. The government of Mongolia should establish a Ministry of Productivity and Innovation in order to improve economic development. Further, the export sector must be developed by introducing high technology and improving intellectual capacity in order to enhance the efficiency of production and investment. The state needs to develop investment plans for R&D, and high technology and Innovation.

#### ii. Public-private partnership and international cooperation

In an increasingly interconnected world, the government recognizes the importance of maintaining ties with other international organizations, national agencies, and other bodies within and outside the Asia-Pacific region and all over the world. The government needs

to actively promote participation of the organizations, institutions, and productivity-oriented individuals in its complex policy for improving productivity. It especially demands the government's commitment and vision in order to bring into existence a sustainable productivity policy.

#### iii. Real measurement for economic growth

The state must focus on measurement of economic growth in particular sectors such as mining, transportation, trade, and service. It can, for instance, measure the relationship between real average wage and labor productivity.

### REFERENCES

- [1] National Statistical Office of Mongolia. Statistical Yearbook 2011, Ulaanbaatar: Government Printer; 2012.
- [2] Government of Mongolia, United Nations Development Programme. Country programme action plan between the government of Mongolia and United Nations Development Programme 2007–2011, [http://asia-pacific.undp.org/content/rbap/en/home/operations/country\\_programme\\_documents](http://asia-pacific.undp.org/content/rbap/en/home/operations/country_programme_documents).
- [3] Mongolia Human Development Report 2011. From Vulnerability to Sustainability: Environment and Human Development, Ulaanbaatar, Mongolia.
- [4] Asian Productivity Organization, APO Productivity Databook 2011, [http://www.apo-tokyo.org/about/measurement.html#apo\\_database](http://www.apo-tokyo.org/about/measurement.html#apo_database), accessed on 28 May 2012.

---

# NEPAL

PRABIN KUMAR  
ACHARYA

## Branch Officer

National Productivity and Economic  
Development Centre

---

### INTRODUCTION

Nepal's level of productivity and economic growth rate are among the lowest in the region. Table 1 reveals the historical trends of macroeconomic indicators, mainly GDP at constant prices, growth rate of GDP per capita, and employment and population from 1970–2005.

GDP at constant prices, which was 8.4 in 1975, had risen to 33.3 in 2008. Similarly, GDP growth rate per capita, which was at 1.7 in the same fiscal year (1975), was 2.9 in 2008. The table shows the country has been able to generate jobs and has created employment opportunities, but there is much to be done.

Employment opportunities could not be created for the 400,000 labor force that enters the labor market annually. Opportunities for entrepreneurship, quality skill development, and creation of employment opportunities are dismally low. Millions of youths are compelled to head overseas to seek employment. During the 1970s, 1980s, and 1990s, Nepal exported readymade garments to the USA and woolen carpets to Europe, which created employment and improved its GDP and per capita rate. During that era, Nepal saw the industrial establishments grow, and the country's economy was investment- and export-oriented.

However, currently the country's economy is gradually becoming consumption oriented due to remittance of income and other factors, thereby causing a hopeless plunge in savings and investment rates. Consumption to GDP that stood at 88.3% in 2000–01 increased to 93.3% by 2010–11. As a result, the rate of domestic savings had come down to 6.7% from 11.7% during that period.

Consumption-oriented economy naturally leads to dependency, resulting in the dearth of resources for investment. Hence, it is another challenge in creating the foundation for economic growth. The economic situation of the country, which is a major indicator of economic development, had not been satisfactory. In a period of over a decade, Nepal had achieved an average economic growth rate of 4%. In an environment where the country's neighbors had achieved double-digit economic growth, Nepal could not achieve this landmark, mainly due to political instability, weak infrastructure, and uneasy labor relations.

### Present Structure of Economic Activities

Nepal's economic activities can be summarized as follows:

The economic growth rate was less likely to be encouraging in 2010–11 with GDP growth estimated at 3.5% against the target of 4.5%. In the fiscal year 2010–11, the agriculture sector was estimated to grow by 4.1%, non-agriculture sector by 3.1%, and fisheries by 6.8%. Similarly, mining and quarrying by 2.1%, manufacturing by 1.5%, construction by 3.3%, hotel and restaurant by 7.4%, transport, communication, and warehousing by 7.1%, financial intermediation by 3.9%, real estate, rent, and commercial services by 2.6%, public administration and defense by 3%, education by 2.9%, health and social works by 5.9%, and other community, social, and personal services by 8.6%. As for electricity, gas, and water supply, the production of this subsector was estimated to decline by 4%, and for the wholesale and retail trade, the average growth rate was 2.1% for the last five years [2].

Table 1. GDP at Constant Prices, Growth Rate of GDP Per Capita, Employment, and Population

Year	GDP at Constant Prices	GDP Growth Rate Per Capita	Employment ('000)	Population ('000)
1970	NA	NA	4,692	11,297
1975	8.4	1.7	5,559	12,815
1980	9.8	5.3	6,614	14,631
1985	12.0	2.4	6,942	16,320
1990	15.3	4.1	7,242	18,100
1995	19.5	2.9	8,191	20,264
2000	24.8	3.3	9,582	22,671
2005	28.9	1.2	10,873	25,343
2006	29.9	1.2	11,155	25,887
2007	31.7	4.0	11,454	26,380
2008	33.3	2.9	11,770	26,867

Source: APO [1]

Note: GDP at Constant Prices in USD billion using 2005 purchasing power parities

Table 2. Annual Growth Rate of GDP by Economic Activities at Constant Prices

Industries	01/02	02/03	03/04	04/05	05/06	Average Growth Rate (01/02–05/06)	06/07	07/08	08/09	09/10	10/11	Average Growth Rate (06/07–10/11)
Agriculture and forestry	3.0	3.3	4.7	3.4	1.7	3.22	0.9	5.8	3.0	1.2	4.1	3
Fishing	8.7	4.0	12.2	7.1	9.9	8.38	3.0	7.3	5.3	3.9	6.8	5.26
Mining and quarrying	8.8	3.2	-0.4	6.8	8.3	5.34	1.5	5.5	0.7	3.1	2.1	2.58
Manufacturing	-5.3	0.0	2.2	2.6	2.0	0.375	2.6	-0.9	-2.8	1.2	1.5	0.32
Electricity, gas, and water	11.4	19.0	4.1	4.0	4.0	8.5	13.0	1.1	-3.4	5.4	-4.0	2.42
Construction	6.4	2.1	-0.3	2.9	7.7	3.76	2.5	5.1	1.0	5.0	3.3	3.38
Wholesale and retail price	-11.6	2.3	10.8	-6.2	3.7	-0.2	-5.6	4.2	5.3	6.7	-0.2	2.08
Hotels and restaurants	-18.2	2.0	12.7	-5.4	6.3	-0.52	3.5	6.9	2.3	7.2	7.4	5.46
Transport, storage and communications	8.4	5.2	7.5	6.4	2.5	6.0	5.0	9.4	7.0	6.1	7.1	6.92
Financial intermediation	3.8	1.7	6.2	24.3	24.4	12.08	11.4	9.2	2.0	2.8	3.9	5.86
Real estate, rentals, and business activities	-4.9	-4.0	-2.1	10.0	6.3	1.06	11.8	10.4	1.9	3.6	2.6	28.22
Public administration and defense	36.8	11.5	-0.6	6.6	6.9	12.24	1.3	0.6	7.4	4.4	3.0	3.34
Education	21.1	13.7	5.1	9.8	3.7	10.68	7.3	6.4	10.8	7.3	2.9	6.94
Health and social work	7.4	15.3	6.1	11.3	5.9	9.2	6.5	8.5	9.6	4.3	5.9	6.96
Other community, social, and personal service activities	-8.6	4.4	13.4	-3.4	3.3	1.82	19.5	9.4	12.7	11.8	8.6	12.4
Agriculture	3.1	3.3	4.8	3.5	1.8	3.3	1.0	5.8	3.0	1.3	4.1	3.04
Non-agriculture	-1.1	3.5	5.3	3.2	5.3	3.24	4.4	5.9	4.1	5.4	3.1	4.58

Source: Nepal Ministry of Finance [2]

Note: The figures of 2010–11 were estimated as growth rates

As for Table 2, it highlights the growth rate of GDP by industry from 2000 to 2011.

**FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES**

**PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS**

**GDP and Labor Productivity Growth by Periods**

As highlighted earlier, Nepal's productivity level and economic growth rate were among the lowest in the region. Studies showed that despite lower wage costs as one important competitive advantage in Nepal, this had been significantly offset by lower labor productivity in the economy.

From the published data of Barro and Lee, and the APO Productivity Databook 2011, Table 5 depicts the relation of labor productivity to average years of schooling, ratio of government consumption to GDP, R&D, and trade openness from 2001 to 2008.

Table 6 highlights labor productivity growth regression from 2001 to 2008, calculated from the data presented in Table 5.

Tables 3 and 4 reveal the growth of GDP, total employment, and labor productivity, respectively. As per statistics, GDP in 1975 was 4.3, with 5.6 million workers employed in various disciplines. Labor productivity in the said year was 0.570. In 2008, GDP climbed only 0.5 to a total of 4.8, which is neither satisfying nor as per desired. The employment figure had escalated to 11.77 million workers. Even though the number of jobs seemed to increase, the country can hardly boast about achieving this outcome, especially when considering the growth rate of the population was at 2.5% [1].

Implications from the regression results showed that human capital investment (represented by average schooling year) had positive and significant impact on labor productivity growth, whereas government consumption, R&D investment, and trade opening policies may also have had positive influence on labor productivity growth, but such impacts were statistically insignificant.

**PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS**

**Organizations that Lead Productivity Movement in Nepal**

Similarly, the productivity of the Nepalese labor force seemed to have fallen from 1.439 in 1961–70 to -0.206 during 2001–10, while the average growth was only 1.042. The conclusion was that the Nepalese workforce needed more training to upgrade their skills and be educated in order to cope with advanced technologies [1].

There are three types of organizations that are directly involved in productivity movement. They are government organizations, non-government organizations, and private organizations.

Table 3. Growth Rate of GDP at Constant Prices, Total Employment, and Labor Productivity

Year	Growth Rate of GDP at Constant Prices	Total Employment ('000)	Labor Productivity Year 2005 =1
1975	4.3	5,559	0.570
1985	4.5	6,942	0.652
1995	5.2	8,191	0.897
2005	3.3	10,873	1.000
2006	3.4	11,155	1.008
2007	5.9	11,454	1.042
2008	4.8	11,770	1.063

Source: APO [1]



Table 4. Labor Productivity Growth

1961–70	1971–80	1981–90	1991–2000	2001–10	Average
1.439	0.611	1.874	1.638	-0.206	1.042

Source: APO [1]

Table 5. Labor Productivity, Average Schooling Year, Ratio of Government Consumption to GDP, R&amp;D, and Trade Openness from 2001–2008

Year	Labor Productivity Growth (%)	Average Years of Schooling (No. of Years)	Ratio of Government Gross Consumption to GDP	Ratio of R&D to GDP	(Export+ Import)/GDP
2001	0.943	2.927	7.50	-4.01	-4.27
2002	0.959	2.927	2.56	1.10	-1.23
2003	0.981	2.927	1.82	2.82	4.28
2004	0.992	2.927	0.35	2.11	1.05
2005	1.000	3.377	0.24	1.72	1.51
2006	1.008	3.377	2.02	1.47	0.94
2007	1.042	3.377	0.54	3.55	1.23
2008	1.063	3.377	1.93	1.60	3.27

Source: APO [1]

Table 6. Labor Productivity Growth Regression from 2001–2008

Factor	Coefficient	Standard Error	T-value	P-value
Intercept	0.632433	0.168099	3.762254	0.032839
X1	0.109954	0.048509	2.266685	0.108256
X2	0.003899	0.012872	0.302875	0.781773
X3	0.005483	0.015273	0.358990	0.743381
X4	0.004869	0.007108	0.685084	0.542477

Note: i. Adjusted R square 0.524543  
 ii. F value 2.930669  
 iii. X1 = Average years of schooling; X2 = Growth rate (government gross consumption/GDP); X3 = Growth rate (R&D expenditure/GDP); and X4 = Growth rate (Export + Import)/GDP

### Government and Government-owned Organizations

- i. National Productivity and Economic Development Centre (NPEDC)

The NPEDC, which functions under Nepal's Ministry of Industry, is a public research and consulting company. It has been providing research and consultancy services in the field of economic development, and it

undertakes various productivity-related activities as the national productivity organization (NPO). The center is also the secretariat of the National Productivity Council and liaison office for the Asian Productivity Organization (APO).

ii. Nepal Administrative Staff College

The main role of this organization is to provide training for government officials who are selected for government service.

iii. Industrial Enterprises Development Institute

The basic objective of this organization is to create entrepreneurs, develop them, and promote them by providing training and imparting knowledge on marketing, technical know-how, and other industry-related activities.

iv. Cottage and Small Industry Board

This organization keeps the records of industries in operation, production, etc.

**Non-governmental Organizations**

i. Federation of Nepal Chamber of Commerce and Industry (FNCCI)

FNCCI is an umbrella organization of the Nepalese private sector.

ii. Nepal Chamber of Commerce and Industry

The organization was established to promote businesses as well as to safeguard the interests of the business community and workers.

iii. Management Association of Nepal (MAN)

MAN is a professional association with institutional and individual members. It was established in 1979. The association has been conducting short-term management training courses.

**Organizations that Monitor Productivity Improvement in Nepal**

Nepal is one of the founding members of the APO, which was established in 1961. However, the first official declaration relating to productivity policy came only in 1996 when the National Productivity Council (NPC) was formed. Three years later, the National Productivity Policy was declared.

From 1993 onwards, the NPC was responsible for assisting the government to formulate policies in promoting the productivity movement. It undertakes productivity activities as national campaigns directly, supervising and monitoring the productivity programs and projects that are launched by the council. It also facilitates an environment that is conducive for productivity awareness as well as establishes national-level awards so as to provide incentives to enhance productivity.

The council comprises the minister of industry as chairperson, assistant minister of industry as vice chairperson, and members of the National Planning Commission (industry sector) as members. Other members include secretaries of the Ministries of Industry, Finance, Agriculture, Tourism, and Labour; the chairperson of Federation of Nepalese Chamber of Commerce and Industries; representatives from labor unions; the secretary of Council of Technical Education & Vocational Training; the dean of Faculty of Management, Tribhuvan University; and the chairperson and general manager of NPEDC.

Similarly, in 1995, the National Development Action Committee (NDAC) was formed under the chairmanship of the prime minister. The committee comprises ministers, vice-chairman, and members of the National Planning Commission, and the chief secretary of the Nepal government. NDAC meets every month and tackles various issues and matters that require high-level action.

Likewise, at the ministry level, the Ministerial Development Action Committee (MDAP) was

formed. MDAP represents related ministries, chief secretaries of related ministries, representatives of the National Planning Commission, Ministry of Finance, Ministry of General Administration, and chiefs of the Planning Division and the Monitoring of Evaluation Division of concerned projects. It meets on a bimonthly basis.

### Overview of Productivity Movement Over the Last Decades

The productivity movement in Nepal can be traced to the First Five-Year Plan (1956–1961). The movement generally centered on industries. The productivity-related activities can be summarized as follows:

- i. In the 1950s, 1960s, and 1970s, Nepal relied on a mixed economy. Since the 1980s, heavier reliance had been placed on the private sector
- ii. From the 1990s, the economy had been opened and a free market liberal economy policy had been adopted. There was easy availability of foreign exchange to import capital goods and raw materials. Airlines have been licensed to the private sector, and banking and finance sector was opened to competition
- iii. The use of computers and improved communication technology in business operations have been introduced in some sectors
- iv. The initiative to improve the performances of public-sector enterprises was put forward by:
  - appointing a professional and competent chief executive officer through a selection process
  - conducting institutional studies with a view to analyze the strengths, weaknesses, and future strategies
  - handing over public enterprises on management contract and on lease to the private sector
- v. Labor laws were enacted to protect the rights and interests of the labor force.

Disputes between management and labor force were resolved through negotiations

- vi. The private sector was encouraged to invest in the development of hydropower by formulating the Hydropower Policy and Act
- vii. The private sector was encouraged to promote tourism by establishing Tourism Development Board
- viii. Nepal's membership with the APO in 1961 and the establishment of the NPO thereafter have played a significant role in the productivity movement of the country. By creating a productivity mindset among government agencies, industry federations, and chambers and enterprises, productivity movement in Nepal had gained momentum. This was further enhanced with the establishment of the NPC under the chairmanship of the Ministry of Industry as an apex body for the productivity movement, the NPEDC as its secretariat, and the NPO of Nepal in 1994 [3].

### ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY

The level of productivity was low in Nepal. There were numerous challenges and issues that confronted Nepal in improving the area of productivity. These issues were divided and categorized into national and firm levels. Among them, the major ones on the national level were pointed out as follows:

#### National Level

- i. Inadequate infrastructure and institutional base

There was a very low level of awareness among the concerned authorities who were responsible for the productivity improvement in the country. Also, the policies set by the government were inadequate and the priorities were not as per the needs. Similarly, productivity

research was not widely practiced, which led to insufficient data collection and poor analysis.

- ii. No linkages between achievements and productivity

There was an absence of effective economic policies, as the country was highly dependent on rainfall-based agriculture. Declining yield rate demanded the expansion of cultivated land in order to increase agricultural production. This was further aggravated by inefficient management of the relevant productivity-related organizations.

- iii. Unemployment and underemployment

The rate of unemployment was on the rise, while there was underemployment in the agriculture sector, which was a sheer waste of the existing labor force.

Another factor that proved to be a problem was the migration of people from rural areas to urban areas and to foreign countries, as well as a lack of skilled manpower due to inadequate training and education.

- iv. Low rate of returns from investments

There was inadequate concentration of investment in the production sector, low investment in modern technology, and poor linkages between investment projects and socioeconomic bases.

- v. Inadequacies in organizational and managerial capabilities

Organizational structures were complicated. The working procedures were not simple nor easy, and poor leadership resulted in unproductive work attitude. There was also a distinct lack of skilled and knowledgeable manpower as well as poor management and weak employee relationship.

### **Firm Level**

The issues confronting the firm level were divided into two aspects: internal and external.

- i. Internal factors

Internal factors encompassed the various types of products and services, organizational structures, inadequate funds, high cost of energy (electricity and fuel), lack of skilled staff and organizational culture, lack of commitment from top level management, as well as weakness in labor management relationship.

- ii. External factors

These factors included the structure of the economy (lack of capital, skill, and market pressures to improve productivity), utilization of natural resources (land, labor, energy, and raw materials), physical infrastructures (poor transportation and communication, power, etc.), demography (migration of labors, trained women, population structure, etc.), dominance of cultural values and attitudes, existence of red-tapeism, corruption, lack of risk-taking attitude, inefficient and complicated government policies, unsound fiscal and taxation regulations, gaps in policy planning and implementation, and lack of decentralization and good governance [4–5] .

### **Areas Requiring Attention of the Government**

- i. Formulating macroeconomic policies, particularly in relation to foreign exchange, tariff, wages, and inflation.
- ii. Investing in human capital development in terms of skill upgrading.
- iii. Bringing together stakeholders, employers, workers, and NPOs, and playing the adversarial role between labor and management when the issue of productivity arises.

iv. Detailing national strategies for productivity improvement such as:

- a. The institutional set-up. As in other APO member countries, Nepal too has an NPC and the NPEDC that acts as a secretariat and is the NPO of Nepal.
- b. Priority setting for productivity movement, where the government must focus on the following areas:
  - Nepal has to take concentrated efforts in increasing agricultural production and productivity. Hill irrigation schemes, both canal and lift irrigation, need to be expanded. Rural credit has to be simplified
  - The private sector as well as foreign investors should be encouraged to invest in the industrial sector
  - Performances of public enterprises have to be improved. More autonomy should be given to these enterprises
  - A healthy capital market has to be developed and appropriate steps to be taken, both regulatory and promotional, to revitalize the capital market
  - Regular supply of hydroelectricity to the manufacturing and service industries has to be set up
  - Nepal has abundant cheap labor force; the government should take necessary steps to establish more technical and vocational training institutes, which will attract more foreign investments
  - Establish technology parks/common facility centers to allow enterprises, especially small and medium, to upgrade their technology in enhancing their productivity
  - Facilitate in developing linkages between small, medium, and large

units to maintain flexibility in production and increase value-adds

- Reform policies in areas such as taxation; economy, labor regulations; simplification of procedures, technology transfers, and development through R&D, upgrading of physical infrastructure facilities that encompass transportation, communication, and power; and development of institutions, including the NPO
  - Setting up autonomous productivity boards in key sectors of the economy. These boards could undertake state-of-the-art surveys, identify specific and concrete terms as well as impediments to productivity. They could also suggest tripartite policy reforms to the government and establish standard databases for evaluating performance. The board could also produce useful literature of productivity-oriented practices
- c. Solving labor management disputes  
In view of the present level of industrialization in Nepal, there should be a logical balance between labor and management. Thus, the disputes between these two parties must be settled as soon as possible. The following areas have to be looked into:
    - Establishment of a legal framework for collective bargaining and resolution of disputes by conciliation and arbitration
    - Promotion and formation of joint consultative committees
    - Implementation of small group activities

#### **The Role of the APO Secretariat**

The APO has a major role in promoting productivity in its member economies through

important researches, projects, surveys, publications, and any relevant knowledge regarding productivity. Conclusions and recommendations of these should be widely disseminated and used for initiating policy changes [4, 5].

## REFERENCES

- [1] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [2] Central Bureau of Statistics, Government of Nepal. Economic Survey: 2010/11. Kathmandu: Government Printer; 2011, pp. 8.
- [3] Thapa N.S.A. Evolution of productivity movement in Nepal. In: Current Issues on Productivity Book. Kathmandu: National Productivity and Economic Development Centre; 1999, pp. 89–100.
- [4] Monga R. C. Evolution of productivity movement in Nepal. In: Current Issues on Productivity Book. Kathmandu: National Productivity and Economic Development Centre; 1999, pp. 3–23.
- [5] Tiwari M.N. Evolution of productivity movement in Nepal. In: Current Issues on Productivity Book. Kathmandu: National Productivity and Economic Development Centre; 1999, pp. 257–281.

---

# PAKISTAN

KHAWAJA  
MUHAMMAD YOUSUF

RABIA JAMIL

LIAQAT ALI

**Former CEO**  
NPO Pakistan

**Head of International Relations**  
NPO Pakistan

**Chief Executive Officer**  
Pakistan Bureau of Statistics  
Government of Pakistan<sup>1</sup>

---

## INTRODUCTION

Pakistan is a developing country situated in South Asia with a total estimated population of 180.7 million in 2012. The total civilian labor force was 59.3 million, out of which, 55.8 million were employed [1]. Pakistan became independent in 1947 from the British rule. At the time of independence, Pakistan was an agrarian economy, with a 53% agricultural contribution toward GDP in 1950.

The country has experienced major shifts in the sectoral shares. During the fiscal year 2012, the agricultural, industry, and services sectors toward GDP were 21.1%, 25.4%, and 53.5%, respectively [1]. Pakistan has faced varying economic growth since its inception. Growth was slow during civilian ruling, while three long periods of military rule have seen remarkable recovery. Despite being a very poor country in 1947, the growth rate had been better than the global average in the subsequent five decades, but it slowed down in the late 1990s.

Pakistan's economy gained momentum again and grew at an average rate of 7% between 2003–07 [1], which enabled the government to raise development spending. As a result, the poverty headcount was reduced by more than 10% from 34.5% in 2001 to 22.3% in 2006 [2]. Since the beginning of 2008, Pakistan's economic outlook had been stagnant. Security concerns stemming from the nation's role in the war on terror had created great instability and led to a decline in foreign direct investment from approximately USD5.410 billion in 2008 to USD2.206 billion for the fiscal year 2010 [3].

Concurrently, the insurgency has forced massive capital flight from Pakistan to the Gulf. Combined with high global commodity prices, the dual impact shocked Pakistan's economy with gaping trade deficits and high inflation. The GDP growth rate was 3.7% during the fiscal year 2012 [1]. In 2008, inflation reached as high as 21% [1] and Pakistan had to depend on an aggressive fiscal policy backed by the International Monetary Fund to avoid possible bankruptcy. The inflation rate for the fiscal year 2011 and 2012 were 13.81% and 10.84%, respectively [1]. The average inflation rate between 2008 and 2012 stood at 12.76%, whereas food inflation in the same period was 16.73% [1].

It is feared that the gains made in reducing poverty in the mid-2000s may have been eroded by the high food inflation rate. The rise in inflation rate may have adversely affected labor productivity as well as total factor productivity (TFP).

## PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

The salient features causing changes in economic and productivity movements can be summarized as follows:

- i. Development planning was started in the second half of the 1950s, and the second five-year plan (1960–65) was the most successful. In spite of a 17-day war with neighboring India in 1965, the overall economic performance was very good

- ii. Political instability, heavy floods, military operation, and the result of the separation of then East Pakistan (now Bangladesh) in December 1971 caused a major downturn in the economic growth rate of Pakistan during early 1970
- iii. The nationalization policy of Zulfikar Ali Bhutto, the only civilian chief martial law administrator and prime minister (1972–79) caused a major shift in the economic environment in Pakistan
- iv. Prior to 1972, the exchange rate of Pakistan currency was PKR4.76=USD1 and until February 1973, it was PKR11=USD1. However, with effect from 8 January 1982, the Pakistan Rupee became a floating against the US Dollar and is linked to a basket of currencies
- v. Privatization was encouraged during the early 1990s. However, a number of public-sector enterprises such as Pakistan International Airlines, Pakistan Steel, and Pakistan Railway still operated under government control. Most of the public-sector enterprises were running under deficit and needed immediate restructuring
- vi. Pakistan can still be labeled as a mixed economy. Private sector plays a vital role in the industrial sector as well as in the service sector such as banking, insurance, trade, communication, transportation, health, and education
- vii. There is an increasing use of computers and IT in almost all sectors of the economy in Pakistan
- viii. Pakistan's economy gained momentum and grew at an average rate of 7% between 2003–07 [1] during the military regime of General Pervez Musharraf (1999–2008). Increased consumer financing, higher level of foreign remittances, rescheduling of foreign debts, and increased foreign assistance because of Pakistan's active participation in the war against terror were the driving forces behind this growth
- ix. Labor laws were enacted to protect the rights and interests of labor, and a new Industrial Relations Ordinance was approved in 2008
- x. Worsening law and order situation due to its pivotal role in the war against terror, rapidly growing energy crises, global financial crises, widening budget deficit, decreasing investment, and existence of the phenomenon of stagflation are Pakistan's major challenges and must be address at the earliest

### Overview of the Present Economic Activities

Different factors have some roles to play in determining how much output a country can produce. For example, factors of production such as size of the labor force and capital stock certainly matter. However, a large number of other aspects such as education, government regulation, and even the weather, have their roles to play.

The overall performance of an economy and productivity is supposed to have a high correlation. The economic performance is usually measured with real GDP growth rate. Pakistan's economic performance for the period of 1961–2010 is summarized in Table 1.

Pakistan's overall economic performance had been satisfactory since its independence from British rule in August 1947. The GDP had grown at an average rate of 5.21% between 1961 and 2010 (Table 1). During the same period, the growth rates for agriculture, manufacturing, and service sectors were 3.75%, 7.01%, and 6.09%, respectively (Table 1). The growth rates of GDP were 7.01% and 6.50% during 1961–65 and 1966–70, respectively (Table 1). The remarkable economic growth during these periods can be attributed to the political stability, followed by the consistency of economic policies during the military regimes of General Ayub Khan (1958–69). During these periods, emphasis was on planning and development, and Pakistan's



Table 1. Growth of GDP and its Components, and Labor Productivity in Pakistan

Period	GDP (%)	Agriculture (%)	Manufacturing (%)	Commodity Producing Sector (%)	Services Sector (%)	Per Worker Labor Productivity Growth (%)	Per Hour Labor <sup>2</sup> [2] Productivity Growth (%)
1961–65	7.01	3.79	11.74	6.48	7.30	4.11	4.06
1966–70	6.50	6.35	8.12	7.17	6.18	5.01	5.07
1971–75	4.22	0.83	4.66	2.46	7.11	1.53	0.63
1976–80	5.18	3.91	6.34	5.30	9.40	1.71	2.88
1981–85	6.46	3.78	9.48	7.16	6.51	4.26	4.25
1986–90	5.45	4.37	6.95	5.85	5.34	2.88	2.57
1991–95	4.77	4.19	4.83	4.71	5.12	3.69	3.49
1996–2000	3.89	4.88	3.24	3.96	4.00	1.03	1.35
2001–05	4.87	2.20	10.04	5.02	5.10	1.94	2.42
2006–10	4.14	3.21	4.75	3.89	4.81	-0.33	-0.40
1961–2010	5.21	3.75	7.01	5.20	6.09	2.51	2.57

Source: APO [4], Pakistan Bureau of Statistics [5], National Accounts Data [6], Ministry of Finance [1, 2, 7, 8]. Coauthor's calculations were based on GDP (1999–2000=100) at constant market prices

Note: Figures of total population and employment used for the calculation of labor productivity were taken from the Ministry of Finance [6] and Pakistan Bureau of Statistics [9–11] for the period of 1960–61 to 1968–69, and 2008–09 to 2010–11. Figures from the APO [4] were used for the period of 1969–70 to 2007–08

second five-year plan (1960–65) was a success story, causing an industrial revolution in the country. The result was a historic growth in the manufacturing sector, which stood at 11.74% during this period. The growth rates of per worker labor productivity and per hour labor productivity were 4.11% and 4.06%, respectively, during this period (Table 1). The highest growths in per worker labor productivity (5.01%) and per hour labor productivity (5.07%) were observed during 1966–70 due to remarkable economic performance in that same period. Negative growths in per worker labor productivity (-0.33%) and per hour labor productivity (-0.40%) were seen during 2006–10 (Table 1) due to poor economic performance owing to the energy crises and declining investment, both domestic and foreign.

### TFP Dynamics in Pakistan

Decomposition of Pakistan's economic growth is presented in Table 2. Capital emerged as a

key driver of economic growth in Pakistan with contribution ranging from 2.56% during 1996–2000 to 5.15% during 1961–65. During 1960–65, Pakistan's second five-year development plan was implemented successfully and the result was a remarkable growth in the industrial sector. Consequently, a structural change occurred between 1960–65, where the share of the industrial sector toward GDP increased from 15% in 1960 to 21% in 1965, registering an increase of 6% in five years [3]. The contribution of labor ranged from -0.21% during 1991–95 to 2.04% during 2006–10 (Table 2). The contribution of TFP growth ranged from -0.96% during 1971–75 to 0.54% during the period of 1981–85 (Table 2).

The contribution of TFP growth was lowest during the period of 1971–75 because of the ongoing civil war in then East Pakistan, which ultimately separated from Pakistan and became Bangladesh in 1971. Consequently,

the contribution of TFP growth remained on the lower side in the period of 1976–80 and stood at -0.72% (Table 2). Negative contribution of TFP growth was again observed during 2006–10 as a result of energy crises and adverse law and order situation in the country.

The contribution shares of labor, capital, and TFP growth toward GDP are presented in Figure 1, which highlights the share of labor toward GDP ranging from -4.38% during 1991–95 to 49.4% during 2006–10. The share of capital in the economic growth of Pakistan ranged from 63.07% during 2006–10 to 94.49% during 1991–95 (Figure 1).

The contribution share of TFP growth toward GDP ranged from -22.74% during 1971–75 to 9.89% during the period of 1991–95 (Figure 1). The negative share of TFP growth during the period of 1971–80 was due to civil war in then East Pakistan. Again, negative share of TFP growth during the period of 2001–10 was due

to energy crises and adverse law and order situations.

### Labor Productivity Dynamics in Pakistan

The role of TFP growth and capital deepening in labor productivity growth is summarized in Table 3. The decomposition of labor productivity growth and the contribution of TFP growth and capital growth are presented in Table 3 and Figure 2 for the period of 1961–2010. Capital deepening has emerged as the prime cause of labor productivity growth in Pakistan. The contribution share of capital deepening toward labor productivity growth ranged from 55.23% during 2006–10 to 163% during the period of 1971–75. The contribution share of TFP growth toward labor productivity growth ranged from -155.23% during 2006–10 to 18.72% during 1996–2000 (Table 3). The contribution shares of both capital deepening and TFP growth were observed as quite high during the periods of 1971–75 and 2006–10 because they were not normal periods in nature.

Table 2. Output Growth and Contributions of Labor, Capital, and TFP in Pakistan

Period	GDP Growth	Labor (%)		Capital <sup>3</sup> [3] (%)		TFP (%)	
		Source	Contribution in Growth	Source	Contribution in Growth	Source	Contribution in Growth
1961–65	7.01	1.68	(24.05)	5.15	(73.48)	0.17	(2.47)
1966–70	6.50	0.96	(14.82)	5.10	(78.44)	0.44	(6.75)
1971–75	4.22	1.42	(33.69)	3.76	(89.05)	-0.96	(-22.74)
1976–80	5.18	1.89	(36.54)	4.00	(77.31)	-0.72	(-13.86)
1981–85	6.46	1.34	(20.73)	4.58	(70.87)	0.54	(8.39)
1986–90	5.45	1.38	(25.30)	4.05	(74.41)	0.02	(0.28)
1991–95	4.77	-0.21	(-4.38)	4.51	(94.49)	0.47	(9.89)
1996–2000	3.89	1.13	(29.09)	2.56	(65.96)	0.19	(4.96)
2001–05	4.87	1.59	(32.54)	3.33	(68.43)	-0.05	(-0.97)
2006–10	4.14	2.04	(49.40)	2.61	(63.07)	-0.52	(-12.47)
1961–2010	5.21	1.32	(25.24)	3.94	(75.62)	-0.04	(-0.86)

Source: Pakistan Bureau of Statistics [5, 9]

Note: Calculations are based on GDP at constant market prices of 1999–2000=100

Unit: Average annual growth rate percentage. Figures in parenthesis are percent contribution toward growth

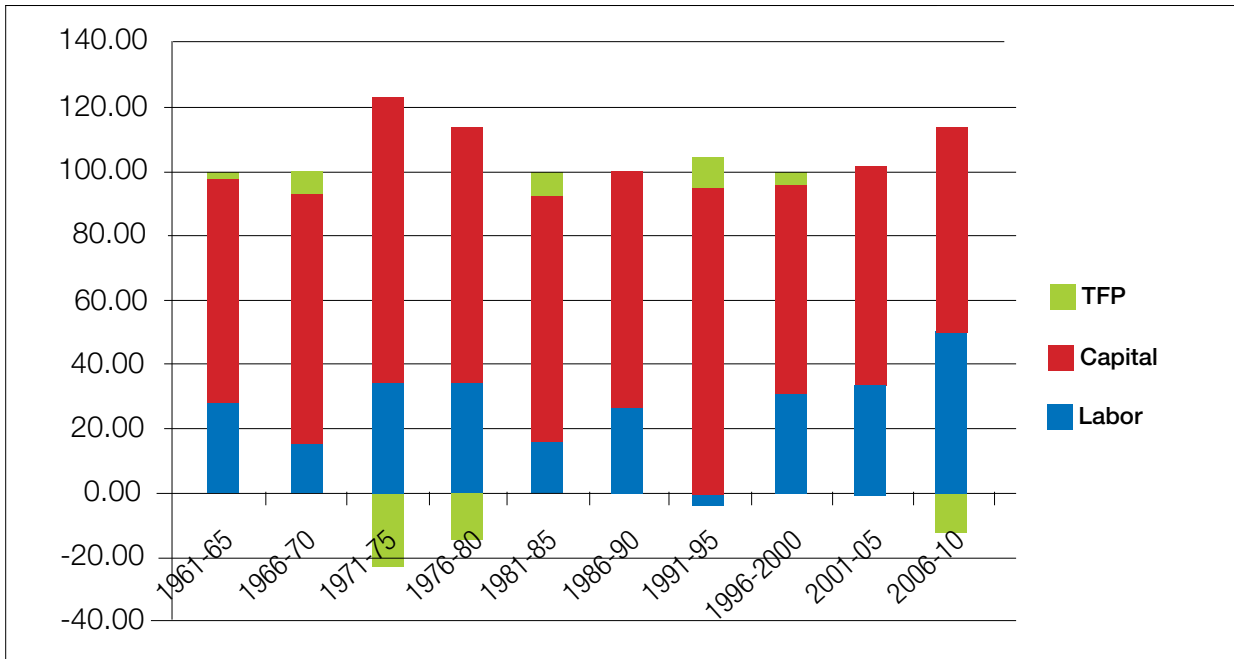


Figure 1. Contribution Shares of Economic Growth in Pakistan from 1961–2010  
 Source: Calculations were made by using GDP at constant market prices of 1999–2000=100

**FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES**

In this section, an attempt is made to investigate the macroeconomic determinants of TFP growth in Pakistan's economy.

**The Model**

The basic empirical framework employed in this study is based on the determinants of economic growth, specifically, the macro determinants of labor productivity growth and TFP growth. The model of determinants of labor productivity can be specified as:

$$LPG_t = a + X_{it} \beta + \mu t \quad (1)$$

where  $LPG_t$  refers to labor productivity growth,  $X_i$  represents the vector of determinants of labor productivity growth, and  $\mu$  is an error term.

The empirical relationship between total factor productivity and other variables can be specified as:

$$TFPG_t = a + X_{it} \beta + \mu t \quad (2)$$

where  $TFPG_t$  [9] refers to total factor productivity growth,  $X_i$  represents the vector of

determinants of TFP growth, and  $\mu$  is an error term.

The vector of determinants ( $X_i$ ) includes variables such as education (Edu), export to GDP ratio (EX/GDP), import to GDP ratio (IM/GDP), foreign direct investment as percentage of GDP (FDI/GDP), government final consumption expenditure as percentage of GDP (Gov/GDP), expenditure on education as a percentage of GDP (Edu Exp/GDP), ratio of total investment to total employment (K/L), constant GDP per capita ( $y$ ), life expectancy at birth (Life) and population (POP). The two dummy variables for a period of democratic government and a normal year were also introduced in the model. Differences of natural logarithm of all the explanatory variables were used in the regressions except for constant GDP per capita, life expectancy at birth, and population, where the actual values of natural logarithm were used. The first dummy variable (D1) assumed the value 1 for a period of a democratic government and 0 for a period of a dictatorship or military rule. The second dummy variable (D2) assumed the value 1 for a normal year and 0 for a period of war or natural calamity.

Table 3. Role of TFP and Capital Deepening in Labor Productivity Growth from 1961–2010

Period	Labor Productivity (%)	Capital Deepening (%)		TFP (%)	
1961–65	4.11	3.94	(95.79)	0.17	(4.21)
1966–70	5.01	4.57	(91.24)	0.44	(8.76)
1971–75	1.53	2.49	(162.57)	-0.96	(-62.57)
1976–80	1.71	2.42	(142.05)	-0.72	(-42.05)
1981–85	4.26	3.72	(87.27)	0.54	(12.73)
1986–90	2.88	2.87	(99.46)	0.02	(0.54)
1991–95	3.69	3.22	(87.22)	0.47	(12.78)
1996–2000	1.03	0.84	(81.28)	0.19	(18.72)
2001–05	1.94	1.99	(102.44)	-0.05	(-2.44)
2006–10	-0.33	0.18	(55.23)	-0.52	(-155.23)
1961–2010	2.55	2.60	(101.76)	-0.04	(-1.76)

Source: APO [4], Pakistan Bureau of Statistics [10, 11], Ministry of Finance [1, 2, 7, 8]. Calculations were based on GDP at constant market prices of 1999–2000=100 and per worker labor productivity

Note: i. Unit is based on average annual growth rate percentage

ii. Figures of total population and employment used for the calculation of labor productivity were taken from the Ministry of Finance [6] and the Pakistan Bureau of Statistics [9–11] for the periods of 1960–61 to 1968–69 and 2008–09 to 2010–11. Figures from the APO [4] were used for the periods of 1969–70 to 2007–08

The results of the regression of equation (1) having dependent variable as growth of labor productivity are presented in Table 4. The various regression models, i.e., M1, M2, M3, M4, M5, M6, M7, M8, M9, and M10 were estimated by including the various explanatory variables. The results of the regression equation M10 looked more appropriate, where the value of R-squared was 0.457 and the value of F-statistics was 2.596 (Table 4). This indicates the significance of overall regression results. The variable export to GDP ratio (EX/GDP) emerged as the significant one in all the regression equations at various levels of significance. The variable foreign direct investment as percentage of GDP (FDI/GDP) was significant in the equations M3, M8, M9, and M10 at 20%, 25%, 20%, and 30% levels of significance, respectively.

The government final consumption expenditure as percentage of GDP (Gov/GDP) has emerged as significant at 10% and 5% levels of

significance in the equations M4, M9, and M10, respectively. Population was also observed as the significant variable in the equations M6 and M10 at 5% and 30% levels of significance, respectively (Table 4). The variable expenditure on education as a percentage of GDP (Edu Exp/GDP) turned out to be significant at 20%, 25%, and 20% in equations M2, M8, and M9, respectively.

The variables import to GDP ratio (IM/GDP) was significant in equations M3, M8, M9, and M10, and the ratio of total investment to total employment (K/L) was significant in equations M4, M9, and M10. The variables constant GDP per capita ( $y$ ) and life expectancy at birth (Life) also emerged as significant at 5% and 10% levels of significance in M5 and M7, respectively (Table 4).

The results of the regression of equation (2) having dependent variable as growth of TFP

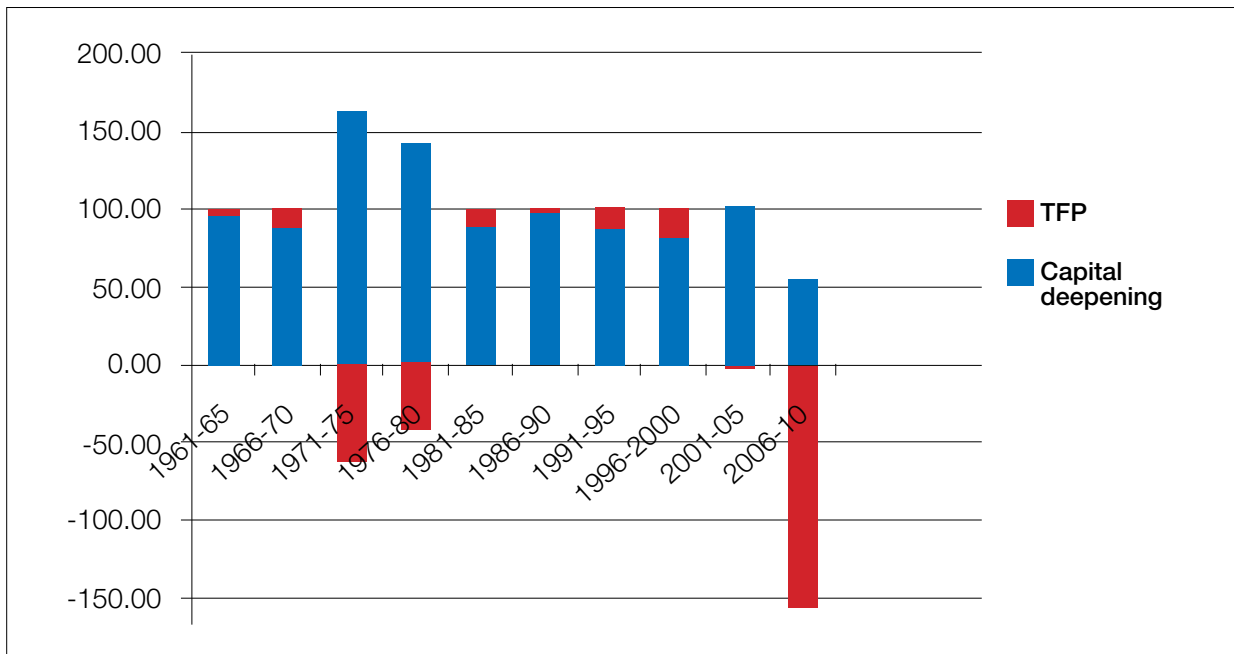


Figure 2: Contribution Shares of Labor Productivity Growth in Pakistan from 1961–2010

Source: APO [4], Pakistan Bureau of Statistics [10, 11], Ministry of Finance [1, 2, 7, 8]. Calculations were based on GDP at constant market prices of 1999–2000=100 and per worker labor productivity

Note: Figures of total population and employment used for the calculation of labor productivity were taken from the Ministry of Finance [6] and the Pakistan Bureau of Statistics [9–11] for the periods of 1960–61 to 1968–69 and 2008–09 to 2010–11. Figures from the APO [4] were used for the periods of 1969–70 to 2007–08

are presented in Table 5. The various regression models, i.e., M1, M2, M3, M4, M5, and M6 were estimated by including the various explanatory variables.

The results of the regression equation M6 looked more appropriate, where the value of R2 was 0.271. This indicated the significance of the overall regression results. The export to GDP ratio (Ex/GDP) emerged as a significant variable in equations M1, M2, M3, and M4 at 20% level of significance (Table 5).

The government final consumption expenditure as percentage of GDP (Gov/GDP) also emerged as significant explanatory variable at 30%, 10%, and 20% levels of significance in the equations M2, M4, and M6, respectively (Table 5). The variable expenditure on education as a percentage of GDP (Edu Exp/GDP) also turned out to be significant at 25% level of significance in equations M2 and M6. The ratio of total

investment to total employment (K/L) emerged as a variable having significant relationship with the growth rate of TFP in equations M4 and M6 at 5% and 10% levels of significance, respectively.

## PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

Pakistan became a member country of the Asian Productivity Organization (APO) in 1961. The establishment of the National Productivity Organization (NPO) thereafter has played a significant role in the productivity movement of the country. By creating a productivity mindset among government agencies, chambers of commerce and industries, and individual enterprises under the chairmanship of the Ministry of Industries, the productivity movement in Pakistan has contributed effectively toward the overall productivity enhancement.

Table 4. Ordinary Least Squares (OLS) Estimates of Labor Productivity Equations  
(Dependent Variable: Labor Productivity Growth)

Variables	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Constant	3.838*** (1.828)	3.741*** (1.794)	3.703*** (1.774)	3.602*** (1.853)	11.914** (2.823)	32.436** (2.740)	37.872** (2.033)	3.615*** (1.742)	3.246*** (1.766)	16.781 (0.342)
Dln(Edu)	-45.254 (-0.687)	-42.235 (-0.645)	-42.141 (-0.644)	-42.585 (-0.699)	-57.559 (-0.905)	-34.833 (-0.556)	-38.107 (-0.592)	-39.356 (-0.605)	-34.221 (-0.594)	-40.808 (-0.518)
Dln(Exp/GDP)	7.231*** (1.980)	7.434** (2.049)	7.428** (2.047)	4.223# (1.196)	6.867*** (1.955)	6.508*** (1.872)	6.562*** (1.834)	7.615** (2.111)	4.124## (1.236)	3.668### (1.091)
Dln(FDI/GDP)	0.262 (0.730)	0.238 (0.668)	0.538# (1.295)	0.108 (0.323)	0.220 (0.637)	0.233 (0.685)	0.262 (0.750)	0.505## (1.220)	0.511# (1.397)	0.424### (1.136)
Dln(Gov/GDP)	-1.908 (-0.615)	-2.883 (-0.909)	-0.936 (-0.295)	-6.145*** (-1.912)	-2.777 (-0.923)	-2.986 (-1.003)	-2.500 (-0.822)	-1.911 (-0.589)	-6.270** (-2.011)	-7.309** (-2.271)
Dln(Edu Exp/ GDP)	-	5.912# (1.297)	-	-	-	-	-	5.688## (1.255)	5.297# (1.320)	3.706 (0.872)
Dln(IM/GDP)	-	-	-2.342## (-1.288)	-	-	-	-	-2.252## (-1.246)	-3.854** (-2.321)	-3.259*** (-1.935)
Dln(K/L)	-	-	-	16.791* (2.933)	-	-	-	-	20.163* (3.595)	16.506* (2.819)
ln(y)	-	-	-	-	-1.315** (-2.178)	-	-	-	-	0.651 (0.240)
ln(Pop)	-	-	-	-	-	-2.521** (-2.450)	-	-	-	-5.544### (-1.065)
ln(Life)	-	-	-	-	-	-	-8.422*** (-1.838)	-	-	11.571 (0.748)
D1	-	-	-	-	-	-	-	-	-	-0.887 (-0.915)
D2	-	-	-	-	-	-	-	-	-	-0.272 (-0.256)
R <sup>2</sup>	0.103	0.136	0.136	0.250	0.191	0.211	0.167	0.166	0.363	0.457
F statistics	1.296	1.389	1.384	2.932	2.072	2.353	1.767	1.430	3.412	2.596
Df	45	44	44	44	44	44	44	43	42	37
SS Regression	44.183	58.306	58.118	106.900	81.523	90.240	71.535	71.172	155.077	195.517
SS Residual	383.575	369.452	369.640	320.858	346.235	337.518	356.223	356.586	272.681	232.241

Note: Figures in parenthesis are t-ratios. \*, \*\*, \*\*\*, #, ##, and ### means significant at 1%, 5%, 10%, 20%, 25%, and 30%, respectively

#### Description of variables

- EDU: total schooling interpolated
- EX/GDP: Export/GDP\*100
- IM/GDP: Import/GDP\*100
- FDI/GDP: FDI investment/ GDP\*100
- GOV/GDP: Government consumption/GDP\*100
- Edu Exp/GDP: Education Expenditure/GDP\*100
- K/L: Total investment/Total employment
- y: Constant GDP per capita

#### Unit of Measurement

- Years of schooling
- percentage
- percentage
- percentage
- percentage
- percentage
- ratio
- USD

- Life: Life expectancy Years
- POP: Population '000'
- D1: A dummy variable assumed the value D =1 for a period of democratic government, 0 for a period of a dictatorship or military rule
- D2: A dummy variable assumes the value 1 for a normal year and 0 for a period of war or natural calamity.

Table 5. OLS Estimates of TFP Equations (Dependent Variable: TFPG)

Variables	M1	M2	M3	M4	M5	M6
Constant	0.672 (0.713)	0.63167 (0.673)	0.69115 (0.725)	0.584 (0.650)	0.05935 (0.030)	0.987 (0.039)
Dln(Edu)	-23.937 (-0.809)	-22.678 (-0.769)	-24.380 (-0.815)	-22.942 (-0.813)	-23.004 (-0.766)	2.897 (0.072)
Dln(Exp/GDP)	2.388# (1.456)	2.473# (1.513)	2.360# (1.424)	1.266 (0.775)	2.415# (1.457)	1.395 (0.812)
Dln(FDI/GDP)	0.002 (0.013)	-0.008 (-0.049)	-0.037 (-0.196)	-0.055 (-0.355)	0.005 (0.032)	-0.027 (-0.143)
Dln(Gov/ GDP)	-1.142 (-0.819)	-1.549### (-1.085)	-1.281 (-0.884)	-2.722*** (-1.831)	-1.076 (-0.758)	-2.388# (-1.452)
Dln(Edu Exp/GDP)	-	2.467## (1.201)	-	-	-	2.826## (1.301)
Dln(IM/GDP)	-	-	0.333 (0.401)	-	-	-0.284 (-0.330)
Dln(K/L)	-	-	-	6.260** (2.363)	-	5.506*** (1.840)
ln(y)	-	-	-	-	0.100 (0.350)	1.151 (0.832)
ln(Pop)	-	-	-	-	-	-2.507 (-0.942)
ln(Life)	-	-	-	-	-	5.021 (0.636)
D1	-	-	-	-	-	0.066 (0.134)
D2	-	-	-	-	-	0.567 (1.044)
R <sup>2</sup>	0.070	0.099	0.073	0.174	0.072	0.271
F statistics	0.842	0.969	0.694	1.859	0.685	1.147
Df	45	44	44	44	44	37
SS Regression	5.796	8.254209	6.078	14.512	6.011	22.562
SS Residual	77.398	74.940	77.116	68.682	77.183	60.632

Note: Figures in parenthesis are t-ratios. \*, \*\*, \*\*\*, #, ##, and ### means significant at 1%, 5%, 10%, 20%, 25%, and 30%, respectively

The NPO is an attached sole department of the Ministry of Industries, holding a mandate of promoting and improving productivity and quality to achieve Global Competitiveness by contributing to major economic sectors of the country. NPO Pakistan is one of the founding members of the APO, a 20-country association established in 1961 with the aim of adding value to the sustainable socioeconomic development of the Asia-Pacific region. The NPO acts as a catalyst in advancing productivity-related activities for mutual benefit and strengthening of Pakistan's economy with specific emphasis on industrial, services, academia, agriculture, and research sectors.

Initially, the NPO concentrated on generating awareness to improve productivity through seminars, conferences, workshops, trainings, consultancies, publications, etc. Over the years, the NPO has become the sole body spearheading the Quality and Productivity Movement in Pakistan. To strengthen its roles and functions, the NPO revamped itself and focused on new areas such as special initiatives, energy efficiency, competitiveness, consultancy, and research.

The main focus was to ensure that businesses transformed to be more productive through productivity and innovative tools, processes, and systems as well as to create the multiplier effect to reach out to the masses through partnerships with both local and global players.

NPO Pakistan, with the help of the APO and Spring Singapore, initiated the Prime Minister Quality Awards 2012 to develop national organizations on business excellence methodologies to become world-class organizations.

The NPO also initiated the Benchmarking Study for various industrial sectors (surgical, cutlery, fan, and horticulture) with the help of the United Nations Industrial Development Organization (UNIDO) to develop 24 Master Trainers under

the UNIDO TRTA-II Program. Subsequently, 200 consultants/trainers, 40 individuals on management systems, and 10 companies on CE Marking were to be developed.

The energy sector plays a vital role in the development of economy, particularly the manufacturing sector. In today's ever-changing scenario, with the continuous price hike in petroleum and the big gap in demand and supply of electricity in Pakistan, it has become imperative to look for alternate energy resources to ensure economic, effective, and uninterrupted power supply to the manufacturing units to enhance productivity. The NPO has taken the initiative in December 2005 and signed the agreement with Gesellschaft für Technische Zusammenarbeit to launch energy audits for the textile sector under the Renewable Energy and Energy Efficiency framework to enhance productivity and quality.

Moreover, the NPO's Energy Efficiency Department conducted numerous energy audits in textile, steel, and public-sector buildings to help measure energy-saving potential in the private and public sectors, and saved 25% energy without any financial implications.

The NPO initiated its first agriculture sector project on Peach for Prosperity at Swat, funded by the Business Support Fund under the Ministry of Finance. Moreover, the NPO launched UNDP Disaster Risk Reduction program for industrial sectors, focusing on motor vehicle gas cylinders. The NPO launched the Women Entrepreneurship Development System in southern Punjab to help women entrepreneurs display and sell their products to larger markets.

The long-term goals and vision of the NPO include areas in Green Productivity, Clean Development Mechanism, and development of business excellence centers to strengthen the competitiveness of SMEs, public sector productivity, innovation, and value creation.



In addition to NPO Pakistan, other organizations involved in enhancing productivity, competitiveness, and sustainable economy are:

i. Pakistan Industrial Development Corporation (PIDC)

PIDC was established to set up industries with a view of creating employment opportunities and removing regional disparities, thus promoting the development of the private sector.

ii. Small and Medium Enterprise Development Authority (SMEDA)

An institution of the government under the Ministry of Industries, SMEDA was established in October 1998 to take on the challenge of developing Small and Medium Enterprises (SMEs) in Pakistan. With a futuristic approach and professional management structure, it focuses on providing an enabling environment and business development services to SMEs.

iii. Pakistan Horticulture Development and Export Company (PHDEC)

PHDEC falls under the Ministry of Commerce. The company was created based on Pakistan's enormous potential in horticulture products such as mango, orange, and apple for the global market.

iv. Federation of Pakistan Chambers of Commerce and Industry (FPCCI)

FPCCI is the main body of trade and industry in Pakistan, and the chief representative of the private sector in the country.

The federation represents 42 chambers of commerce and industry, including seven women's chambers of commerce and industry and 89 associations of trade and industry of Pakistan, including in Azad Jammu Kashmir and Gilgit-Baltistan.

v. Management Association of Pakistan (MAP)

The MAP is the apex management association of the country. Its mandate is to further the management thought, practice, and advocacy. The association provides a platform for exchange of management knowledge and acts as a bridge between the public and private sectors, management practitioners, and the government. The association is a forum at which national and international economic issues are discussed in seminars and other meetings. Experience has shown that such discussions have been helpful in identifying potential solutions to various issues facing the country.

vi. National Vocational and Technical Training Commission (NAVTC)

NAVTC was established in December 2005 as a main center for technical and vocational training and is attached with the Prime Minister's Secretariat (Public). As a federal agency for Technical and Vocational Education and Training (TVET), NAVTC facilitates, regulates, and provides policy direction for skills development in Pakistan. Under the NAVTC Act 2011, the organization is responsible for setting up the national occupational skills standards, curriculum, national qualification framework, labor market information analysis, training of trainers, public-private partnerships, and institutional standards for TVET providers.

**Some Major Policy Initiatives Taken by the Government of Pakistan**

Realizing that food security concerns are sweeping across the country, the government took timely steps to establish the Ministry of National Food Security and Research to tackle the food security issues:

- The National Food Security Council representing federal, provincial, and local level governments was first established

- The Ministry, in collaboration with World Food Program, launched the Zero Hunger Program worth USD1.6 billion to address the food security objective
- The government of Pakistan launched Khushhal Pakistan and Tameer-e-Pakistan Public Works Programs. These programs provide essential public works on a nationwide basis as a supplementary means for economic revival and to restore quality of life and incomes
- The social assistance programs in the public sector such as food support programs, zakat, Pakistan Bait-ul-Mall, employees old-age benefit institution, social security schemes, and social welfare programs (destitute homes, mother and children homes, rescue homes, abandoned babies and destitute children homes, homes for the old and infirm persons, etc.) provide relief to about five million beneficiaries, or about 10% of the poor population, estimated on the basis of food poverty
- Promoting of primary education and introducing skills-based literacy, introducing technical stream at the secondary level, strengthening colleges of technologies, establishing polytechnics and mono-technical institutes, revamping science education, and expanding college education are the priority areas to improve the Human Development Index of the country
- The government of Pakistan intends to provide institutional and infrastructure support through the NPO that will offer a permanent platform for cultivating awareness and leadership training in Six Sigma, Total Quality Management, and Advanced Product Quality Planning. In addition, the Pakistan Standards and Quality Control Authority will be reinforced, and similar authorities will be established at the provincial level under its auspices. The Pakistan Council for Scientific and Industrial Research, Plastic Technology Centre, Pakistan Industrial Training and Advisory Centre, and Automotive Testing and Training Centre will be made more productive, focused, and industry oriented
- Through the President's Fanni Maharat Program and under the Presidential directive, NAVTC will be establishing 130 new vocational training centers/ institutes in 79 *tehsils* of Sindh, Punjab, Khyber Pakhtunkhwa, Balochistan, Azad Jammu Kashmir, and Gilgit-Baltistan, where no TVET institute exists
- Through the Prime Minister's Hunarmand Pakistan Programme, NAVTC has taken the initiative of offering short-term skills development programs of mostly up to six months in duration in collaboration with public- and private-sector training institutes. It covers four priority sectors, including construction, agriculture (dairy and livestock), IT and telecommunication, and skills for women. The other sectors include hospitality, light engineering, paramedics, services, traditional trades (cottage crafts, etc.), and Textile
- The Pak-China Cooperation for Agriculture Research and Development project was initiated on the visit of the president of Pakistan to China in February 2009, wherein Pakistan Agricultural Research Council signed a Memorandum of Understanding with various Chinese companies for agricultural research development. The project aimed at productivity enhancement of crops, which are important for food security, export competitiveness, import

substitution, resource conservation technologies, and introduction of nontraditional commercial crops of economic importance

- The government of Pakistan realizes the importance of human capital, and thus its special focus is on investments in human capital, especially girls' and women's education, and investments in physical capital, particularly women's access to formal sector employment and labor productivity

## ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY

The issues and challenges in improving labor productivity and TFP in Pakistan can be outlined as:

### i. Growing energy crises

Energy is the key determinant of economic development and prosperity of the society. It also provides an impetus for sustainability in economic growth. Pakistan has been facing energy crises for the past few years, as the demand and supply gap widens. Its current energy demand far exceeds its indigenous supplies, fostering dependency on imported oil that places a substantial burden on the economy. Energy availability has remained the main impediment to Pakistan's economic growth in recent years, and poses a serious threat to the country's economic prospects in the coming years as well.

### ii. Poor law and order

Poor law and order situations due to Pakistan's role in the war against terror have also become obstacles to its economic growth. More than 40,000 individuals, including almost 6,000 security personnel, have perished as a result of ongoing war against terror since it began in September 2001.

### iii. Decreasing investment

Investment in Pakistan has declined from 22.5% of GDP during 2006–07 to 13.4% during 2010–11 [8], mainly due to poor law and order situation and energy crises.

### vi. High fiscal deficit

Fiscal deficit in Pakistan was 7.6%, 5.3%, 6.3%, and 4% (provisional) of GDP during the financial years of 2007–08, 2008–09, 2009–10, and 2010–11 [8], respectively.

### v. High inflation rate

Consumer Price Index (CPI)-based inflation in Pakistan was 12%, 20.77%, 11.73%, and 14.08% during the financial years of 2007–08, 2008–09, 2009–10, and 2010–11 [8], respectively.

### vi. Political instability

Political instability is another major problem for Pakistan. The country has mostly been governed by military dictators. Even after 65 years of independence from British rule, the political institutions are not stable, and the elected government is often engaged in power struggles with the military establishment.

### vii. Global financial crises

The global financial crises and sharp rise in the prices of petroleum products has put further pressure on the already unstable economy of Pakistan.

### viii. Low literacy rate

The literacy rate in Pakistan was very low and stood at 57.7% in 2009–10. It was 69.5% for males and 45.2% for females [8].

### ix. High proportion of unskilled labor

Due to the lack of technical education facilities, most of the labor force is unskilled and engaged in low-paying jobs in rural areas of Pakistan.

- x. High unemployment and underemployment, particularly in the agriculture sector

Unemployment rate in Pakistan was 5.6%, and 3.1 million labor force was unemployed in 2010–11. Among these, 44.96% were engaged in agriculture [11].

- xi. Less expenditure on education as percentage of GDP

Expenditure on education as percentage of GNP in Pakistan was 2.4%, 2.1%, 2%, and 1.8% during the financial years of 2007–08, 2008–09, 2009–10, and 2010–11, respectively [8].

- xii. Less expenditure on R&D

R&D has been a neglected sector in Pakistan, which is similar to other developing countries. In Pakistan, PKR29.5 billion were spent on higher education during the financial year 2010–11, out of which only PKR9.2 billion were allocated for development purposes [8].

## ENDNOTES

- 1 Views expressed in this report are those of the authors, not of the organizations they represent.
- 2 The Labor Force Survey, published by the Pakistan Bureau of Statistics, contained details of hours worked by labor force, including categories such as not worked, less than 5 hours, 5–9 hours, 10–14 hours, 15–24 hours, 25–34 hours, 35–41 hours, 42–48 hours, 49–55 hours, and 56 hours and above. Extrapolation using a 10-year average was made, where the information from the labor force survey was not available. The number of hours for workers who worked less than 5 hours, and 56 hours and above have been assumed as 2.5 and 59 hours, respectively, while for the remaining categories the average number of hours was used. In each category, the number of hours worked in each class was multiplied by the fraction of labor force in that class. The sum of these products was the average number of hours worked in the reference week during that period. The total number of hours worked during a week were multiplied by 48 to obtain the annual hours worked during the year.
- 3 Capital stock was estimated using the perpetual inventory method, which argues that the present stock of capital is the accumulation of past streams of investment.  $K_t = w_t I_t + w_{t-1} I_{t-1} + \dots + w_{t-T} I_{t-T}$ . Two issues are involved in the estimation of capital stock using this equation. These are the estimation of initial capital

stock  $K_0$ , and determination of rate of depreciation  $\phi$ . Initial capital stock  $K_0$  can be estimated in a number of ways. One way, as used by Mahmood and Siddiqui [12], is to estimate the initial investment by running a linear regression of log of investment against the time trend. The estimated value of initial investment is then used to estimate the initial capital stock using the following equation:

$$K_{t-1} = I_t / (\phi + g)$$

where  $g$  is the rate of growth of output and  $\phi$  is the rate of depreciation. Following Mahmood and Siddiqui [12], Khan [13], and Ahmed et al. [14], the depreciation rate is assumed to be 4%.

## REFERENCES

- [1] Ministry of Finance. Economic Survey of Pakistan 2011–12. [http://www.finance.gov.pk/survey\\_1112.html](http://www.finance.gov.pk/survey_1112.html).
- [2] Ministry of Finance. Economic Survey of Pakistan 2007–08. [http://www.finance.gov.pk/survey\\_0708.html](http://www.finance.gov.pk/survey_0708.html).
- [3] State Bank of Pakistan. Handbook on Statistics 2010. [http://www.sbp.org.pk/departments/stats/PakEconomy\\_HandBook/index.htm](http://www.sbp.org.pk/departments/stats/PakEconomy_HandBook/index.htm).
- [4] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [5] Pakistan Bureau of Statistics. 50 Years of Pakistan in Statistics Volume III (1947-1997). Islamabad: Government Printer; 2000, pp 63–133.
- [6] National Accounts Data, Pakistan Bureau of Statistics, [www.pbs.gov.pk](http://www.pbs.gov.pk).
- [7] Ministry of Finance. Economic Survey of Pakistan. 2008–09 & 2009–10. <http://www.finance.gov.pk>.
- [8] Ministry of Finance. Economic Survey of Pakistan 2011. [http://www.finance.gov.pk/survey\\_1011.html](http://www.finance.gov.pk/survey_1011.html).
- [9] Pakistan Bureau of Statistics. 50 Years of Pakistan in Statistics Volume II (1947-1997). Islamabad: Government Printer; 2000, pp.11–150
- [10] Pakistan Bureau of Statistics. Labor Force Surveys. 2008–09 & 2009–10. <http://www.pbs.gov.pk/labour-force-publications>.
- [11] Pakistan Bureau of Statistics. Labor Force Survey 2011. <http://www.pbs.gov.pk/content/labour-force-survey-2010-11>.

- [12] Mahmood Z., Siddiqui R. State of technology and productivity in Pakistan's manufacturing industries: Some strategic directions to build technological competence. *The Pakistan Development Review* 2000; 39 (1): 1–21.
- [13] Khan S.U. Macro determinants of total factor productivity in Pakistan. *SBP Research Bulletin* 2006; 2 (2): 383–401.
- [14] Ahmed K., Chaudry M.A., Ilyas M. Trends in total factor productivity in Pakistan agriculture sector. *Pakistan Economic and Social Review* 2008; 46 (2): 117–132.

---

# PHILIPPINES

CARLOS A. SAYCO, JR.

**Vice President**

Development Academy of the Philippines

DR. GILBERTO M.  
LLANTO

**Senior Fellow**

Philippine Institute for Development Studies

---

## INTRODUCTION

The Philippines was one of the founding members of the Asian Productivity Organization (APO) in 1961. In the last 50 years since joining the APO, the country's economy has gone through a cycle of growth and decline, but has showed remarkable resilience even during times of global crisis. Despite being saddled with inefficiencies and adversities resulting from past economic regimes, fundamental weaknesses in its governance system, inadequate infrastructure facilities to attract high-valued investors, and a host of other developmental issues ranging from environmental to sociopolitical, the country continues to find its place in the increasingly competitive markets of modern times. Relying on the country's bountiful natural and human resources while implementing adaptive yet strategic policies toward a more sustainable growth path, the Philippine government remains focused on economic reforms that will progressively raise living standards for the nation.

During the 1950s, the government adopted a policy of import substitution as a key strategy for becoming an industrialized nation. In the 1960s, the country experienced relative prosperity. At the time when the Philippines committed its participation in the APO, the country's economy had been enjoying a significant level of progress. In fact, at one point, the country was hailed as "one of Asia's most impressive beacons" of economic progress in the region. In the 1970s, economic growth spurted. History shows, however, that weak governance and corruption easily unraveled the country's strong growth prospects. Martial rule undid the country's earlier start toward sustained growth.

By the start of the 1980s, the nation was heavily in debt, and poverty worsened while economic and democratic institutions collapsed.

With the restoration of a new democratic framework in the late 1980s, the new government renewed hopes of economic progress, as reforms were implemented to liberalize markets, dismantle monopolies, and improve the overall investment grade. From the late 1980s to early 1990s, the government intensified groundbreaking reforms under "Philippines 2000" in banking, electricity, telecommunications, shipping, and oil. With democratic and aggressive economic policy reforms, the country slowly recovered, suffering only a minor hiccup during the Asian crisis of 1997. Presently, the Philippines is classified as a middle-income developing country with very good growth prospects. It continues to implement economic reforms to improve its ranking vis-à-vis other countries: 47th in GDP, 33rd in the world share of GDP, and 105th in per capita GNI among 142 countries surveyed by the World Economic Forum from 2011 to 2012.

## PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

It is now well known that increases in productivity have played a significant role in the growth experiences of East Asian countries. In East Asia, the decade of 1985–1995 was the golden period for total factor productivity (TFP) growth [1]. After World War II, the Philippines was overtaken in economic growth and per capita income by the more productive East Asian economies: Korea and Taiwan in the 1950s, Thailand in the 1970s, Indonesia in the 1980s, and China in the 1990s. The Philippines missed the growth

opportunities of the industrial restructuring in East Asia as trade and investments found their way into Malaysia, Thailand, and Indonesia during 1970–80, and China in the 1990s. By 2011, Thailand, a close comparator country, became a high middle-income country [2].

In the past decades, the Philippines has lagged behind East Asian countries in economic growth, and sustainable economic development had seemed elusive [2–5]. The last 50 years witnessed “episodes of instability interspersed with periods of good growth” in the Philippine economy [5]. Some economists have characterized this performance as a “boom-bust” cycle of economic growth because an episode of growth is quickly followed by some crisis such as balance of payments, financial, or political that negates incipient economic gains and followed by another episode of short-term growth, which is then trailed by another crisis. The growth rate was never smooth with the economy contracting in 1984–85, 1990, and 1998 [6]. Researchers cited various factors to explain the Philippines’ lackluster performance in the past decades: macroeconomic instability [5], policy incoherence [3], low TFP [7], sustained decline in domestic investments [8], lack of congruence between political structures and the needs of economic development, institutional uncertainty [9], cultural issues [10], and productivity growth deficit.

Subsequently, initial signs of sustained growth seemed to have emerged as the economy started to reap the dividends of economic policy reforms initially pursued in the mid-1980s which were continued and expanded by succeeding government administrations.

Selected key indicators of the economy from 2005–10 indicate that, especially in 2010, there were signs of recovery. GDP grew by 7.6% in 2010 from 4.8% in 2005, inflation rate came down to 3.8% from 7.7% in 2005, exports grew by 33.8% in 2010 from 4.0% in 2005, and import was 30.7% from 7.8% in 2005.

Given the series of economic reforms, initial signs of sustained growth, and the realization that the Philippines has lagged behind its ASEAN neighbors, the key questions for policy makers are: i) Will the economy finally be able to graduate into the ranks of rapidly developing East Asian countries and break out of its characterization as a “major development puzzle”<sup>1</sup>; ii) What will be the role of productivity to achieve high and sustained growth, and overcome high unemployment, deep poverty, and high-income inequality?; iii) How can the economy exploit TFP growth to meet its sustained growth and poverty reduction goals?

Finally, the Philippines would also need to face both the challenges and opportunities raised by greater economic openness and integration in the ASEAN economic community in 2015.

#### **GDP and Labor Productivity Growth by Periods**

To understand the Philippine growth and productivity dynamics in the past 50 years<sup>2</sup>, the period was divided into decades, characterized by their respective trade and industrial sector policy environments:

- 1961–1970: Pre-reform decade of trade restrictions and protectionist policy
- 1971–1980: Decade of attempts toward an outward-looking trade policy
- 1981–1990: Decade of trade liberalization and openness of the economy
- 1991–2000: Decade of difficult recovery, sweeping economic reforms, and financial crisis in the ASEAN region
- 2001–2010: Decade of continuing reforms in a highly competitive global and regional economy

A comparative review of economic growth and productivity dynamics of the Philippine economy<sup>3</sup> showed that there was a positive relationship among the growth rates of output, labor productivity, and TFP from 1971 to 2000, and similarities in the cycles of growth and decline from the 1970s to the 2000s, as gleaned

from the average growth rates per decade. From the 1970s to the 1980s, there was a drastic decline in all three indicators. From 1980–90, the country recovered from the slump, and by the start of the 2000s, growth appeared to have gained some momentum and consistency. While in the previous four decades (1961–70, 1971–80, 1981–90, 1991–2000), the Philippine TFP growth rate had been either very low or even negative. Calculated figures for TFP and labor productivity growth rates were positive at 1.89% and 2.0%, respectively, in the decade 2001–10<sup>4</sup>. Table 1 provides numerical details,

while Figure 1 illustrates the peaks and valleys of the cycles per decade. Data used are from TFP and labor productivity computations in the APO Productivity Databook 2011<sup>5</sup>.

Highlighting some key findings from the productivity dynamics analysis, Table 1 shows the growth rates of GDP, labor productivity, and TFP. The Philippines experienced higher economic growth in the 1970s (5.95%). However, for the period of 1971–2008, the economy grew only by 3.7%. Average labor productivity growth was low for 1971–2008

Table 1. Growth of GDP, Labor Productivity, and TFP in the Philippines from 1971–2008

Period	GDP (%)	Labor Productivity (%)	TFP (%)
1971–80	5.95	1.57	0.008
1981–90	1.64	1.15	-2.51
1991–2000	3.05	1.19	-0.05
2001–08	4.74	2.02	1.89
1971–2008	3.70	0.84	-0.29

Source: APO [11]

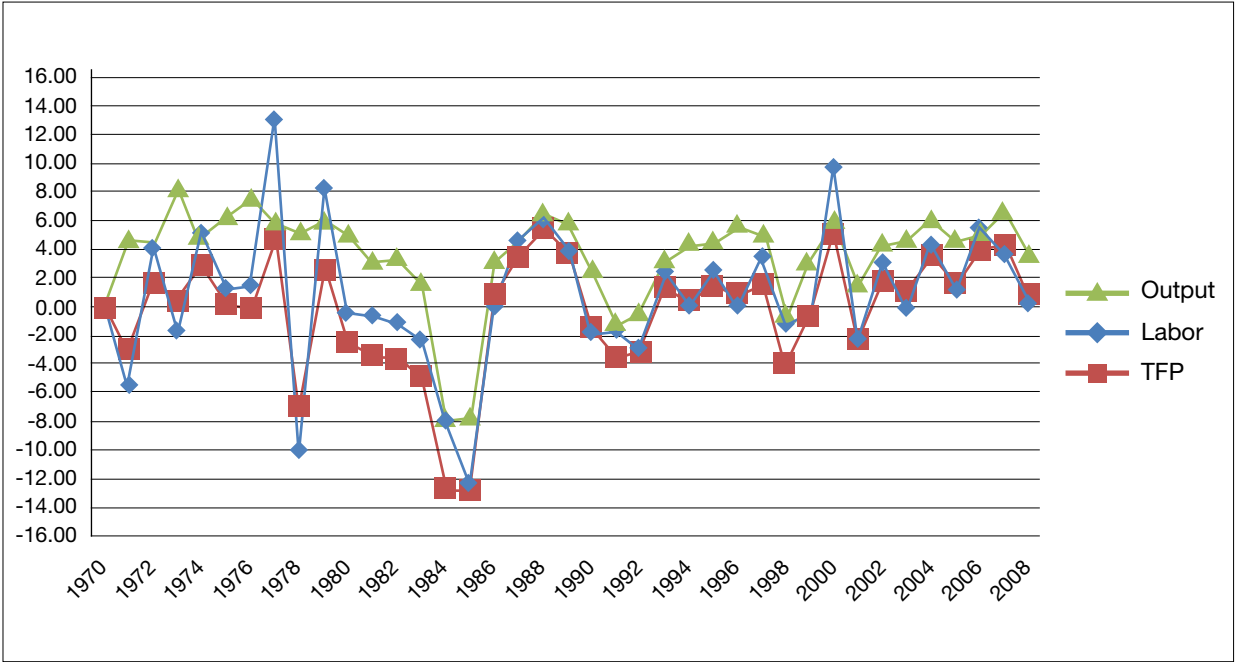


Figure 1. Trend of Output, Labor Productivity, and TFP in the Philippines from 1971–2008

Source: APO [11]



(0.84%), although it rose to 2.02% in the 2000s. TFP growth for the four decades was either low or negative, averaging -0.29% and was not a contributing factor to growth. The growth trends of labor productivity and TFP were similar to the growth trends of output (Figure 1).

### Sources of Growth Analysis

Table 2 shows the decomposition of GDP growth into the growth rates of labor productivity, capital productivity, and TFP.

It highlights that the main driver of economic growth in the Philippines was capital accumulation, particularly non-IT capital. The contribution of capital to GDP growth averaged 71.6% for the four decades, coming from non-IT capital at 64% and IT capital at 7%. Labor productivity contributed 36.2%, while TFP's contribution was negative.

Table 3 shows the decomposition of labor productivity growth by decade for 1971–2008.

Table 2. Growth Accounting and Source of Economic Growth in the Philippines from 1971–2008

Period	GDP	Labor	Capital	K(IT)	K(Non-IT)	TFP
1971–80	5.95	2.29	3.65	0.15	3.50	0.008
1981–90	1.64	1.35	2.80	0.20	2.60	-2.51
1991–2000	3.05	0.81	2.29	0.25	2.04	-0.05
2001–08	4.74	0.99	1.86	0.56	1.30	1.89
1971–2008	3.70	1.34	2.65	0.26	2.37	-0.29
Contribution (%)						
1971–80	100.0	38.4	61.3	2.50	58.8	0.10
1981–90	100.0	82.3	170.7	12.1	158.5	-153.0
1991–2000	100.0	26.5	75.0	8.1	66.8	-1.60
2001–08	100.0	20.8	39.0	11.8	27.3	39.80
1971–2008	100.0	36.2	71.6	7.0	64.0	-7.80

Source: APO [11]

Table 3. Growth of Labor Productivity, Capital Deepening, and TFP in the Philippines from 1971–2008

Period	Labor Productivity	Capital Deepening	K(IT)	K(Non-IT)	TFP
1971–80	1.57	1.56	0.07	1.49	0.008
1981–90	-1.15	1.36	0.15	1.21	-2.51
1991–2000	1.19	1.24	0.21	1.03	-0.05
2001–08	2.02	0.13	0.45	-0.32	1.89
1971–2008	0.84	1.14	0.20	0.94	-0.29
Contribution (%)					
1971–80	100.0	99.36	4.46	94.90	0.51
1981–90	100.0	118.26	13.04	105.22	-218.20
1991–2000	100.0	104.20	17.65	86.55	-4.20
2001–08	100.0	6.44	22.28	-15.84	93.56
1971–2008	100.0	135.70	23.80	111.90	-34.50

Source: APO [11]

As earlier cited, labor productivity growth was 0.84%, of which capital deepening accounted for 135.7%, coming mostly from non-IT capital. TFP contribution was negative. Figure 2 shows the trend of labor productivity growth, TFP growth, and capital deepening. Labor productivity growth as well as capital deepening were positive except in the 1980s, but decreased with a significant drop in the early 2000s (0.13%).

**FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES**

To understand the factors and government policies influencing productivity changes, regression runs were done to examine the determinants of TFP and labor productivity growth. Testing several macroeconomic variables as explanatory variables that represented or implied specific policies, and TFP growth and labor productivity growth as dependent variables in a number of regression exercises, the best results obtained are shown in Tables 4 and 5.

**Factors Affecting TFP Growth**

The results confirmed the expected signs with most of the explanatory variables found to

be significant. The following were significant determinants of growth in TFP: i) educational attainment, ii) inflation rate, and iii) foreign direct investments (FDI). The following were also found as significant determinants: i) expenditure in health and education (Run 7), ii) external trade (Run 5), and iii) population growth (Run 1).

*Educational Attainment*

The positive sign of educational attainment is consistent with the theory and evidence on the impact of education on growth. Several studies found that investment in human capital increases labor’s efficiency units with positive impact on earnings and aggregate growth performance. Human capital accumulation, mainly through education, has an important role in development. Further arguments for the importance of education that raises a country’s ability to innovate and take advantage of technological progress are pointed out by Romer [12]. Investments in education play a major role in stimulating technological changes and innovation.

*Inflation Rate*

A stable macroeconomic framework measured by inflation rate is important in the growth of

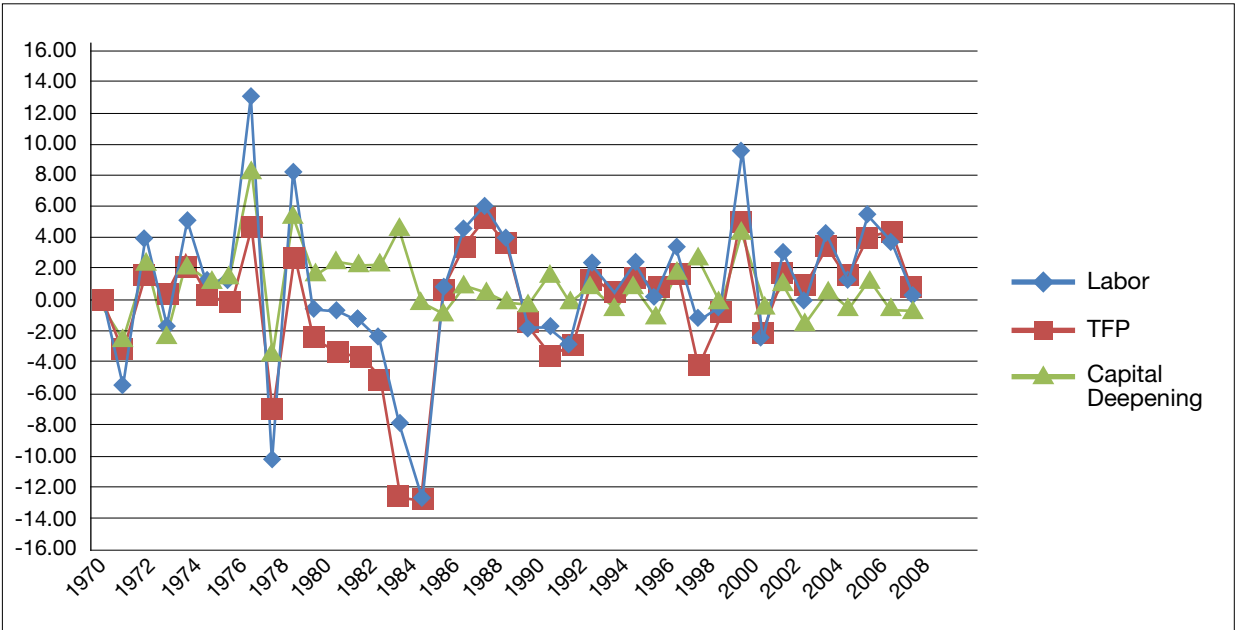


Figure 2. Trend of Labor Productivity Growth, TFP Growth, and Capital Deepening in the Philippines from 1971–2008  
Source: APO [11]

TFP. The higher the inflation rate, the more adverse the impact on TFP. Macroeconomic stability, as evident from a managed inflation rate, assures the orderly functioning of markets, which enable economic agents to make optimal decisions.

#### National Government (NG) Deficit

NG deficit yielded the expected negative

sign, but it was insignificant. It was a measure of policy instability to the extent that if policy makers cannot attain fiscal balance, crowding-out effects of government borrowings tend to depress private investment. A healthy fiscal balance assures private economic agents that the government pursues market-enhancing policies. A strong fiscal position, which is indicated by fiscal balance, calms nervousness in capital

Table 4. Determinants of TFP Growth - Regression Results

Explanatory Variable	Regression Runs						
	1	2	3	4	5	6	7
Educational attainment - Growth in years of education	506.29722 (2.57)**	455.85511 (2.10)**	381.70175 (1.83)*	621.85867 (2.79)***	478.4452 (3.24)***	490.943 (3.01)***	583.667 (2.39)***
Growth in education and health expenditures	0.07589 (1.11)	0.03836 (0.54)	0.04876 (0.68)	0.06343 (0.95)	0.02188 (0.34)	0.03082 (0.46)	0.14539 (2.15)**
Trade openness - FDI/GDP	1.18572 (1.74)*	1.12866 (1.40)	1.36947 (1.74)*	1.07392 (1.57)	1.2520 (1.82)*	1.45120 (2.17)**	- -
Inflation	-0.15849 (-1.73)*	-0.20373 (-2.25)**	-0.20439 (-2.20)**	-0.16352 (-1.84)*	-0.17823 (-2.28)**	-0.17213 (-2.09)**	- -
National government deficit (PHP'million)	-0.00001 (-0.92)	-0.00001 (-0.36)	-0.00001 (-0.72)	-0.00001 (-0.51)	- -	- -	-7.5E-07 (-0.05)
Population growth	-5.26032 (-1.93)*	- -	- -	- -	- -	- -	- -
Exports/GDP	- -	0.1447 (1.21)	- -	- -	- -	- -	- -
Trade/GDP	- -	- -	0.0404 (0.77)	- -	0.07666 (1.92)*	- -	0.067561 (0.74)
Total population	- -	- -	- -	0.000002 (2.14)**	- -	- -	- -
Manufacturing exports as % of total exports	- -	- -	- -	- -	- -	0.05279 (1.63)	0.0119 (0.15)
Telephone lines/100 persons	- -	- -	- -	- -	- -	- -	1.3240 (1.07)
Constant	5.69030 (0.94)	-10.2862* (-1.83)	-7.9997 (-1.48)	-18.37419 (-2.60)**	-11.2441 (-2.60)**	-9.0459 (-2.41)**	-16.1225 (-3.03)***
R <sup>2</sup>	0.6377	0.6087	0.5963	0.6471	0.5492	0.5359	0.4729
Adjusted R <sup>2</sup>	0.5572	0.5217	0.5066	0.5687	0.4787	0.4634	0.3558
Number of observations	34	34	34	34	34	34	34

- Notes: i. t-statistic in parenthesis: \*significant at 10%, \*\*significant at 5%, \*\*\*significant at 1%  
ii. Educational attainment - Growth in number of years of education representing human capital investment, which somewhat embodies R&D  
iii. Inflation rate - Measures macroeconomic stability  
iv. FDI/GDP - Ratio of Foreign Direct Investment to GDP, which measures openness of the economy  
v. Exports/GDP - Ratio of total exports to GDP, which measures openness of the economy  
vi. Growth in expenditures in health and education - Represents growth of investments in human capital development  
vii. Population growth - Growth rate interpreted as representing the economy's human resource endowments

markets about the ability of the government to pursue growth expenditures, and at the same time, meet the servicing of its debts.

#### *Ratio of Foreign Direct Investments to Gross Domestic Product*

The estimated coefficient of FDI/GDP followed the expected positive sign. FDIs provided a channel for transfer of technology, thereby introducing innovations and good business practices at production and managerial levels.

#### *Openness of Economy*

The results indicated that “more openness,” as measured by the significance of trade or the ratio of exports to GDP, and also by FDI/GDP, had a positive impact on TFP. The record of growth of neighboring East Asian economies showed that those that have been more open and hospitable to FDIs and demonstrated more credible assurances of outward-looking policies had reaped the benefits of higher productivity growth, more rapid economic growth rates, and higher rates of employment.

#### *Government Expenditure in Health and Education*

The importance of human capital investment to growth in TFP was shown by the positive sign of the coefficient of growth in health and education expenditures of government. Run 7 showed that it was a significant determinant of TFP growth. In the process of structural transformation, a modernizing economy needs highly skilled, well educated, and healthy professionals, technicians, and laborers. For the economy to be able to move up the value chain, TFP growth must take place and this depends to a large extent on educated and skilled human capital.

#### *Population Growth*

At least one regression run (Run 1) indicated the negative effect of population growth on TFP growth. A high population growth was seen more as a “drag” to economic growth in the present particular stage of the Philippine development, based on the studies of several local researchers. Recalling the review made

earlier on the Philippine productivity dynamics in the past 50 years, it was noted that the slow transformation and modernization of the economy have resulted in low output and high unemployment. Improvements in productivity have lagged behind population growth. On the other hand, population interpreted as representing the economy’s human resource endowment had a positive and significant impact on TFP growth (Run 4).

#### *R&D*

Results of runs with R&D as explanatory variable found that R&D was significantly correlated with growth of years of education. Due to potential multicollinearity problem, R&D was dropped as an explanatory variable. It was noted that educational attainment was a significant and positive determinant of TFP growth. R&D somewhat embodied in educational attainment was an important factor in improving TFP.

#### **Factors Affecting Labor Productivity Growth**

Substantial per capita gaps between developing and developed countries were largely explained by the former’s relatively poor labor productivity growth [13]. The literature shows various determinants or sources of labor productivity growth<sup>6</sup>. Bosworth and Collins [14] found that catch-up effects represented by initial conditions, openness, geographic factors, institutional quality, and policy variables significantly affected labor productivity growth; Benhabib and Spiegel [15] found that human capital influenced productivity growth; and several studies reported the important role of R&D in productivity growth.

The results of the estimation of the determinants of labor productivity growth are shown in Table 5. In all four regression runs reported in Table 5, the coefficients turned in the expected signs. FDIs, educational attainment, openness of the economy, and government expenditure in health and education were significant determinants of labor productivity. The results drew attention to the policy levers that the government may manipulate or handle to improve labor productivity.

### *Inflation Rate*

The negative coefficient of inflation rate denoted that low inflation rates, signifying macroeconomic stability, had a positive impact on labor productivity growth. A favorable macro environment was conducive to more investments and job creation, hence the positive impact of low inflation on labor productivity growth. Total employment growth had a negative coefficient because the quality variables, namely years of education and education expenditures, pick up the positive impact of employment.

### *Educational Attainment*

The educational attainment variable was highly correlated with the R&D variable. Several regression runs showed years of schooling as a robust and significant determinant of labor productivity growth.

### *Openness of the Economy*

Openness of the economy, measured by ratio of Total Exports to GDP and ratio of FDI to GDP, were significant positive influences on labor productivity growth. In this regard, the government should continue with economic policy reforms that strengthen the export markets and bring in more FDI. The competition provided by discriminating (foreign) export markets created incentives on domestic firms to become more productive and competitive. Otherwise, the export market will be lost to competitors. On the other hand, FDI brought into the domestic markets new products, new processes, innovations, and a host of complementary institutions (e.g., efficient supply chains) that motivated labor productivity growth.

### *Government Expenditure*

Investments in human capital through greater

Table 5. Determinants of Labor Productivity Growth - Regression Results

Explanatory Variable	Regression Runs			
	1	2	3	4
FDI/GDP	1.1637 (1.94)*	0.6857 (1.24)	- -	- -
Inflation rate	- -	-0.2148 (-4.41)***	- -	- -
Growth in education years	264.0284 (2.51)**	388.0344 (4.46)***	190.4944 (1.86)*	272.6425 (2.52)**
Growth of total employment	-0.8851 (-7.31)***	-0.9369 (-8.71)***	-0.9498 (-7.83)***	-0.9457 (-7.08)***
Export/GDP	0.0820 (1.87)*	0.0361 (0.93)	0.1109 (2.59)**	0.0983 (2.08)**
Growth of education and health expenditure	0.1170 (2.42)**	- -	0.1362 (2.76)***	- -
Growth in the share of education and health expenditure	- -	0.0244 (0.45)	- -	0.0621 (0.91)
Constant	-3.97048*	-0.7515	-2.4040	-2.5696
R <sup>2</sup>	0.7195	0.7967	0.6863	0.6233
Adjusted R <sup>2</sup>	0.6756	0.7573	0.6483	0.5777

Note: i. t-statistic in parenthesis \*significant at 10%, \*\*significant at 5%, \*\*\*significant at 1%  
 ii. FDI/GDP – Ratio of Foreign Direct Investments to GDP, which measures openness of the economy  
 iii. Inflation rate – Measures macroeconomic stability  
 iv. Exports/GDP – Ratio of total exports to GDP, which measures openness of the economy  
 v. Growth in expenditures in health and education – Represents growth of investments in human capital development

expenditure on health and education will be critical in ensuring labor productivity growth.

## **PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS**

The Philippine productivity dynamics in the last 50 years may also be viewed from an institutional perspective. It is important to understand the role of government institutions such as the national productivity organization (NPO) and other productivity-focused organizations in championing the productivity movement. By doing so, they enhance TFP and labor productivity growth through initiatives that directly impact human capital investments/education, good governance, and indirectly, the overall macro-economy.

The productivity movement in the Philippines over the past five decades and the evolution of its productivity organizations went through five phases: Phase I (1967–72), National Government Commitment to Productivity Promotion; Phase II (1973–early 1980s), Program Assistance and Institutional Development; Phase III (mid-1980s–mid-1990s), Policy and Program Implementation; Phase IV (late 1990s–early 2000), Consolidation and Support to Multisector Productivity Initiatives; and Phase V (mid-2000–to date), Strategic Repositioning for National Competitiveness and Sustainability.

Throughout this process, the NPO had contributed to the country's human capital investments, mainly in capacity and competency building of the public sector and private production sector. It had also cooperated with the APO for the past decades, contributing to the effective implementation of APO projects and programs in the Philippines and benefitting multi-sector beneficiaries. On the other hand, the Philippines greatly benefitted from its APO membership, especially from its Technical Experts Services (TES) program; the productivity and quality-related trainings and seminars for Filipino managers, executives, government officials, consultants, and experts; foreign study missions; and researches and

surveys. Since the late 1960s, the Philippines had implemented various productivity-enhancing programs for both private and public sectors that have directly and indirectly contributed to productivity improvements in various production sectors, including the public sector. These initiatives are described further in Annex 1.

The Philippine government formally demonstrated its commitment to the productivity movement when it created the Productivity and Development Center (PDC) in 1967 under the National Economic Council (NEC), the country's highest economic planning body. The PDC was mandated as the NPO in line with the country's membership in the APO. It was assigned to implement the government-sponsored Industry Development Program. In 1972, the NEC was renamed as the National Economic and Development Authority (NEDA). And in 1973, PDC was transferred to the Development Academy of the Philippines (DAP) through the Presidential Decree 205. This transfer from NEC-NEDA, a planning agency to DAP, an R&D institution, reinforced the importance of integrating productivity into national development programs and directed the shift to a more action-oriented focus in the national productivity movement.

There are currently three key government organizations involved directly and indirectly in promoting the productivity movement in the country, through their various mandates related to the planning, execution, and monitoring of productivity-related policies, programs, and projects: i) the Development Academy of the Philippines, ii) the Philippine Institute for Development Studies, and iii) the National Wages and Productivity Commission. Their primary roles are described in Table 6.

As the NPO, the DAP-PDC's institutional mandates include promoting productivity consciousness in the key sectors of the economy, helping to effect actual productivity increases, particularly at the firm level, and establishing and strengthening

Table 6. Key Productivity-related Government Organizations

Organization	Role and Responsibility
Development Academy of the Philippines (DAP)	DAP is the designated NPO of the country by virtue of the Philippines membership in the APO. It coordinates the planning and execution of government initiatives on productivity, and recommends and implements government policies to promote productivity and good governance. It also conducts productivity impact studies and developed a Productivity Database System, an industry database that has been used in productivity measurement and analysis models.
Philippine Institute for Development Studies (PIDS)	PIDS, as the policy research arm of the government, conducts productivity-related studies in support of policy-making and development planning. It promotes utilization of its research outputs through its publication and public affairs programs.
National Wages and Productivity Commission (NWPC)	The NWPC rationalizes wage setting in the country by using productivity performance as the basis, and sets minimum wages by geographical areas using regional productivity data. It monitors labor productivity performance at the national and regional levels, and has a repository of labor productivity measurement indices at the national and regional levels.

institutional infrastructure vital to sustained productivity enhancement. The PDC was organized with five program units: i) Research, Advocacy, and Institutional Development Office; ii) Philippines Productivity and Quality Training Institute; iii) Technology Development and Management Office; iv) Regional Productivity Development Office; and v) APO/International Relations Office, and complemented by a Support Services Office.

In 2002, the PDC roles were fully assumed by the DAP. An APO directorate oversaw the PDC, comprising the deputy director-general of NEDA (as the APO director for the Philippines), the president of the DAP (as the APO alternate director), and the managing director of the PDC (as the APO liaison officer for the Philippines). As the NPO, the DAP was mandated to support the country's economic players through selective human resources development programs; research and information services; and scientific, interdisciplinary, and policy-oriented research, education, training,

consultancy, and publications in various fields such as economics, public administration, and political sciences. It also aimed to discharge a regional role in catalyzing the exchange of ideas and expertise on development activities in Asia and the Far East.

While the NPO, now represented by the DAP, is not directly involved in the country's economic planning and management, it plays a key role in enhancing the enabling environment for both public and private sectors that are involved in the production and delivery of products and services. The role of the DAP-NPO bears significantly on two areas of opportunity: i) initiatives for improved public management and administration, and overall good governance by the government (national and local); and ii) micro-level (i.e., organization, industry-based, or value chain-based) opportunities for productivity improvements. The importance of raising productivity in the public sector and good governance, and the impact on the economy

is shown in Figure 3. This has the economic growth framework adopted by the DAP in charting the course toward organizational excellence in the public sector.

The essential challenge for the NPO is to increase its effectiveness in transferring productivity knowledge to the right stakeholders, driving them to become aware of, to learn, and to practice tools, systems, and processes that will raise their productivity. In the current government's vision for sustainable development, DAP's role has been carved out as follows: i) promoting national productivity and competitiveness, and ii) promoting good governance.

DAP's programs and projects, while recognizing the regional dimensions such as the APO strategic directions, and international commitments and agreements, must primarily address internal and external opportunities in a more focused way, directing its initiatives to industries and enterprises that have the potential for strengthening the country's competitiveness and supporting

government agencies in their drive toward organizational excellence. In order to improve national productivity and competitiveness, the DAP works to harness institutions created from past and current productivity movements/initiatives such as the National Competitiveness Council, the Philippine Quality and Productivity Movement, Productivity Improvement Circles Association of the Philippines, and the Philippine Society for Quality, among others, both in the public and private sectors. These organizations are described in Annex 2.

In order to promote public-sector productivity and good governance, the DAP has mapped out its strategy for assisting government agencies to attain organizational excellence through various programs and projects such as training and education, technical assistance and consulting, and R&D. DAP's programmatic initiatives include working with specific national government agency clusters (e.g., agriculture and agrarian reform) to introduce productivity enhancing interventions in public administration and management. DAP's graduate school

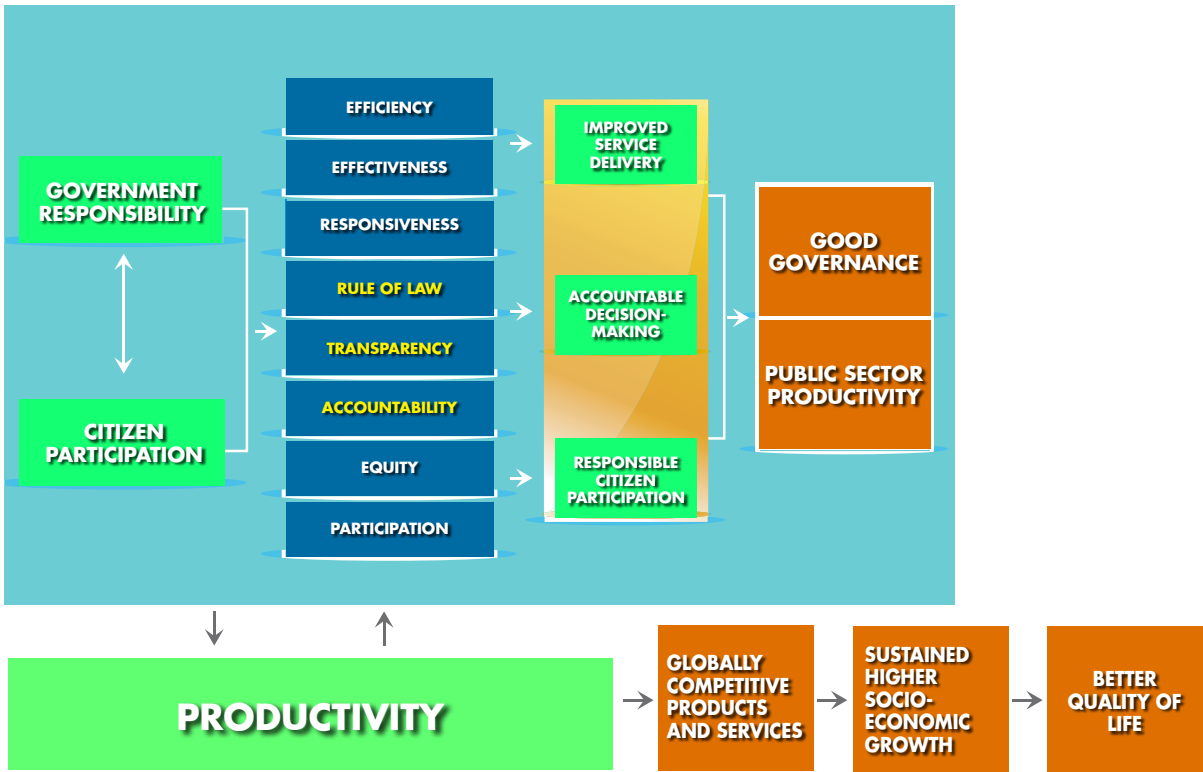


Figure 3. DAP-NPO Framework on Economic Growth



continues to raise the quality of government senior executives, middle managers, and legislators/policy makers through training and graduate degree offerings. Policy-based initiatives institutionalize the implementation of innovative programs such as the ISO quality management system certification of government agencies, corporations, and local government units, thereby, establishing the government quality management program and creation of a task force that aim to harmonize the numerous results-based performance management systems used by government agencies. This follows the principles of the Malcolm Baldrige Award and balanced scorecard.

## **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

In light of the analysis of productivity dynamics in the past five decades and the findings of the empirical investigation, there are three essential conclusions that can be made: i) economic growth with factor accumulation is desirable, but TFP growth is the more ideal path for sustainable development; ii) the government has a key role to play in stimulating and sustaining economic growth; iii) TFP and labor productivity growth can be enhanced by policy levers that present themselves as critical in improving productivity growth rates in the economy.

In other words, investments in education, more government expenditure for improving human capital, greater openness of the economy (measured by FDI/GDP and Exports/GDP), attracting more FDIs, and maintaining macro-economic stability are indispensable in improving productivity growth and performance.

### **Factor Accumulation versus TFP Improvement**

Studies have shown that the sustained growth of developed countries has ridden on the back of technological advances rather than factor accumulation. As factor inputs cannot increase indefinitely, TFP improvement is logically the only route to sustained economic growth in the

long run. In his survey article, Chen [16] pointed out that almost all studies of developed economies showed that TFP was a far more important source of growth than factor inputs. On the other hand, empirical studies of growth accounting for developing economies in Asia and Latin America have indicated that capital input was the major source of growth. The fear was that reliance on factor accumulation alone would not make growth sustainable.

In the Philippines, a general picture emerging from various studies is that TFP has not been a key source of growth. With studies finding negative and very low TFP growth, factor accumulation has seemingly underpinned economic growth, which is not a sustainable source of growth. If the low- and non-inclusive growth trend continues, the Philippine economy will continue to lag behind its East Asian neighbors. The Philippine growth of the past decade portrayed as "jobless growth" has had an insignificant impact on poverty reduction. Alba [7] warned that a low steady-state level of output per worker would consign the economy to a slow rate of long-term growth. It is a worrisome prognosis conjuring images of a continuous diaspora of the best and brightest migrating to developed countries, a persistently weak economy, and a further worsening of poverty and high-income inequality in the future. To reverse this trend and put the economy on a high, sustained growth path, there is a case for improving TFP growth, and in particular, labor productivity growth, including, pursuing innovations and reforming the country's institutions as a pathway to inclusive growth.

### **Role of the Government**

Is there a particular role for the government in stimulating growth and making it sustainable? In the Philippines, various market imperfections and the presence of various types of externalities seem to indicate a role for the government in policy coordination and in addressing information externalities and the excesses of the market. As observed by Sarel [16], the government can play a useful role in the orderly development of the market, in the acquisition of technology, and in allocating

funds for useful projects that promise a good rate of return. Put differently, a study stated a case for the role of government in economy: “The government should jump-start the industrialization process by transforming economic structure faster than private entrepreneurs would.”[16]

### **Investing in Education**

Investments in education (and by implication, R&D) will play a major role in stimulating technological changes and innovation. A study showed the underinvestment in the Philippine R&D and an inefficient allocation of very limited R&D resources to various sectors of the Philippine economy. The economy had a severe shortage of R&D personnel and an inefficient institutional setup in the science and technology sector. This was indicated by the weak linkage between government-funded R&D institutes with private industry and manufacturing. Thus, there was a need for policy makers to heighten their focus on R&D to make TFP a major source of economic growth in the future.

Complementary to this is the need to manage the brain drain problem. Human capital that has been sufficiently trained and empowered with valuable skills is leaving the country to find work elsewhere. Because of job scarcity in the country, around six million Filipinos have found work outside the Philippines. Even as they contribute almost 10% of the country's GDP in the form of foreign exchange remittances, the migration of professionals and highly skilled workers is counterproductive to the country. Investing in improved education should also involve ensuring the retention of skilled manpower/professional workers in the country, so that the requirements of higher value-adding production activities can be internally fulfilled.

### **Macroeconomic Stability**

Policymakers should continuously strive to maintain macroeconomic stability. A regime of low inflation, fiscal balance, and judicious debt management provides that stability. Currently,

the fiscal deficit-to-GDP ratio stands at 1.4% and the government is on the right track of continuing with fiscal policy reforms.

### **Maintaining Openness of the Economy**

Empirical results show the importance of FDIs and exports to the economy. Larger markets, innovations, new technologies, and other growth-enhancing developments are the dividends of an outward-looking orientation. It will be critical to continue with efforts toward greater integration with the region and the global economy, even as policymakers should be vigilant about the spillover effects and risks brought about by such integration.

### **ENDNOTES**

- 1 Balisacan and Hill [2] called the Philippines one of the world's major development puzzles. Despite favorable initial conditions in the post-war period, high educational standards, ample agricultural land, and access to the USA market, the Philippines failed to capitalize on these and faltered on its way to development.
- 2 Following guidelines given by APO.
- 3 This section makes extensive use of recent studies on the Philippine growth and development conducted by Balisacan and Hill [2], Sicat [5], Yap [4], and other authors who wrote chapters in Balisacan and Hill, and Yap. Detailed discussions of trade and industrial policy, employment, and productivity growth by individual authors are provided in Yap [4].
- 4 Due to space limitations, the extended account of the interplay among economic policy, the governance scenarios, and productivity in each of the five decades to be published separately by the DAP and PIDS as another report.
- 5 Information on 1961–70 was also drawn from published and unpublished works of Cororaton (1995, 1999, 2004) and Austria (1998), and other sources because the APO Productivity Databook only reported the estimated TFP and labor productivity of Asian countries for the period of 1971–2008. It was assumed that the APO 2008 TFP and labor productivity estimates remained valid for 2009–10 in the absence of more recent estimates.
- 6 Cited by chief expert Dr. Tsu-Tan Fu in his guideline, Explanation on the Methodology of the Study.

## REFERENCES

- [1] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [2] Balisacan A., Hill H., eds. *The Philippine Economy: Development, Policies and Challenges*. Quezon City: Ateneo de Manila University Press; 2003.
- [3] Yap, J. "Policy Coherence Initiative on Growth, Investment and Employment: The Case of the Philippines" Paper prepared for the International Labour Organization Regional Office for Asia and the Pacific; 2009.
- [4] Yap J., ed. *The Philippines Beyond 2000: An Economic Assessment*. Makati City: Philippine Institute for Development Studies; 2002.
- [5] Sicat G. *Direction or drift: Philippine economy after 2004*. Quezon City: University of the Philippines, School of Economics; 2004.
- [6] Canlas D., Cham R., Zhuang J. Development performance and policy. In: Canlas K., Zhuang, eds. *Diagnosing the Philippine Economy: Toward Inclusive Growth*. London: Anthem Press; 2009, pp. 13–16.
- [7] Alba M. Why has the Philippines remained a poor country? *Philippine Review of Economics*; 2007; 44-2; 1–31.
- [8] Bocchi A. Rising growth, declining investment: The puzzle of the Philippines. Policy Research Working Paper (4472) of The World Bank. 2008; pp. 1–49.
- [9] Pritchett L. A toy collection, a socialist star and a democratic dud: Growth theory, Vietnam, and the Philippines. In: Rodrik D., ed. *In Search of Prosperity: Analytical Narratives on Economic Growth*. New Jersey: Princeton University Press. 2003; pp. 124–150.
- [10] Nelson R. *The Philippine economic mystery*. Quezon City: University of the Philippines, School of Economics; 2007.
- [11] Asian Productivity Organization. APO Productivity Database 2011. <http://www.apo-tokyo.org/about/measurement.html#apo-database>, accessed on 15 December 2012.
- [12] Romer P. Endogenous technological change. *Journal of Political Economy*. 1990; 98 (5): S71-S102.
- [13] Nomura K. Why labor productivity matters. [http://www.apo-tokyo.org/productivity/mp\\_002.htm](http://www.apo-tokyo.org/productivity/mp_002.htm), date accessed 3 March 2012.
- [14] Bosworth B., Collins S. The empirics of growth: An update. *Brookings Paper on Economic Activity* 2003; 34: 113–206.
- [15] Benhabib J., Spiegel M. The role of human capital in economic development: Evidence from aggregate cross-country data. *Journal of Monetary Economics* 1994; 34: 143–173.
- [16] Chen E. The total factor productivity debate: Determinants of economic growth in East Asia. In: *Asia Pacific Economic Literature*. Canberra: The Australian National University and Wiley Publishing Asia Pty Ltd; 2002, pp. 26–30.
- [17] Sarel M. *Growth in East Asia: What We Can, and What We Cannot Infer*. Washington DC: International Monetary Fund; 1996.

## ANNEX 1

### **The Philippine Productivity Movement and the Role of DAP-PDC as the Philippine NPO from 1960–2000**

The productivity movement in the Philippines and the evolution of productivity organizations can be traced through five major phases: Phase I - National Government Commitment to Productivity Promotion; Phase II - Program Assistance and Institutional Development; Phase III - Policy and Program Implementation; Phase IV - Consolidation and Support for Multisectoral Productivity Initiatives; and Phase V - Strategic Repositioning for National Competitiveness and Sustainability.

#### **Phase I: National Government Commitment to Productivity Promotion from 1967–1972**

The productivity movement in the Philippines started in 1961 when it joined seven other countries in establishing the APO. As a founding member, the Philippines was able to utilize APO programs to support the Industrial Development Program in the country, which was the major framework of productivity development efforts. In 1967, the Philippine government created the Productivity and Development Center (PDC) and placed it under the NEC, the country's highest economic planning body at the time. With the creation of the PDC, the government formally demonstrated its commitment to productivity. The PDC was given the mandate as the national productivity organization in line with the country's membership with the APO. The PDC was tasked to implement the government-sponsored industry development program. Thus, the productivity movement started with a strong focus on the industry (manufacturing) sector. In 1972, the NEC was renamed as the National Economic Development Authority (NEDA).

#### **Phase II: Program Assistance and Institutional Development from 1973–early 1980s**

This phase was characterized by intensive program development and experimentation, the expansion of the coverage to various

sectors (agri-business development, energy management, and environmental management), and the establishment of institutional infrastructure vital to sustained productivity improvement. In June 1973, (through the Presidential Decree 205), the PDC was transferred from NEDA to the Development Academy of the Philippines (DAP). This transfer from a planning agency to an action cum R&D institution reinforced the importance of integrating productivity into national development programs and directed the shift to a more action-oriented focus in the national productivity movement.

The DAP was established to build institutional capabilities both in the public and private sectors to enable them to contribute to accelerated socioeconomic development. In line with the national development plan at the time, the PDC focused on increasing productivity of the manufacturing sector and the agri-business industries. The centerpiece of this program was the Medium and Small Scale Industries Coordinated Action Program in 1974, which was designed to assist in the development of small and medium enterprises (SMEs). To help the SMEs enhance their productivity and quality performance, the PDC launched the Quality Control and Productivity Improvement Project in 1975, and initiated and assisted in the creation of Small Business Associations across the country.

During the energy crisis in the 1970s, the PDC with the support of the Ministry of Energy developed the Energy Management Program to promote the efficient utilization of energy. As awareness of productivity concepts, approaches, and techniques intensified through various economic sectors, the PDC encouraged and supported the establishment of industry associations, especially among SMEs.

In 1980 alone, 23 Sectoral Productivity Associations were organized with a total of 401 member firms. The PDC also spearheaded

the creation of Technical Productivity Associations and productivity-oriented organizations, including the Maintenance Association of the Philippines in 1993, the Productivity Improvement Circle Association of the Philippines in 1981, the Energy Management Association of the Philippines in 1980, the Philippine Society for Quality Control in 1969, the Corporate Planning Society of the Philippines in 1987, the APO Society of the Philippines in 1980, Production Management Association of the Philippines in 1977, the Philippine Productivity Movement (renamed Philippine Quality and Productivity Movement) in 1982, the National Productivity Commission, the Commission for Small-and-Medium Scale Industries dedicated to the concerns of SMEs, and the Government Productivity Improvement Council.

These bodies have since evolved into other organizations that continue to address specific productivity concerns nationwide. The NPC, which later merged with the National Wage Council to form the National Wages and Productivity Commission, drafted the implementing rules of the Productivity Incentives Act of 1990, which encourages productivity and maintains industrial peace by providing incentives to both labor and management.

### **Phase III: Policy and Program Implementation from mid-1980s–mid-1990s**

The expansion of productivity concerns in the 1980s and the advent of trade liberalization and globalization in the 1990s led to the intensified efforts in addressing pressing quality and productivity concerns. This phase, covering roughly a decade, was characterized by: i) significant policy advocacy, ii) continued expansion of productivity efforts to other economic sectors, iii) systematic testing and adaptation of productivity and quality technologies, iv) development of productivity professionals, and v) linking productivity to government thrust such as industrial peace and harmony, wages and productivity-gain sharing, product quality, and export competitiveness.

The PDC-DAP programs, projects, and activities during this phase were clustered around its two major roles: policy advocacy and capability building. Policy advocacy was directed at decision-makers in the private and public sectors. In the private sector, the focus was on securing the commitment of the top corporate management and business leaders in specific industries to make sustained investment in productivity improvement programs for their individual firms and for the relevant industry sector. In the public sector, advocacy was directed at integrating government support for industrial productivity improvement. This advocacy led to the development of the Government Productivity Improvement Program (GPIP) in which the PDC played a key role. The GPIP was an organized, comprehensive, and long-term strategy to enhance and sustain government productivity in the delivery of essential and quality services and to optimize the use of public resources. In support of the national vision and strategy of Philippines 2000, the NPO established the Philippine Productivity and Quality Training Institute (PPQTI) in 1999 to strengthen and accelerate the development of skilled productivity specialists and professional productivity advisers throughout the country.

### **Phase IV: Consolidation and Support for Multisectoral Productivity Initiatives from late 1990s–early 2000s**

The gains from the three earlier phases of the national productivity movement led to a subsequent concern for harmonizing the country's various productivity-related policies, programs, and activities, as well as the recognition of the need to obtain maximum synergy from them. In 1996, the president of the Philippines, through Administrative Order No. 267, constituted a Multisectoral Steering Committee representing business, labor, government, academia, and civil society with the task of reviewing all productivity efforts, determining consultatively the future directions of the national productivity movement and proposing the institutional mechanism for promoting synergy and coordination among related programs. The government saw the

need to establish a coherent framework for the productivity efforts in the country and integrated this with the goals of the Medium-Term Philippine Development Plan. Productivity is recognized not only as a strategy for global competitiveness, but also as a means to attain a better quality of life.

#### **Phase V: Strategic Repositioning for National Competitiveness and Sustainability from mid-2000s-to date**

From 1980 to 2007, the country had the lowest average productivity growth rate and productivity level within the ASEAN, suffering from chronic problems of unemployment, poverty, and underinvestment. A first step forward was to push for reforms to address the long-standing challenges such as insufficient provision of basic infrastructure, weak investment, and business environment to ensure that the economy can increase its productivity. According to a study conducted, fiscal consolidation was an urgent agenda for increasing spending on infrastructure since public investment has been constrained by decades of weak revenue performance and poor expenditure management.

Cumbersome business procedures and overregulation, weak contract enforcement and property rights, and investment climate had seriously hindered the business community. These concerns were addressed by the NPO through its Good Governance and National Productivity and Competitiveness Agenda. The NPO also pursued a program to directly improve product diversification in the private sector through DAP's "Productivity Thru Innovation" program. Local and foreign study missions were conducted to demonstrate to Filipino entrepreneurs the impact of innovation on product diversification that results in higher productivity and profitability.

## **ANNEX 2**

### **NPO Programs and Projects, the 1970s–2000s, and Partner Organizations**

#### **A. NPO and APO Cooperation Projects**

##### *APO Project Hostings*

- "Project Feasibility Study" training course, a joint NPO-APO-ADB project that started in the early 1970s and continued until the late 1980s
- "Development of Productivity Specialists" training course that started in the mid-1990s and is still being implemented
- "First World Conference in Green Productivity" was successfully implemented in 1996 and was attended by 400 local and foreign participants
- "5th Eco-Products International Fair" in 2009, which was sponsored by the APO
- During the decade of 2000–10, PDC-DAP has continuously and consistently hosted various APO projects in training and seminars, covering various topics and areas such as: Development of Women Entrepreneurs, Managerial and Entrepreneurship Development, Workshop on Green Productivity Facilitators, Application of Information Technology in Community/Rural Development, Productivity Infusion in School Curricula, Integrated Community Development, Development of Niche Market for Agricultural Products, Standards and Certification Systems for Organic Food Production and Processing, and others.

##### *APO Research and Survey Projects*

- Research on Factors That Help or Hinder Productivity, Labor Productivity Measurement and Analysis
- Survey of Producers Associations for the Marketing of Agricultural Products
- Research on Technology Development for Small and Medium Scale Industries

- Research on Quality Management Practices in the Manufacturing and Services Sectors
- Basic Research on the Impact of Governance on Productivity
- Development of Case Studies on Benchmarking
- Survey on In-Company Training for Knowledge Workers
- Research on Knowledge Management and others

#### BCBN/OSM

PDC-DAP was the host to visiting scholars and researchers from APO member countries who visited the Philippines to study and learn productivity and quality concepts, techniques, approaches, and experiences, which can be applied in their own country.

#### **Deployment of Filipino Experts to APO Member Countries**

The APO has tapped the Philippines as a major source of technical experts who are sent to APO member countries that seek assistance in the application/implementation of specific productivity concept, technology, or approach. Since the year 2000, six to 10 Filipino experts are deputed to various APO member countries annually in the following areas: Green Productivity Activities, Productivity Facilitators' Training, Storage of Agricultural Products, Agricultural Finance and Credit Policy, Development of Agribusiness Enterprises, Advanced Course for Productivity Specialists, franchising, productivity measurement, productivity and quality approaches, human resource development, TQM, promotion and marketing, financial management, and research development, among others. In 2006, the APO appointed the NPO to spearhead KM measurement in APO member countries.

#### **B. Current NPO Partner Organizations in Productivity Movement**

##### *National Competitiveness Council (NCC)*

The NCC is a public-private council on the Philippine competitiveness created by

the present administration to address the improvement of the country's competitiveness from the bottom third of the rankings to the top third by 2016. Chaired by the Trade and Industry secretary for the public sector and co-chaired by a top official from the private sector, the NCC's vision is to promote a more competitive Philippines and instill a culture of excellence through public-private sector collaboration as a means of reducing poverty through inclusive growth. The DAP works with the NCC as a member, contributing in the formulation of the national competitiveness agenda that is linked to the Philippine development plan (<http://wwcompetitive.org.ph/about-ncc>).

##### *Productivity Improvement Circles Association of the Philippines (PCAP)*

The association is a national organization of quality practitioners from various industry, government, and academic sectors organized in 1980 by the PDC with the help of the Union of Japanese Scientists and Engineers. It is dedicated to the development of human quality for the growth and development of the country, is united in its pursuit of innovation to make work-life better for people through people-centered and customer-oriented technology, and is determined to find creative alternatives that will lead to total employee participation in quality and productivity improvement. At present, there are five local chapters that span the whole country to bring the concepts and principles of quality to the grassroots level.

##### *Philippine Society for Quality (PSQ)*

The PSQ is a non-stock, non-profit organization established in 1969 in cooperation with the PDC and 64 charter members (representatives of different companies and individuals). The group laid down the groundwork for setting up a quality-control organization that can serve as a catalyst for action in the application of quality management. The PSQ aims to promote quality awareness and practices in both the private and public sectors through seminars, conferences, publications, and awareness campaigns; promote the development of

members in quality leadership and technology; advocate total quality management and recognition of outstanding quality companies as a way of institutionalizing quality; and link with international organizations for updates in recent trends and latest technologies ([www.psq.org.ph/PSQ\\_about.html](http://www.psq.org.ph/PSQ_about.html)).

*Philippine Quality and Productivity Movement (PQPM)*

The PQPM was organized following the First National Productivity Congress, with the DAP-PDC serving initially as its technical secretariat. Incorporated in May 1986 as the Philippine Productivity Movement, it was renamed Philippine Quality and Productivity Movement in 1994. It is a non-stock and non-profit corporation with chapters in key regions advocating for a sustained productivity program involving all economic sectors. It serves as the organizational network base for quality and productivity movement of its various chapters in the country.



---

# SINGAPORE

LOW HOCK MENG

**Executive Director**

Singapore Productivity Association

SHARON CHANG

**Deputy Director (Research)**

Singapore National Arts Council

---

## INTRODUCTION

Singapore is an island nation situated in the heart of Southeast Asia between Malaysia and Indonesia. With an area of just 715.8 sq km, it is home to 5.31 million people, who in 2012, enjoyed a per capita GDP of SGD65,048 (USD52,051). Its major industries of electronics, chemicals, financial services, oil drilling equipment, petroleum refining, rubber processing and products, processed food and beverages, ship repair, offshore platform construction, life sciences, and entrepot trade contributed to a GDP of SGD345.6 billion (USD276.5 billion) in 2012. Approximately 95.9% of the population above 15 years of age can read and write, with nine out of every 10 households owning their own homes. The IT infrastructure is also well-developed - a boon to individuals, households, and corporations.

### **National Development and Productivity**

The development of productivity is not an isolated exercise. It is done in conjunction and in support of the economic development strategy of the country. In the case of Singapore, its formal Productivity Movement was launched only in 1981, but even before that, in the 1970s, for instance, the nascent efforts to raise productivity at the shopfloor and middle management levels were key to the success of Singapore's first industrialization drive. The next few paragraphs trace the key challenges in the respective stages of Singapore's economic development - the labor-driven, investment-driven, and innovation-driven phases - and elaborate on some of the national strategies and key productivity plans that were implemented in response to these challenges.

### **Labor-driven Phase**

In this stage of development, industrialization initiatives had taken flight and provided jobs for Singaporeans, and this increased employment, which drove Singapore's economic growth.

#### *1960–1964*

Singapore is a small country with no natural resources, apart from its people. In 1960, the population numbered 1.6 million, but was growing rapidly. Economically, it was highly dependent on entrepot trade and the provision of services to British military bases in Singapore. The domestic manufacturing base was tiny and there was little industrial know-how and domestic capital.

To address the increasing problem of unemployment and reduce its dependence on entrepot trade, Singapore decided to embark on industrialization via import substitution. To implement this, several public agencies were established to spearhead the attraction of foreign direct investment (FDI), promote tourism as well as develop industrial estates.

#### *1965–1978*

Post-independent Singapore faced a number of urgent economic challenges. The loss of opportunity to have Malaysia as hinterland and potential market meant that import-substitution was no longer viable. Political difficulties with Indonesia threatened Singapore's traditional role as a major trading post for the region. Unemployment fears loomed larger with the planned withdrawal of British bases, which employed around 40,000 workers in 1970.

To meet these challenges, Singapore switched to an export-oriented industrialization strategy,

attracting inward foreign investments to develop its manufacturing and financial sectors. Recognizing the importance of a stable and cooperative industrial relations climate for both foreign investors and Singaporeans alike, the Employment Act was enacted to lay down standards of employment to help resolve industrial disputes, and the National Trades Union Congress and National Wages Council were set up to promote better labor-management relations.

An important success factor in Singapore's industrialization efforts was tripartism. Keenly aware that its smallness posed a huge disadvantage when it had to compete against larger and more resource-rich economies, Singapore emphasized from very early on that "all partners in the industrialization program - workers, employers, and government - must pool their efforts and strive for a continuing increase in productivity and output in all enterprises". Since then, there has been a continuous and united push for greater efficiency and effectiveness.

### **Investment-driven Phase**

In this stage of development, a reorientation of industrialization strategy toward higher value-added economic activities drove larger investments in capital, and these underpinned economic growth.

#### *1979–1985*

As industrialization took off, the labor market tightened and exerted upward pressure on wages. Developing countries in the region with larger labor forces emerged as strong contenders for investments. There was a need to restructure the economy toward higher value-added activities.

Successful economic restructuring hinged on having a workforce with the requisite skills. There was thus renewed emphasis on manpower development through education and training. At the micro or industry level, government incentives were provided to companies to boost automation, mechanization, and computerization.

#### *1986–1997*

In 1985, Singapore's first recession in two decades sparked an urgent relook at its economic strategies. Several challenges were identified: the inevitability of slower growth rates associated with a more mature economy; resource constraints and faster rising costs; more intense competition from both developed and developing countries; and a relatively low technology base. The necessary economic response to these challenges was to deepen its technology base, develop industrial clusters, promote both manufacturing and services as twin pillars of the economy, and to seek economic opportunities in the fast-rising Asian markets.

Productivity programs took on new importance as these were seen to be key to enhancing the synergy between labor and capital. New technology and new industrial clusters needed workers with the right skills. In addition to boosting factory floor and manufacturing efficiency, there was now a need to enhance service-sector productivity.

### **Innovation-driven Phase**

The development in this stage saw economic growth and sustainability being dependent on Singapore's ability to develop its skills, technology base, and innovative capacity to make and deliver knowledge-intensive products and services.

#### *1998 to Present*

The economic climates of the late 20th and 21st centuries were characterized by unpredictability and competitive intensity at unprecedented levels. Change was constant and rapid. With globalization, demand and supply shocks in one country quickly rippled outwards to the region and the rest of the world. This was clearly demonstrated through the Asian financial crisis of 1997, which began with the devaluation of the Thai Baht, the terrorist attack on 11 September 2001, the SARS epidemic, the global financial crisis of 2008, and the Eurozone crisis.

To survive and thrive in such an environment, it is imperative to transform into a knowledge-based, innovation-driven economy. In particular, Singapore aimed to enhance its economic resilience through boosting entrepreneurship and even further economic diversification. In 2010, strategies identified by the Economic Strategies Committee were: growing through skills and innovation, anchoring Singapore as a Global-Asia Hub, building a vibrant and diverse corporate ecosystem, making innovation pervasive and strengthening the commercialization of R&D, becoming a smart-energy economy, enhancing land productivity, and building a distinctive global city. Singapore's various economic development phases and the guidance provided through various economic and productivity development plans are summarized in Appendix A.

### PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

Annually, between 1970 to 2010, Singapore's GDP grew at an average of 7.4% and labor productivity at 3.2%. Although total factor productivity (TFP) improved over this period, it was a marginal 0.5% average annual growth. Compared to other newly-industrialized economies such as Hong Kong, Republic of Korea (ROK), and Republic of China (ROC), TFP growth accounted for a much lower share of economic growth. Table 1 provides a summary of the average annual growth of GDP, TFP, and Labor Productivity.

A salient feature of this period is that the main source of economic growth for Singapore was

capital deepening (67%), in particular the increase in non-IT capital stock (Figure 1).

Data on multifactor productivity from the Singapore Department of Statistics showed that it was large increases in employment and capital stock that drove output growth from 1973–85. With little systematic effort dedicated to enhancing the synergy between labor and capital investments, TFP declined at an average of 0.5% every year during the period of 1973–80. This was consistent with the APO data, which showed that TFP notched its largest decline in the period of 1970–75 (-2.2%).

The launch of Singapore's Productivity Movement in 1981 had an almost immediate effect. TFP growth rebounded to an average of 1.8% per year in the 1980s and 0.9% in the 1990s. TFP recorded its strongest performance in the period of 1985–95, growing at a strong 3.1% per year (2.6% based on APO data). However, increases in factor inputs dominated economic growth from 1995–2000, with TFP declining by 0.5%. Fortunately, with renewed effort to boost productivity and take advantage of globalization and the huge advances in information and communication technologies, TFP growth recovered to a relatively strong 1.3% average per year in the first decade of the 21st century.

According to APO data, the contribution of IT capital had more than doubled between the two periods, rising from 3% between 1970–85 to 8% between 1985–95, and continued to rise to 12% during the period of 1995–2008. Investments in IT capital were prerequisites to benefiting from the advancements in information and communication technology. Hence, the rising

Table 1. Average Annual Growth of GDP, TFP, and Labor Productivity from 1974–2010

Factor	1974–80	1981–90	1991–2000	2001–10	1974–2010
GDP	7.89	7.41	7.25	6.37	7.00
TFP	-0.08	1.76	0.95	2.13	1.09
Labor Productivity	3.35	3.37	3.33	2.04	2.98

Source: i. GDP and TFP computed from Singapore Department of Statistics data  
 ii. Labor Productivity from Nomura and Amano [1]

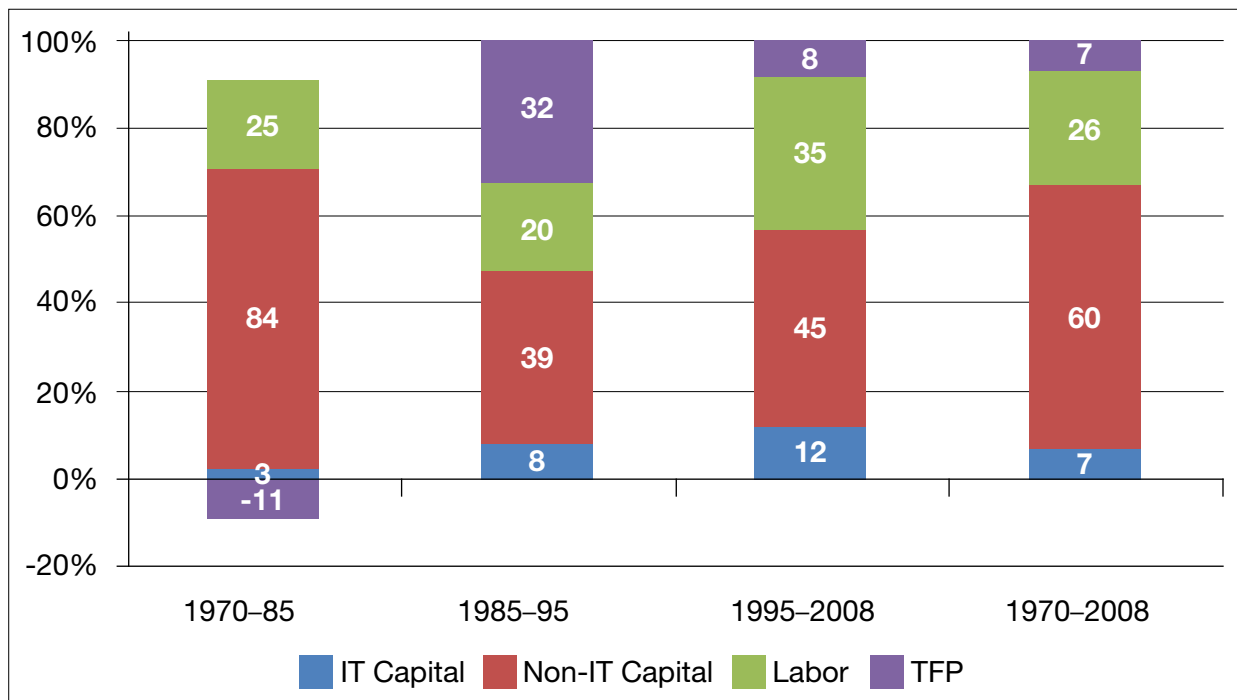


Figure 1. Contribution Share of Economic Growth  
Source: APO [2]

contribution from IT capital deepening augurs well for future economic growth.

The positive impact of IT capital was reinforced in a study by the Monetary Authority of Singapore

(MAS) [3]. The study considered the impact of ICT - investments in computer hardware, computer software, and telecommunication equipment - on economic growth. These investments directly impacted economic

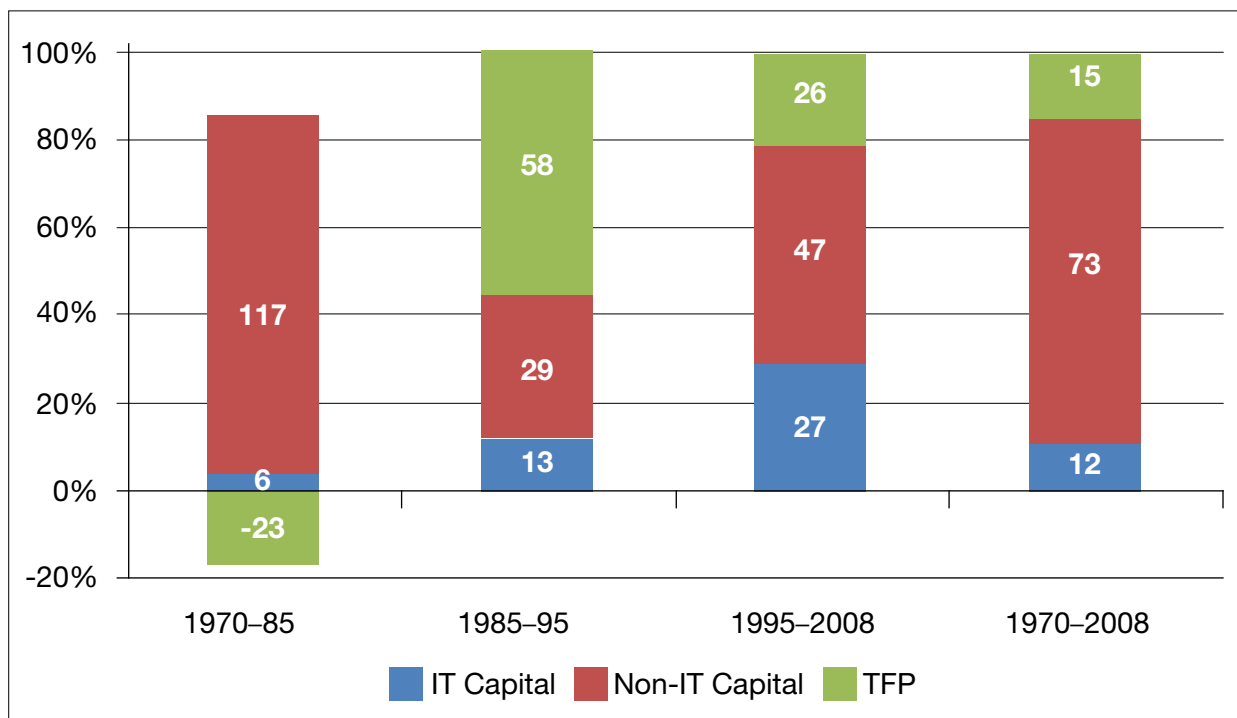


Figure 2. Contribution Share of Labor Productivity Growth  
Source: APO [2]

growth in three ways. First, it added to the capital stock that was available for workers and thus raised labor productivity. Second, the ICT-producing sector itself was a source of growth, largely due to rapid growth in the market for ICT products and technological advances inherent in this sector that continuously raised its productivity. Third, the use of ICT enhanced TFP by increasing firms' efficiency in combining labor and capital inputs. It was found that ICT capital share of GDP growth was relatively constant for the period of 1990–2009 at about 13%. Although this contribution from ICT capital was high compared to the rest of developing Asia, it still lagged behind other industrialized countries. The G7 countries, for instance, saw ICT capital account for an average of 22% of GDP growth for the same period.

Contributions by labor declined from 25% (1970–85) to 20% (1985–95), but rose to 35% in the next period (1995–2008), as another period of input growth was driven by the commencement of economic structuring.

From APO data, labor productivity grew at an average of 3.2% a year for the period of 1970–2010. TFP growth was recorded at 0.5% a year in the same period, contributing some 17% of labor productivity improvements, less than half the contributions seen in ROK, ROC, and Hong Kong. Analysis by subperiods showed a downward secular trend: labor productivity growth was highest at 4.5% in 1970–75. It held steady at 3.8% average annual growth for a decade and a half (1985–2000), but has since slowed down significantly, first to 2.7% in 2000–05, and then to a marginal 1.1% a year from 2005–10.

This trend was consistent with MAS' data, which showed that labor productivity in the 1990s and 2000s grew by a respective 3.4% and 1.1% per year. MAS suggested that this decline in labor productivity growth can be attributed to a deceleration in capital deepening and a moderation in TFP growth (from 0.9% to 0.2%). Notwithstanding the deceleration, the study concluded that the capital deepening

undertaken had helped to mitigate the slowdown in productivity growth.

## **FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES**

The following discussion considers the impact of factors such as quality of human capital (as measured by years of schooling), innovation and technology transfer (as measured by share of R&D in GDP and openness of economy) as well as initial conditions such as health or population (measured by life expectancy), catch-up factor (measured by GDP of Singapore relative to US GDP), and population size. In Model 1, the dependent variable was labor productivity growth, and in Model 2, TFP growth.

In general, for both the models, significant determinants of labor productivity and TFP growth were R&D expenditure share, life expectancy, and population size. The following discusses the implications of the findings from the empirical studies.

### **Human Capital**

The quality of labor force in Singapore was characterized by two general trends: first, Singapore saw an inflow of better educated younger workers into the labor force (see Table 2), and second, there was continual upgrading of older workers to meet the requirements of the new economy.

The human capital variable used in both models was average years of schooling of the population. No significant effect was found and there were two possible reasons for this. For one, while schooling may have enhanced labor productivity, it may not have increased the labor productivity growth rate. For the other, although the general schooling (i.e., literacy, numeracy) profile had improved, considering that Singapore's main industries were high value-added manufacturing and financial services, the competencies imparted at school level may not have been sufficient to raise the rate of labor productivity change.

### Model 1 (Labor Productivity Growth Determinants)

$$L'P = \alpha + \beta_S School + \beta_R(R\&D \text{ expenditure}) + \beta_O Openness + \beta_L(Life \text{ expectancy}) + \beta_Y(Relative \text{ GDP}) + \beta_P(Population \text{ size})$$

Independent Variable		Model 1	Model 2	Model 3
<b>Human Capital Quality</b>				
school	Average years of schooling	0.044 (0.027)	- -	0.032 (0.051)
<b>Innovation/Technology Transfer</b>				
rdexpsh	R&D expenditure as share of GDP	-0.106** (0.039)	- -	-0.126** (0.058)
open	Openness of economy	0.159 (0.183)	-0.302 (0.214)	-0.304 (0.234)
<b>Initial Conditions</b>				
lifeexp	Life expectancy at birth	- -	0.029* (0.014)	0.034 (0.022)
lny_us	GDP per capita relative to USA level	- -	0.085 (0.068)	-0.102 (0.092)
lnpop	Log of population	- -	-0.364** (0.162)	- -
_cons		-0.176** (0.136)	0.468 (0.593)	-2.148 (1.431)
Observations		33	29	28
Adj R <sup>2</sup>		0.19	0.10	0.09
Durbin Watson		1.78	1.81	2.07

It was noted, however, that Bartel and Lichtenberg [4] had postulated that the ability to implement and absorb new technologies do increase with general education.

#### Innovation and Technological Transfer

The variable used to capture the impact of innovation and technological change on productivity growth was the share of R&D expenditure in GDP. A significantly negative impact from R&D share in both the models was found. This may be because there was generally a lag before R&D investments showed up in national growth and productivity data. For example, it takes time for basic research to be commercialized, and in turn, increase sectoral value-added.

An institutional factor that contributes to innovation is the openness of the economy.

Other studies have posited and shown that openness enhances TFP and TFP growth by facilitating:

- i. Transfer of technology, e.g., through high value-added or high-technology imports
- ii. Transfer of managerial and technical know-how, e.g., from the ease with which more experienced foreign personnel are able to work in Singapore
- iii. Creation of competition and spurring entrepreneurship when foreign talent move across national boundaries

The impact of several openness variables was investigated. However, none of these had a significant effect on productivity. There were several reasons for the lack of significant results.

## Model 2 (TFP Growth Determinants)

$TFP = \alpha + \beta_S \text{School} + \beta_R (\text{R\&D expenditure}) + \beta_O \text{Openness} + \beta_L (\text{Life expectancy}) + \beta_{PC} (\text{Per capita income})$

Independent Variable		Model 1	Model 2	Model 3	Model 4
<b>Human Capital Quality</b>					
school	Average years of schooling	0.059 (0.099)	0.038 (0.058)	0.027 (0.060)	0.038 (0.058)
<b>Innovation/Technology Transfer</b>					
rdexpsh	R&D expenditure as share of GDP	-0.174** (0.083)	-0.165** (0.059)	-0.159** (0.059)	-0.170*** (0.059)
lopen	Log openness of economy	0.037 (0.069)	0.083 (0.065)	0.089 (0.063)	- -
msh	Import-GDP ratio	- -	- -	- -	0.041 (0.065)
<b>Initial Conditions</b>					
lifeexp	Life expectancy at birth	0.045** (0.019)	0.039** (0.018)	- -	0.041** (0.017)
ln_life		- -	- -	3.118** (1.399)	- -
lny_us	GDP per capita relative to US level	- -	-0.154 (0.093)	-0.143 (0.093)	-0.157 (0.094)
lgnipc	Income per capita	-0.119 (0.117)	- -	- -	- -
_cons		-2.615** (1.189)	-2.830** (1.037)	-13.393** (5.68)	-2.565** (1.101)
Observations		24	24	24	28
Adj R <sup>2</sup>		0.22	0.27	0.28	0.27
Durbin Watson		2.28	2.53	2.53	2.51

First was the composition of Singapore trade. As Singapore has limited natural resources of its own and imports almost all its food, resources, and intermediate inputs, the imports of these other goods may have masked the effects of high-tech imports.

In addition, the trade variable covered all goods. The literature suggested that it would be more useful to consider the impact of specific imports on TFP growth such as high-tech import, capital, or intermediate inputs [5–7]. Isaksson and Ng [8] concluded that “trade openness as a policy is important, but in terms of outcome, it is imports that matter for TFP”. A

positive impact on TFP from imports can also be interpreted as a validation of Singapore's technological absorptive capacity. Without the requisite competencies in science and technology as well as institutional quality, the country would not have been able to assimilate advanced knowledge.

### Institutions

In addition to openness, other investigated institutional factors were life expectancy, governance, and the capacity for catch-up working through two channels - the gap from the USA as the benchmark as well as the initial level of affluence in Singapore.

Table 2. Educational Attainment from 1950–2010

Year	No Schooling	Highest Level Attained						% of Population That Were Educated	Average Years of Total Schooling	Average Years of Primary Schooling	Average Years of Secondary Schooling	Average Years of Tertiary Schooling	Population (1000s)
		Primary		Secondary		Tertiary							
		Total	Completed	Total	Completed	Total	Completed						
(% of population aged 15 and over)													
1950	61.1	23.0	8.0	15.0	4.3	1.0	0.5	39.0	2.657	1.886	0.741	0.030	609
1955	56.1	25.1	9.0	17.7	5.4	1.1	0.6	43.9	3.072	2.152	0.886	0.035	766
1960	49.4	27.1	10.0	21.8	6.9	1.5	0.8	50.5	3.669	2.518	1.104	0.047	928
1965	43.0	28.3	11.0	26.7	8.7	2.0	1.0	57.0	4.319	2.899	1.360	0.061	1,059
1970	34.3	29.6	12.3	34.2	11.3	1.9	1.0	65.7	5.188	3.421	1.709	0.058	1,271
1975	32.4	36.2	16.2	28.7	9.2	2.7	1.3	67.6	5.025	3.454	1.493	0.079	1,522
1980	29.8	38.5	18.4	28.4	10.5	3.2	1.6	70.1	5.244	3.606	1.541	0.097	1,762
1985	19.5	45.1	22.4	31.9	11.5	3.4	1.9	80.4	5.966	4.148	1.713	0.106	2,052
1990	10.2	49.7	26.0	36.7	9.5	3.3	1.8	89.7	6.632	4.672	1.857	0.103	2,368
1995	9.5	43.3	23.2	38.6	11.2	8.5	5.0	90.4	7.371	4.824	2.278	0.270	2,700
2000	9.1	37.0	20.3	40.4	13.6	13.5	8.0	90.9	8.076	4.952	2.696	0.428	3,141
2005	8.5	35.6	20.1	38.7	16.0	17.2	10.2	91.5	8.471	5.023	2.899	0.548	3,482
2010	8.2	27.2	15.8	46.3	22.3	18.3	10.7	91.8	9.138	5.165	3.393	0.580	3,872

### Life Expectancy

This is a proxy for the general health of the population, the effects of which are expected, *a priori*, to be positive, i.e., healthier workers are more efficient and productive. In our regressions, life expectancy at birth had a positive and significant effect on TFP growth. In other words, the improving level of health in Singapore facilitated higher productivity and lower health care costs and absenteeism. Moreover, TFP growth was expected to increase when more workers were able to work beyond current retirement rates, since their experience and tacit knowledge were retained in the workforce.

### Governance

This is important as it facilitates innovation and enterprise as well as foreign investment, which gives further impetus to innovation. The variable used was obtained from the World Development Index comprising measures of government stability, corruption, law and order, and bureaucracy quality. Although the variable was tested, it was not significant, most likely because the time series was too short to be able to draw conclusive implications.

For developing and newly-developed countries, another channel of productivity growth is the convergence process, or the “catch-up factor”. The variable used to capture this is the logarithm of the country's per capita GDP

relative to that of the USA [9]). While Park [10] found a significant negative impact from such catch-up factor, this study found no effect at all. The reason could be while this variable had a good explanatory power in explaining cross-country convergence, it did not play a role in individual-country time-series regressions.

The country's initial level of affluence (as measured by gross national income per capita) had no effect on TFP growth. This may have indicated that in the knowledge century, natural endowment may matter increasingly less in promoting technological progress and eventually economic growth.

## PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

Even before the Singapore Productivity Movement was launched in 1981, productivity was already a watchword. The following highlights organizations and programs that played key roles in each phase of Singapore's development.

### Labor-driven Phase

#### 1965–1981

Amid the political uncertainties of the early 1960s, the National Trades Union Congress, employers, and the government signed a Charter for Industrial Progress and a Productivity Code of Practice in 1965. This was a joint



declaration by employer groups and unions to work together to increase productivity under a Productivity Code of Practice.

This was followed by the establishment of the Singapore Productivity Centre to promote productivity in Singapore. The center, a component unit set up within the Economic Development Board, was established in 1967, and its focus was to provide training and management consultancy to Singapore's newly industrializing sectors and guidance on industrial relations. It was during this period that Singapore became a member of the Asian Productivity Organization (APO) in 1969.

In 1972, the center was upgraded to a full-fledged statutory board, the National Productivity Board (NPB), reflecting the increasing need to devote more time, dedication, and higher level guidance and resources to drive productivity. In addition to its original functions, NPB also introduced Productivity Councils and Low Cost Automation to aid industries.

### Investment-driven Phase

#### 1981–1999

In September 1981, a new milestone was set when the then prime minister, Lee Kuan Yew, launched the Singapore Productivity Movement.

Going into the 1980s, there was an increasing realization that the new economic environment demanded not just diligence, but also skillful workers. So taking a leaf from Japan's book, Singapore's Productivity Movement was born in 1981 to focus on the human aspects of productivity.

Leading the transformation was a Committee on Productivity, which was formed by Lee Kuan Yew in 1981, to examine issues on improving productivity, work attitudes, and labor management relations. The following key initiatives were recommended by the committee to develop productivity:

- i. Educate the public on the productivity imperative
- ii. Disseminate productivity information and conduct training
- iii. Strengthen company identification
- iv. Promote labor-management joint consultation
- v. Promote productivity in the public sector; as the single biggest employer, the public sector can play a lead role and be a model in productivity
- vi. Form a National Productivity Council to review productivity efforts and outline future productivity strategies on an annual basis. This Council enjoys high-level representation from the government, employer groups, unions, and academia

Over the next two decades, with the guidance of the National Productivity Council, the NPB as the national productivity organization actively pursued the following activities:

- i. Training and Management Consultancy - the NPB provided direct assistance through specific schemes and training programs to improve productivity at the workplace
- ii. Collaboration on National Training Programs - A number of training initiatives were established in collaboration with industry leaders: customer service (with Singapore



**"Productivity will come the day we get it into everybody's head that he has a critical contribution..."**

**...It's got to do with self-respect, it's got to do with co-operation between workers, and between worker and manager on the same side."**

**Then Prime Minister Lee Kuan Yew  
1981 National Day Rally**

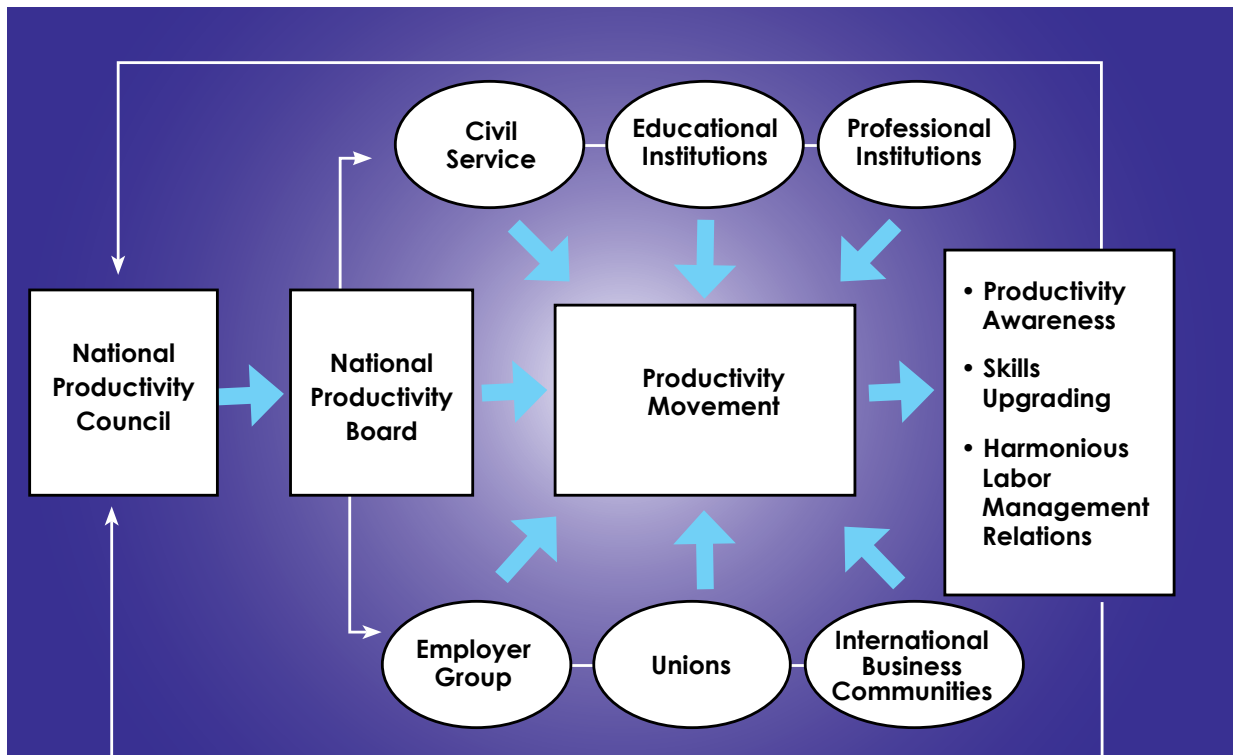


Figure 3. Framework of the Singapore Productivity Movement

Airlines), industrial engineering (with Philips Singapore), and on-the-job training systems (with Seiko Instruments)

iii. Administration of the Skills Development Fund - The Skills Development Fund (SDF) was established in October 1979 with the setting up of the Skills Development Levy Act with the primary objective of encouraging employers to invest in skills upgrading of the workforce

iv. Quality Circles - Innovation through teams have been a part of the Singapore Productivity Movement since Quality Control Circles or QCCs were nationally introduced by the NPB in the 1980s. This evolved into a Team Excellence program under the stewardship of the Singapore Productivity Association (SPA) in 2007

v. Productivity Promotion - The main objective was to promote productivity awareness among companies and the workforce, and to help them understand the meaning of productivity and its benefits. Channels for

disseminating the productivity message included an annual productivity campaign, media and press publicity, the widespread dissemination of promotional materials, recognition of excellence in productivity through the conferment of productivity awards to companies and individuals, and learning events such as productivity conferences. The annual productivity messages were thematic and emphasized the various aspects of productivity. The major productivity campaign themes during these two decades are summarized in Appendix B

Within two decades, some of the milestones and achievements included:

- In 1990, 90% of workers were able to relate productivity correctly compared to 40% in 1986.
- In 1990, 90% of the workforce took action to improve productivity compared to 54% in 1986.
- In 1995, participation of the workforce in Quality Circles (QC) increased to 8.5%

(134,000) compared to 0.4% (4,600) in 1983. Savings reported from QCs in 1995 was SGD131 million.

- The number of training places supported by the Skills Development Fund increased from 32,600 in 1981 to 461,700 in 2001.
- In the same period, companies spent an average 3.6% of payroll on training in 1995, doubling from 1.8% in 1988.

In the second half of the 1990s, three major developments ensued. First was the inculcation of management systems as a key factor driving productivity. Another was the amalgamation of quality with productivity, and the third was the development of a second productivity plan to support economic development.

On management systems, it was found that the world's most competitive enterprises were those that invested in and exploited superior technology, and also possessed management and organizational capabilities that brought technology and manpower together into synergistic collaborations within the enterprise. To this end, the Singapore Quality Award framework was launched in 1994 and promoted as a universal model for business excellence in Singapore. A total of eight organizations received this pinnacle award for business excellence before the decade came to an end.

The amalgamation of productivity and quality saw the merger of two agencies in April 1996 - the NPB and the Singapore Institute for Standards and Industrial Research. The new entity was called the Singapore Productivity and Standards Board (PSB). As a statutory board under the Ministry of Trade and Industry, its mission was to raise productivity so as to enhance Singapore's competitiveness and economic growth for a better quality of life for her people.

The PSB aimed to do this by developing world-class industries and creating a favorable environment for productivity improvement and innovation. Its areas of focus were small- and medium-sized enterprises (SMEs), productivity

and innovation, and standardization and metrology. It continued the work of NPB, its predecessor agency, to spearhead the national productivity movement and the annual productivity campaign to promote the productivity message.

A key initiative undertaken by the PSB was the formulation of the Productivity 2000 (P2000) Action Plan. P2000 was the second productivity plan and was developed to strengthen Singapore's business competitiveness by focusing on five areas: positive work attitudes, skills upgrading, labor-management cooperation, progressive management practices, and effective use of manpower.

#### *APO Activities*

Singapore's participation in APO activities intensified in the 1990s. Singapore-based participants were sent to attend programs organized by national productivity organizations (NPOs) within the APO region; APO programs were hosted in Singapore, APO overseas study missions were organized, and bilateral cooperation was undertaken through the deployment of NPO staff and APO technical experts.

In addition, Singapore provided expertise and assistance in a number of special programs for the APO, namely in running programs for South-South Cooperation, Green Productivity, and the Development of Productivity Specialists. Technical experts from Singapore were also sent to assist in APO programs throughout the APO region and with external collaboration partners, for example, the Pan-African Productivity Association.

#### **Innovation-driven Phase**

##### *2000 to the Present*

In April 2002, the PSB was renamed SPRING (Standards, Productivity and Innovation for Growth) Singapore to signify the shift toward an innovation-driven economy, and therefore, reiterate its new role in promoting creativity to sustain growth for Singaporeans.

A Productivity Action Plan for the 21st Century or ProAct 21 was developed in support of the economic development plans by the Committee on Singapore's Competitiveness (CSC). CSC recommended that measures to drive business competitiveness were critical in making Singapore an advanced and globally competitive knowledge economy.

ProAct 21 was the third productivity plan and aimed to guide the implementation of productivity strategies in Singapore in the first decade of the 21st century. Its vision was to develop Singapore into a knowledge-based economy deriving its competitive edge from productivity. There were three outcomes focused respectively on People, Business, and Innovation. ProAct 21 aimed to achieve the outcomes through eight strategies (Appendix C).

The multiple shocks that threatened global economic development, starting with the financial crisis of 1997, the terrorist attack 11 September 2001, the SARS epidemic, the global financial crisis of 2008, natural disasters (e.g., Japan earthquake and tsunami in March 2011), and now the Eurozone crisis, form the backdrop of developmental challenges in the 12 years since 2000.

GDP growth for the first decade of the 21st century averaged 5.5%, but a large part of this was achieved by the expansion of both the domestic and foreign workforce. To sustain this, an Economic Strategies' Committee (ESC) was set up in 2009 to study the long-term economic transformation of Singapore. One critical finding by the ESC was Singapore's lagging productivity, which spurred the country to redouble its efforts to boost productivity. The ESC recommended setting a medium-term productivity goal of 2%–3% average annual growth in order to underpin GDP growth of 3%–5% over 10 years [11].

In order to achieve this, the ESC identified several key productivity strategies [12]:

- i. Establish a national council to drive productivity and continuing education and training
- ii. Provide incentives to catalyze and sustain productivity transformation in enterprise and industry
- iii. Develop a knowledge base and train personnel to implement productivity improvements

A National Productivity and Continuing Education Council (NPCEC), currently chaired by Singapore's deputy prime minister was established to galvanize the nation to step up its efforts to boost skills and enterprise productivity, and develop a comprehensive system for continuing education and training. NPCEC has representatives from the government, business community, and labor movement. It oversees the work of the different government agencies and promotes close collaboration among the business sectors, workers and unions, and the public sector. Identified for priority assistance are 16 sectors:

- 1. Construction
- 2. Electronics
- 3. Precision Engineering
- 4. Transport Engineering
- 5. General Manufacturing
- 6. Retail
- 7. Food and Beverage
- 8. Hotels
- 9. Health care
- 10. Info-comm
- 11. Logistics and Storage
- 12. Administration and Support Services
- 13. Financial Services
- 14. Accountancy
- 15. Social Services
- 16. Process Construction and Maintenance

Together, these 16 sectors constitute 55% of Singapore's GDP and 60% of employment in Singapore.

A sector-based approach was adopted. Recognizing that each sector would have, *inter alia*, very different cost structures, technological adoption capacity and pace of potential growth. Customized blueprints were developed by the stakeholders in each sector.

The blueprints were intended to help enterprises expand their markets, raise innovation capacity, and improve their products and processes. These common threads within the blueprints highlighted the key drivers of productivity:

- i. Measurement systems and benchmarks - identifying gaps, measuring productivity, and learning from the best practices
- ii. Innovation and process improvements - the objective is to work smarter, which means to work more efficiently, more effectively, and more innovatively. Technology, and Training and Consultancy would be key levers to facilitate innovation in new products, services, and processes
- iii. Mechanization, automation, and use of technology - harnessing these to find new and innovative ways to make products and deliver services
- iv. Optimization of manpower - aligning human capital investments to innovation, mechanization, automation, and technology

Besides being Singapore's national productivity organization, SPRING Singapore is also the lead agency for a number of these sectors, e.g., retail, food and beverage services (restaurants), and food manufacturing.

#### *APO Activities*

Singapore's support of APO activities continued apace. In 2009, Singapore was appointed the first Center of Excellence for Business Excellence. Over the next three years, Singapore hosted activities and programs to share its expertise in Business Excellence with

APO members. The 3rd Business Excellence Global Conference was held in October 2011, participated by some 600 delegates, including some 200 foreign delegates (APO members included).

#### **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

In a globally-connected world, Singapore, like small open economies, has become even more vulnerable to external demand. In particular, its reliance on imported labor was another key productivity challenge confronting Singapore. Although productivity has long been a top priority in Singapore, it was still focused on employment expansion, which had driven economic growth in the past decade. Singapore must, thus, step up its drive to seek productivity enhancement at all levels - national, sectoral, and enterprise - in order to stay competitive, upgrade the quality of jobs, and raise people's incomes.

At the national level, it requires a constant search for new strategies and initiatives in skill enhancement, economic restructuring as well as technological progress. At the sectoral level, it has been recognized that each sector has unique challenges, requiring customized productivity blueprints. While these blueprints may include plans for new measurement systems and benchmarks as well as initiatives to raise process efficiency through the use of work redesign, innovation, mechanization, automation, and technology, the challenge is to translate these from concept to reality, from consultancy advice to practical implementation.

At the enterprise level, it is imperative that every enterprise pay serious attention to how it can innovate to create more value in its products and services, and maximize the potential and performance of every worker. It is often the case that in good times, companies can afford to hire, and so productivity becomes a low priority, making inculcating a productivity mindset even more challenging.

In economically challenging times, companies are then wont to slash training budgets, which may mean that when the economy recovers, workers are not ready to take advantage of new opportunities, given their lack of skills upgrading.

Where once productivity was seen as a marathon requiring a country to have the necessary stamina to keep improving it, the most apt analogy for productivity in the 21st century and beyond is that it is an unending pentathlon. In other words, not only do countries require perseverance in their bid to sustain productivity growth, they also require flexibility and a range of different skills to seize new opportunities.

Underpinning a country's ability to design new productivity strategies is the capacity of its productivity champion to measure the progress and impact of productivity initiatives. This helps countries to know which programs to reinforce and which to drop. In a world often described as one where the only constant is change, investments in measurement methodology and research studies for different sectors and enterprises at different stages have never been more important.

## ENDNOTES

- 1 Total trade-GDP ratio, FDI-GDP ratio, Sachs-Warner Index (covering tariff rates, non-tariff barriers, black market exchange rates, state control over major exports and socialist economic systems) as well as an openness variable from the Penn World Tables.

## REFERENCES

- [1] Nomura K., Amano T. Labor productivity and quality change in Singapore: Achievements in 1974–2011 and prospects for the next two decades. Discussion paper of Keio Economic Observatory (KEO), Keio University 2012; 1–55.
- [2] APO. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2010.

- [3] Monetary Authority of Singapore. Sources of Singapore's economic growth 1990–2009. *Macroeconomic Review* 2010; 66–81.
- [4] Bartel A.P., Lichtenberg F.R. The comparative advantage of educated workers in implementing new technology. *Review of Economics and Statistics* 1987; 69: 1–11.
- [5] Grossman G.M., Helpman E. *Innovation and Growth in the Global Economy*. Cambridge: MIT Press; 1991.
- [6] Caselli F., Wilson D. Importing technology. *Journal of Monetary Economics* 2004; 51 (1): 1–32.
- [7] Eaton J., Kortum S. Trade in capital goods. *European Economic Review* 2001; 45 (5): 1195–1235.
- [8] Isaksson A., Ng T.H. Determinants of productivity: Cross-country analysis and country case studies. Staff working paper of Research and Statistics Branch, United Nations Industrial Development Organization 2006; 1–17.
- [9] Bosworth B., Collins S. The empirics of growth: An update. *Brookings Papers on Economic Activity* 2003; 2: 113–206.
- [10] Park J. Total factor productivity growth for 12 Asian economies: The past and the future. *Japan and the World Economy* 2012; 24: 114–127.
- [11] Shanmugaratnam T. Singapore Budget 2010 - Budget Speech. [http://www.mof.gov.sg/budget\\_2010/speech\\_toc/pb.html#s1](http://www.mof.gov.sg/budget_2010/speech_toc/pb.html#s1), accessed on 4 September 2013.
- [12] Ministry of Finance. Report of the Economic Strategies Committee 2010. <http://app.mof.gov.sg/esc.aspx>.

## APPENDIX A

### Plans for Different Phases of Singapore's Development

Phase	Economic Plan	Productivity Plan
<b>Labour driven</b> 1960-70s	<b>First Development Plan</b> <ul style="list-style-type: none"> <li>• Job creation</li> <li>• Restructuring economy to develop manufacturing base</li> </ul>	—
<b>Investment drive</b> 1st half of 1980s  2nd half: 1980s–1990s	<b>Economic Development Plan for the Eighties</b> <ul style="list-style-type: none"> <li>• Restructuring economy to higher VA activities</li> </ul> <b>Economic Committee Report Strategic Economic Plan</b> <ul style="list-style-type: none"> <li>• Business competitiveness</li> <li>• Singapore as a developed country</li> </ul>	<b>Committee on Productivity Report</b> <ul style="list-style-type: none"> <li>• Attitude, skills, LMR</li> <li>• Productivity Movement</li> </ul> <b>Productivity 2000 Strategic Economic Plan</b> <ul style="list-style-type: none"> <li>• Attitude, skills, LMR</li> <li>• Management practises, use of manpower</li> </ul>
<b>Innovation-driven</b> 2000s	<b>Committee on Singapore's Competitiveness Report</b> <ul style="list-style-type: none"> <li>• Business competitiveness</li> <li>• Singapore as an advanced and globally competitive knowledge economy</li> </ul> <b>Economic Review Committee</b> <ul style="list-style-type: none"> <li>• A globalized, entrepreneurial and diversified economy</li> </ul> <b>Economic Strategies Committee</b> <ul style="list-style-type: none"> <li>• Productivity and Innovation</li> <li>• Continuing Education</li> </ul>	<b>ProAct 21</b> <ul style="list-style-type: none"> <li>• KBE</li> <li>• People, Business, Innovation</li> </ul> <b>National Productivity and Continuing Education Council</b> <ul style="list-style-type: none"> <li>• Automation, Mechanization, Technology</li> <li>• People, Process, Innovation</li> </ul>

#### Notes:

- Singapore's economy has gone through several development phases. Its transitions have been guided by various economic plans. In support of these plans, the Productivity Movement has also formulated long-term productivity plans
- The labor-driven phase of the economic growth: The focus was on generating jobs by building up the country's manufacturing base. There was no particular need for a productivity plan
- The investment-driven phase of the economic growth: A tight labor market and increasing international competition necessitated a shift to higher value-added activities. Job-hopping, low skills, and poor labor-management relations were problems. Hence, the Committee on Productivity Report - the first productivity plan - was published, and the Productivity Movement was launched in September 1981
- Productivity 2000 Action Plan was the second productivity plan intended to help strengthen Singapore's business competitiveness by focusing on five areas: positive work attitudes, skills upgrading, labor-management cooperation, progressive management practices, and effective use of manpower
- The innovation-driven phase of economic growth: The current concern is the transformation of Singapore from an industrial economy to a knowledge-based economy (KBE). To support this, a third productivity plan, ProAct 21, was developed
- National Productivity and Continuing Education Council: Various sectoral plans encouraging improvements and adoption of new and better automation, mechanization, technology, people practices, process, and innovation

APPENDIX B

Productivity Campaign Themes, 1982–2000

PRODUCTIVITY CAMPAIGN SLOGANS

### Awareness Stage (1981-85)



1982  
*Together We Work Better*



1983  
*Come On Singapore - Together We Work Better*



1984  
*Come On Singapore - Let's All Do A Little Bit More*



1985  
*Come On Singapore - Let's All Be The Best We Can Be*

---

### Action Stage (1986-88)



1986  
*Now's The Time... We Must Be The Best We Can Be*



1987  
*Be The Best That We Can Be - Could You Sign Your Work With Pride?*



1988  
*Train Up - Be The Best You Can Be*

### Ownership Stage (1989 onwards)



1989  
*Make "Another Satisfied Customer" Today*



1991-94  
*Quality Work. Quality Life.*



1990  
*100% Right - Another Satisfied Customer*



1995-2000  
*Innovation and Quality*

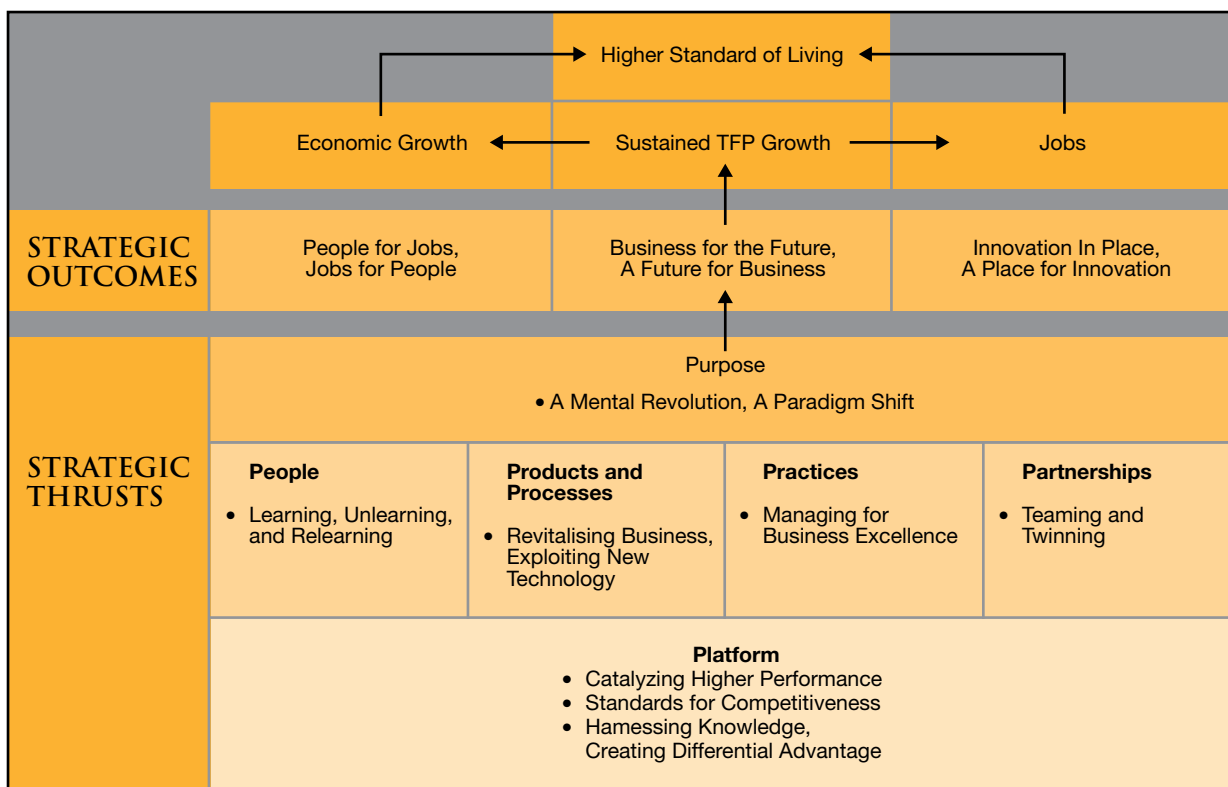
11 15 years of the Productivity Movement

11 15 years of the Productivity Movement



## APPENDIX C

### Vision for ProAct 21



Notes:

#### **A Mental Revolution, A Paradigm Shift**

1. Inculcate a new productivity mindset
2. Impart knowledge of productivity concepts and tools

#### **Learning, Unlearning, and Relearning**

1. Strengthen foundation skills
2. Upgrade technical and managerial skills
3. Develop certification systems to encourage lifelong learning and skills acquisition
4. Align work processes with changes in technology and business configuration

#### **Revitalizing Business, Exploiting New Technology**

1. Strengthen innovation capacity of industries and organizations
2. Facilitate the use of technology to develop niche areas
3. Encourage product excellence

#### **Managing for Business Excellence**

1. Promote a national framework for business excellence

#### **Teaming and Twinning**

1. Facilitate firm-level collaboration for collective competitiveness
2. Adopt an industry-wide approach to raise productivity of specific internationally oriented and domestic industries

#### **Catalyzing Higher Performance**

1. Support the workforce acquisition of higher skills and industry-wide projects to achieve quantum improvements in productivity
2. Provide financing for the growth of local enterprises

#### **Standards for Competitiveness**

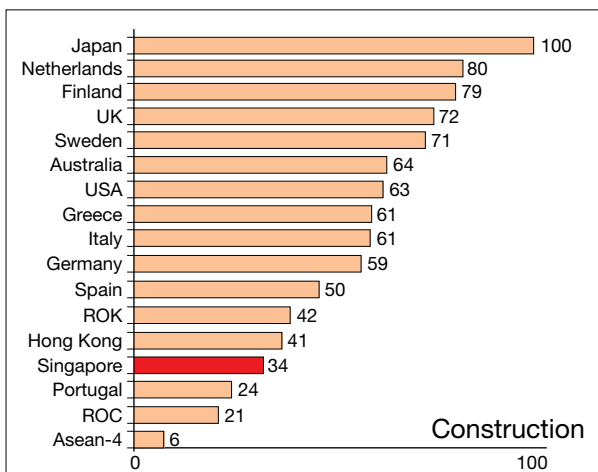
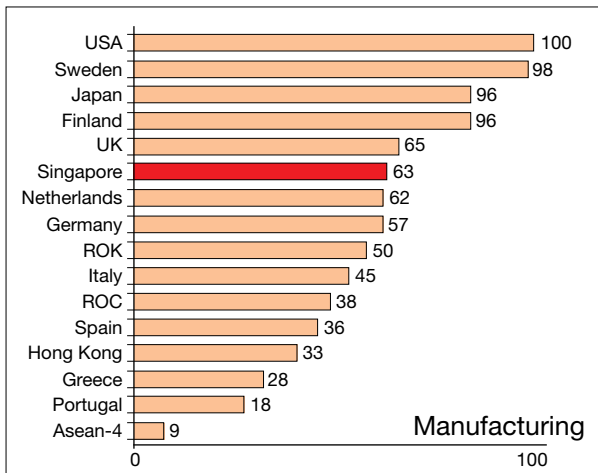
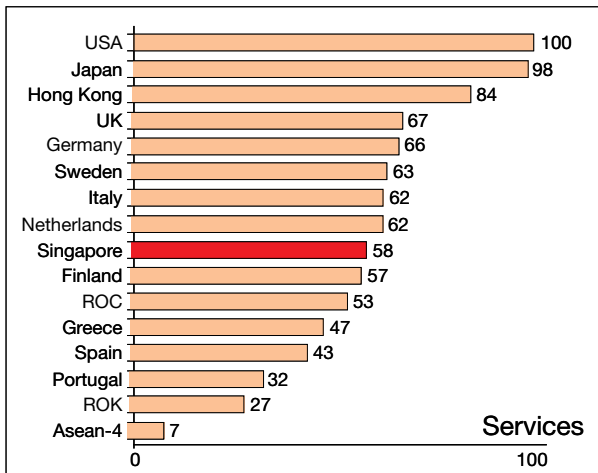
1. Facilitate access to international markets
2. Promote the adoption of standards to raise productivity in various industries

#### **Harnessing Knowledge, Creating Differential Advantage**

1. Spearhead widespread adoption of best practices for business competitiveness

## APPENDIX D

### Cross-Country Productivity Comparisons



“We have **significant room to improve productivity in every sector** of our economy. In absolute levels, Singapore's productivity in manufacturing and services are only 55% to 65% of those in the USA and Japan...

In the retail sector, for example, our average level of productivity is about 75% of that in Hong Kong and one-third that of the USA. In construction, productivity levels are half that of the USA and one-third that of Japan.”

Economic Strategies Committee

Source: ESC Report

Note: The comparisons are for average productivity levels from 2006–08 (based on real GDP data at constant 2000 prices, converted to common currency based on average exchange rates from 1999–2001)

---

# SRI LANKA

D.L. KUMARADASA

**Senior Advisor**

Ministry of Senior Minister's Office  
National Productivity Promotion of Sri Lanka

P.G. JAYASOORIYA

**Retired Additional Director**

Central Bank of Sri Lanka

E.L.K. DISSANAYAKE

**Deputy Director (Admin & HR)**

Telecommunications Regulatory Commission of Sri Lanka  
Budding Labor Economist

---

## INTRODUCTION

Sri Lanka is a lower-middle income economy, which is based largely on services and industrial sectors. The dominant service sector accounts for 59.5% of the GDP and employs 42.8% of the work force [1]. The industrial and agricultural sectors contribute about 29.3% and 11.2%, respectively, to the GDP, while employing about 24.3% and 32.9% of its workforce, respectively.

Foreign trade is an important component of the economy. Major imports include petroleum, food items, motor vehicles, manufactured goods, machinery, capital equipment, etc. Sri Lanka's major exports include garments, tea, rubber, cinnamon, coconut products, gems, and jewelry. The USA is the largest single buyer of Sri Lankan exports (20.3% of total export value), while the UK (10.5%), Italy (5.8%), Belgium (5.4%), India (4.9%), and Germany (4.8%) are among the major buyers.

Sri Lanka encourages foreign investments. Under the Board of Investment, several export processing zones have been established in the country. Sri Lanka has a well developed banking sector, and both local and foreign banks operate in the country.

### Two Eras of Development [2]

Development strategies adopted by the Sri Lankan government from time to time since its independence from Great Britain in 1948 can be identified and segregated into two eras.

The first covers the period of 1948–76 and the second from 1977 onwards. During the first era, the economy was focused on achieving equity and economic growth through import-substitution and encouragement of domestic production. Extensive welfare programs such as food subsidies, provision of free education, and health services were introduced to achieve equity. These programs achieved significant improvements in human development. During this period, the per capita GDP grew only at an average rate of 0.2% per year.

The second era that started in 1977 shifted toward a free market. It liberalized the economy from excessive government controls and promoted the private sector as the engine of growth. Stimulated by enhanced levels of foreign aid and investments, the economy grew at a rate of around 6% per year until 1986, which later decelerated due to ethnic conflict. The cost of the civil war experienced in the past three decades minimized investment in economic infrastructure, human resources, and skills development.

During the years between 2006–08, Sri Lanka achieved a GDP growth rate of around 6%–7% per year. With the end of the civil war in 2009, Sri Lanka became engaged in large-scale reconstruction and development projects that included increasing electricity access and rebuilding roads and rail network. Investment was promoted in the disadvantaged areas, small and medium enterprises were developed

to alleviate poverty especially in the rural areas. However, being adversely affected by the global financial crisis, the Sri Lankan economic growth slowed down to 3% in 2009, which recovered immediately with an average of 7% since 2010.

### The Competitiveness

According to Schwab [3] in the Global Competitiveness Report 2011–2012, Sri Lanka was in transition from a factor-driven stage to an efficiency-driven stage. The radar chart indicates how Sri Lanka compared with the average of other economies in the same transition stage (Figure 1). Accordingly, Sri Lanka had a better score in the areas of health and primary education, higher education, goods market efficiency, financial market development, business sophistication, innovation, institutions and infrastructure.

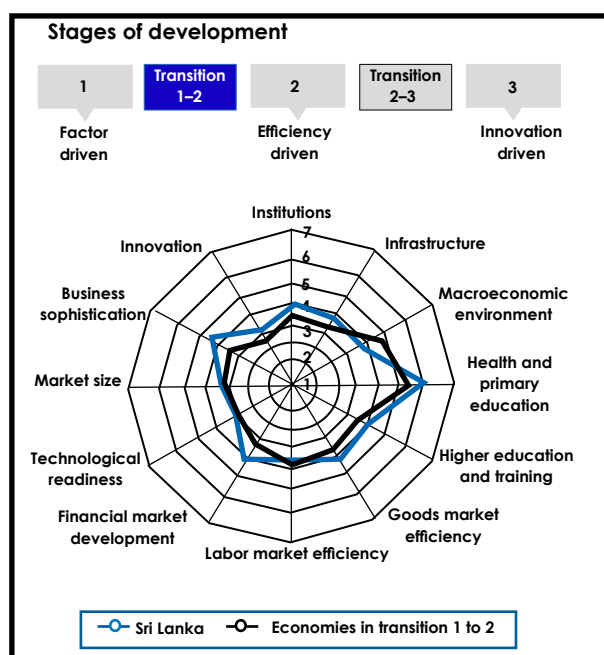


Figure 1. The Radar Chart of Sri Lankan Economic Composition  
Source: Schwab [3]

Being a middle income country, Sri Lanka has to operate within a new paradigm particularly in raising finances for the country's development programs as grants were no longer available from international donors. This requires raising low-cost, long-term financing through new innovative mechanisms and investing them more productively.

### PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS

In considering the 50-year period from 1960 to 2010, the Sri Lankan economy improved from a low-income country to middle income. The GDP at current market price had doubled during 1960–70, and almost quadrupled in the subsequent 1970–80 and 1980–90 decades. However, owing to the sociopolitical instability, the GDP growth during 1990–2000 had slowed down considerably, which was cushioned by the satisfactory GDP growth during 2000–10.

While the GDP at constant prices grew by more than 500% from 1960 to 2010, the labor force doubled only within these 50 years, whereby the classical indicator for labor productivity indicated a drastic improvement over the said period. In the absence of decomposition of other factors related to GDP growth, the above-mentioned classical indicator denoted an overestimated progress in productivity.

The introduction of open economy in the late 1970s has resulted in dramatic changes in the economy, yielding not only a thriving growth of GDP but also changes in its composition. New technology was brought in and under highly competitive scenarios both capital and labor utilization were made more cost-effective. Impacts of the emerging ICT infrastructure have not been adequately demarcated in the national accounts so far.

When considering the annual statistics in detail, Sri Lanka has shown erratic movements in GDP growth, (at constant market price) around 5% during the five decades concerned, apart from the extraordinary negative growth (GDP contraction by 1.4%) in 2001. The year-to-year GDP growth denoted a high relationship with the growth in labor input than the growth in capital stock (Figure 2). On the contrary, the growth in capital stock has indicated comparatively higher shocks basically in line with the politico-economic environment.

Labor productivity was also on par with GDP growth. In contrast, the growth in total factor

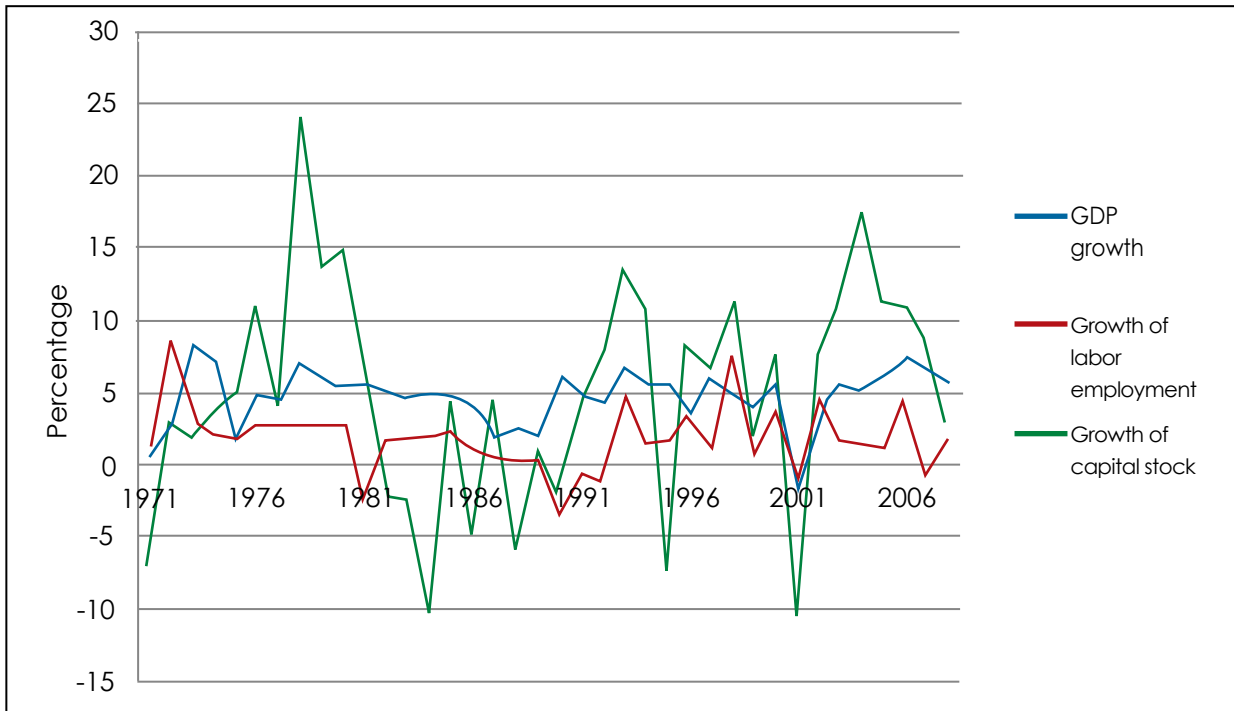


Figure 2. Growth of GDP, Labor Employment, and Capital Stock from 1970–2008

productivity (TFP) has shown a comparatively smaller association with GDP growth, while the two indicators have yielded negative relationships several occasions within the 50 years (Figure 3). Therefore, it can be inferred that the Sri Lankan GDP growth during 1971–2008 was more closely associated with the growth in labor input instead of capital inputs or TFP.

It was evident that capital deepening had emerged significantly during the 2001–08 period (Table 1), which was caused by the high growth of capital stock during 2003–05 period that was topped out in 2004 (Figure 2). Simultaneously, TFP growth had denoted a dramatic fall in 2001 and sharp declines again in 2003 and 2004, resulting in the average growth of TFP

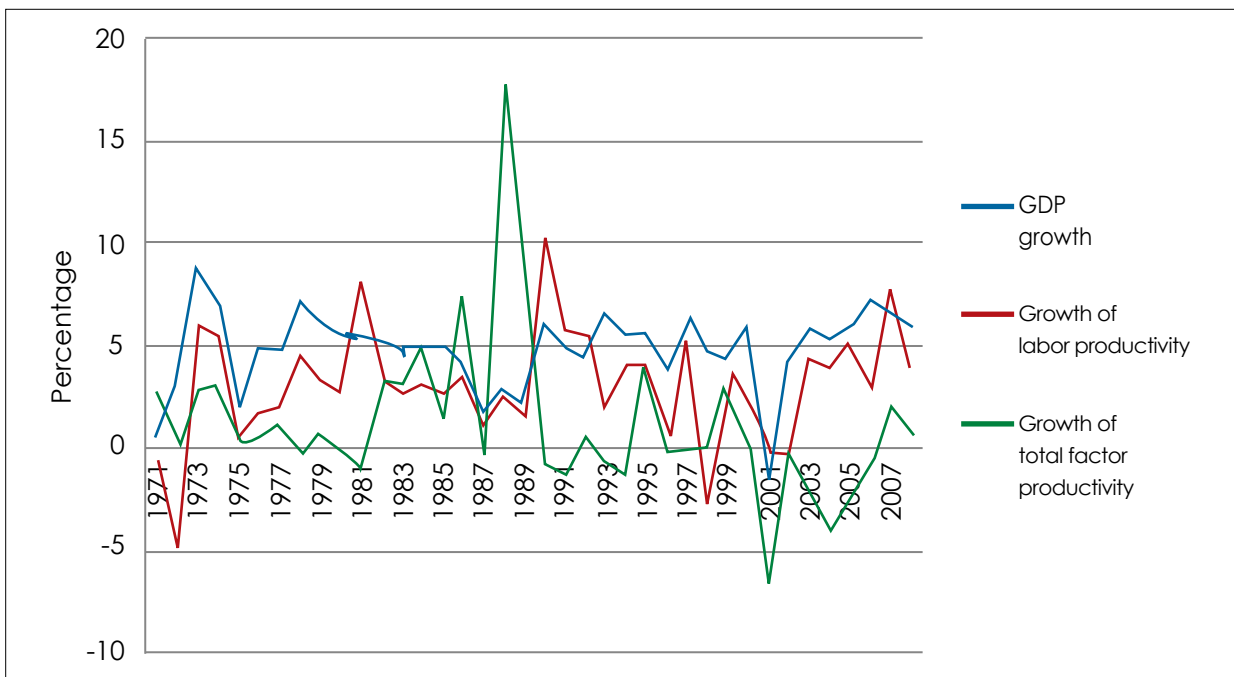


Figure 3. Growth of GDP, Labor Productivity, and TFP from 1970–2008

for the 2001–08 period at a negative figure. Consequently, the dominance of TFP growth in contributing to the growth of labor productivity had been overruled by capital deepening during 2001–08. However, as this unexpected outcome of labor productivity composition was a result of the outlying slumps in 2001, 2003 and 2004 (as illustrated in Figure 3), it did not depict any alarming trends as such.

**FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES**

In order to determine the factors affecting productivity changes, a baseline regression model was chosen with the growth of TFP as the dependent variable and three independent variables: educational attainment, government consumption as a percentage of GDP and the share of exports out of GDP.

According to the Ordinary Least Squares (OLS) estimates for the three factor model (M2 in Table 2) were non-significant even at 10% significance level. In considering the F statistics for model fitting, the three factor model was identified as inadequate for explaining the variance in TFP. On the contrary, the model with two independent factors (M1) - schooling and share of government consumption - denoted a comparatively better fit and OLS estimates at 5% significance level. According to the same, the coefficient of the educational attainment was significantly negative, which denoted an unanticipated negative return on investment for human capital accumulation.

This may have been caused by the increasing educational attainment over the last two decades that had not yielded comparable enhancement in employment outcomes. Instead, there was a rising unemployment and economic inactivity among the highly educated youth. As per the aforesaid baseline model, the share of government consumption had a considerably higher (and significant) impact on the growth of TFP.

The extended regression models (M3–M5), with three additional independent variables (share of investment, share of foreign direct investments or FDI, and a dummy variable to denote years of politico-economic instability), had not provided significant improvement in the variability already explained through the baseline model. Moreover, the OLS estimates for the new variables were not significant. Accordingly, out of all considered independent variables, the share of government consumption to the GDP had a significantly high and positive relationship to the growth in TFP.

The results on determinants of TFP seemed to be quite far from reality, which may be due to the assumptions that were made in the absence of adequate data for certain factors. In addition, the considered regression models took the total economy as a whole rather than the magnitudinal change of GDP and other variables, yet without giving due consideration for the changes in their compositions. For example, the structural changes in the major

Table 1. Average Growth of GDP, Labor Employment, Capital Stock, Labor Productivity [4], Capital Deepening, and TFP from 1971–2008

Period	GDP (at Constant Market Price) (%)	Labor Employment (%)	Capital Stock (%)	Labor Productivity (%)	Capital Deepening (%)	TFP (%)
1971–80	4.9	3.0	7.4	1.9	0.84	1.0
1981–90	4.2	0.4	-0.9	2.9	-0.90	3.8
1991–2000	5.1	2.3	6.5	1.3	0.25	1.0
2001–08	5.0	1.6	7.5	1.5	2.07	-0.6
1971–2008	4.8	1.9	5.0	1.9	0.49	1.4

Table 2. Baseline and Extended Regression Model for Change in TFP

Factor	M1	M2	M3	M4	M5
Constant	45.960** (0.034)	59.500** (0.022)	58.972** (0.024)	56.774** (0.047)	54.885 (0.102)
Schooling	-0.652** (0.031)	-0.872** (0.022)	-0.869** (0.023)	-0.846** (0.037)	-0.811 (0.114)
Government consumption	109.804** (0.046)	129.548** (0.029)	129.975** (0.029)	129.671** (0.032)	125.980* (0.060)
Investment share	-	15.619 (0.326)	15.754 (0.322)	17.648 (0.348)	17.473 (0.362)
Instability (dummy variable)	-	-	1.642 (0.341)	1.584 (0.372)	1.470 (0.477)
FDI share	-	-	-	-28.296 (0.843)	-27.500 (0.850)
Export share	-	-	-	-	-2.327 (0.910)
Adjusted R <sup>2</sup>	0.08	0.08	0.18	0.05	0.02
F (pr >F)	2.61* (0.088)	2.07 (0.122)	1.78 (0.156)	1.39 (0.253)	1.13 (0.370)
Obs.	38	38	38	38	38

Note: \*, \*\*, \*\*\* denote significance at 10%, 5%, and 1% levels, respectively

sectors of the economy from 1970 to 2010 are given in Table 3 below.

Table 3. Change in the Composition of Sri Lankan Economy

Sector		
Agriculture	28.3%	12.8%
Manufacturing	23.8%	29.4%
Services	47.9%	57.8%
GDP	100%	100%

Those changes affected the productivity of each sector, but not in a similar manner. The agricultural sector had gradually shifted from labor-intensive toward a more capital-intensive state, while both the industrial and service sectors had shown the same conversion at comparatively higher rates. In addition, the emerging subareas in the service sector attracted more labor in the recent decades.

Moreover, the apparel (garment) industry emerged at large scales in the early 1990s that yielded low-skilled and less-paid employment for youths. Therefore, to get a true picture of the changes of productivity and related factors, it is essentially required to examine the sector-wise changes in the factors of production.

### PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

Sri Lanka became a member of the Asian Productivity Organization (APO) in 1966. The Management Development and Productivity Centre was established in the same year as the focal point for productivity development in Sri Lanka. This was renamed as National Institute of Business Management, shifting its role to provide management and computer-related training facilities. The task of productivity promotion was taken over by a productivity unit established under the Ministry of Industrial

Development that was subsequently converted to the National Productivity Secretariat (NPS).

The National Productivity Awards Scheme in the 1990s was strengthened by the introduction of the National Productivity Year in 1996 and the National Productivity Decade from 1997–2006. An action program was prepared to meet several objectives, including a national campaign to create awareness, to improve product and service quality, and to enhance productivity in the public, cooperative, and agriculture sectors and among small and medium enterprises.

Under this program, the Japan Sri Lanka Technical and Cultural Association organized the Taiki Akimoto 5S Awards competition and the Nagaoka Yamamoto Kaizen Awards. The Sri Lankan Association for the Advancement of Quality and Productivity launched a program to promote quality circles through an annual competition. The impact of these programs on creating awareness on productivity in the country had been immense and a momentum was generated in the country toward improving productivity in all sectors of the economy [5].

In 2001, the function of promoting productivity was assigned to the Ministry of Labor. As a result, the NPS and the APO liaison office were brought under the Ministry of Labor. The productivity awards scheme was revised, drawing the experiences of productivity and quality award models of other countries. The award ceremony was combined with the National Quality Award and conducted at a much higher level to create an image of prestige.

The Ministry of Labor commissioned the preparation of a National Productivity Policy for the private and public sectors separately with the assistance of the United States Agency for International Development (USAID) and the APO, respectively [6]. The policy was formulated with a wide participation of representatives of the private sector, public sector, employees, and the academia.

The NPS had undertaken many initiatives to improve productivity among public-sector institutions, small and medium enterprises, schools, and the community at large. The programs conducted in government hospitals, police stations, divisional secretariats, and government departments have produced many model organizations.

The NPS had also conducted many national and international programs in collaboration with the APO. On the average, at least 2–3 international programs had been hosted annually by Sri Lanka. During the past 10 years, nearly 1,000 Sri Lankans had participated in international trainings conducted by the APO.

Recognizing the importance of productivity improvement in achieving the objective of a Ten-Year Development Framework, a Presidential Task Force was established to work in partnership with all stake holders to improve productivity and quality in the country.

The productivity Association of Sri Lanka was established in 2009, involving local productivity experts as members to develop a mechanism to mobilize their knowledge, skills, and work experience for the benefit of the productivity movement. This association operates as a non-profit organization to provide services at a reasonable and affordable price to the private-sector organizations.

In 2010, a separate ministry - Ministry of Productivity Promotion - was established and the NPS was assigned to it, resulting in a paradigm shift in the NPS approach, whereby both public and private organizations were mandatorily led toward their "business excellence".

## **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

Improving productivity is a key challenge since it is necessary to ensure that productivity leads to higher wages, better working conditions, and improved quality of life. Low labor productivity is often highlighted as a major



factor behind high cost of production, loss of market competitiveness, and low profits. Improvement of productivity in the public-sector organizations is also vital so as to lead and manage the development process of the economy.

### **Infrastructure and Operating Environment**

Even though considerable progress had been achieved in social development, which was reflected in the high Human Development Index, there had been a significant deficiency in infrastructure development in Sri Lanka mainly due to various social problems.

With the ending of the prolonged ethnic conflict, the government embarked on several major infrastructure development projects. The rehabilitation of the railway and road networks will increase mobility and help contain transport cost. The ports and airports development initiatives enhance the potential for Sri Lanka to become a key transportation and tourism hub in Asia.

In order to achieve higher productivity, these infrastructure should be designed to deliver efficient services. High priority should be attached to costs, quality maintenance, and regulations.

### **Human Capital Development**

The demographic profile of the population and labor force and their expected changes over time are taken into account in human resource planning and development. Particular emphasis is placed on required policy responses to the changing proportions of the young and old, the extent of women's participation in labor, and overseas migration for work.

A set of productivity standards needs to be developed and established at the enterprise level, ensuring that employees would also gain from productivity growth. Labor productivity indexing and standardization in respect to different industries and economic sectors are to be developed. Medium- and long-term labor productivity targets will have to be declared at

macro level, sector level, and subsector level based on corresponding projections.

The recently formulated National Human Resources and Employment Policy [7] had laid down key policy priorities for human resources development and the promotion of full, decent, productive and freely chosen employment opportunities. It covers a broad spectrum of subject areas, including macro-economic and sectoral policies, and small and medium enterprise labor market policies for specific groups of training, management, and career guidance.

### **Technology and Innovation Enhancement**

The application of science and technology would increase productivity leading to marketing better quality goods and services at prices that can overcome the competition from abroad.

At present, high technology exports form only 1.5% of Sri Lanka's manufacturing exports. In addition, the local SME sector is also facing a huge challenge in meeting the competition, in the absence of industrial automation technology inputs. R&D expenditure in Sri Lanka is at a low level of about 0.18% of GNP [8].

The Five-year Science and Technology and Innovation Strategy based on the National Science and Technology Policy has been designed to enable the country to develop economically and help to achieve the development targets of the country.

### **Macroeconomic Policies**

Sri Lanka's current strategy aims at achieving a growth rate of about 8% per annum and doubling its current per capita income to reach USD4,000 by 2016 [9]. To sustain this growth, the share of investments should be increased up to 32%–35% of GDP from its current level of 27%.

Sri Lanka is not ranked high in the Doing Business Indicators of the World Bank [10], which is a serious challenge in improving FDIs. The Central Bank of Sri Lanka released a "Step-by-step

Guide to Doing Business in Sri Lanka" [11] with the aim of elevating Sri Lanka among the top 30 in the Doing Business Index within the next 2–3 years.

Knowledge-based exports through activities such as the ICT-related Business Process Outsourcing and Knowledge Process Outsourcing [12] need to be promoted to increase earnings from the export of services.

[11] Central Bank of Sri Lanka. Step by Step Guide to Doing Business in Sri Lanka. Colombo: Central Bank of Sri Lanka; 2011.

[12] Ministry of Science and Technology. e-Sri Lanka: An ICT Development Road Map. Colombo: Ministry of Science and Technology; 2002.

## REFERENCES

- [1] Central Bank of Sri Lanka. Central Bank of Sri Lanka Annual Report 2011. Colombo: Central Bank of Sri Lanka; 2012.
- [2] Lakshman W.D. Dilemmas of Development: Fifty Years of Economic Change in Sri Lanka. Colombo: Sri Lanka Association of Economists; 1997.
- [3] Schwab K. The Global Competitiveness Report: 2009–2010. Geneva: World Economic Forum; 2009.
- [4] Asian Productivity Organization. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [5] Wijesinha S.G. APO Needs Assessment Survey - Sri Lanka. Asian Productivity Organization; 2007; 3: 16.
- [6] Ministry of Employment and Labour. National Productivity Policy for Sri Lanka. Colombo: Ministry of Employment and Labour; 2003. e-Book.
- [7] Secretariat for Senior Ministers, Government of Sri Lanka. National Human Resources and Employment Policy for Sri Lanka. Colombo: Secretariat for Senior Ministers; 2011.
- [8] Ministry of Science and Technology, Government of Sri Lanka. The Five-Year Science, Technology and Innovation Strategy 2011 Report. Colombo: Ministry of Science and Technology; 2011.
- [9] Chinthana M. Vision for the Future. Sri Lanka: Department of National Planning; 2011. e-Book.
- [10] The World Bank. Doing business. [www.worldbank.org/reference](http://www.worldbank.org/reference), accessed in 2011.

# THAILAND

DR. PHANIT LAOSIRIRAT

Executive Director

Thailand Productivity Institute

## INTRODUCTION

Thailand's GDP has grown very fast over the past 30 years. The country's GDP per capita increased from USD800 to USD2,700, roughly over threefold in the period of 1980–2010 (Figure 1). Thai exports have gradually moved from being resource-based and labor-intensive

promotion and FDI, which led to favorable economic development. Many social and economic policies were designed to support and accommodate export promotion and FDI attraction policies. These policies included favorable exchange rates for exporters to enable them to compete with neighboring competitors, as well as special import and export zoning.

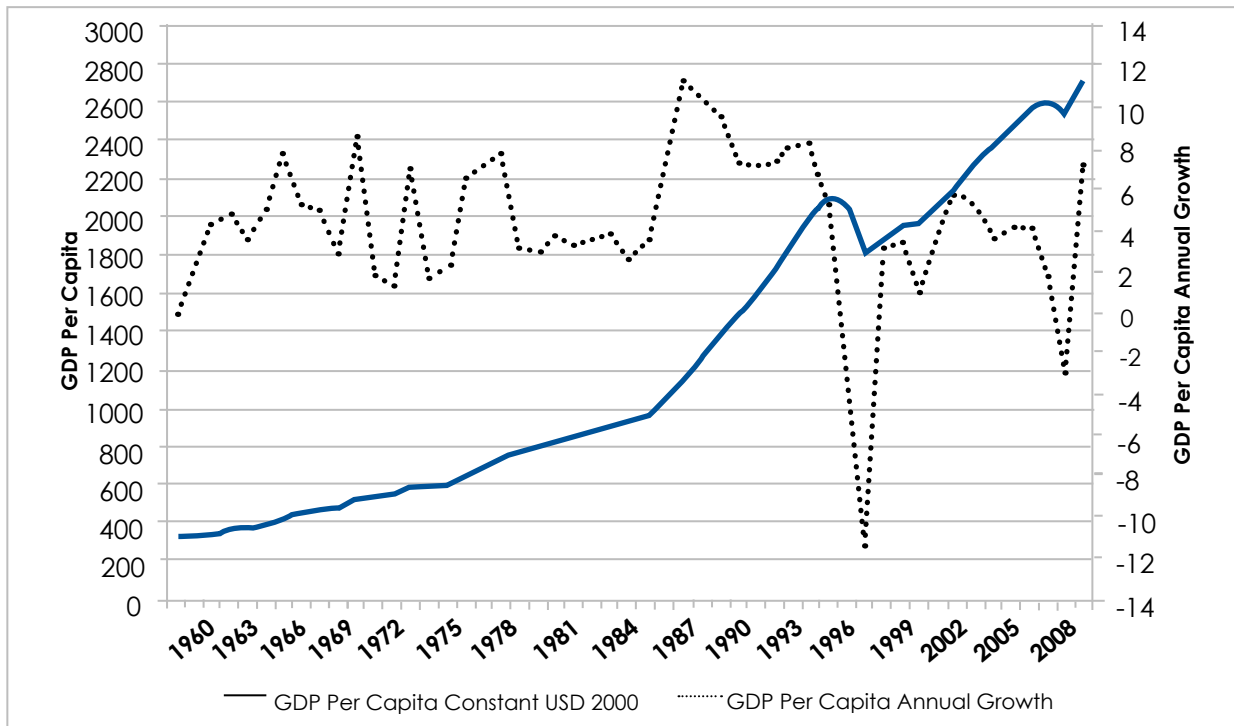


Figure 1. Thailand GDP Per Capita and Growth

Source: World Bank [1]

to high-tech and capital-intensive (Figure 2). The high-tech and capital-intensive exports accounted for almost two-thirds of all exports in 2011. This was the result of many factors, including export-oriented policies, opening up the industrial sector to foreign direct investment (FDI), and the use of abundant cheap labor as well as capital accumulation.

Thailand, like many other countries in the Association of South-East Asian Nations (ASEAN) in the mid-1980s, pursued policies of export-

In addition to the liberalization of foreign trade policies, another notable characteristic of the foreign economic policies pursued by Thailand was the liberalization of policies toward FDI. There were various forms of tax incentives and other incentives that included the human resource development policy, aimed at increasing labor skills in the fields that were mostly wanted by foreign direct investors. In the past, Thailand had restricted the inflow of FDI in order to protect domestic producers from highly competitive foreign multinationals.

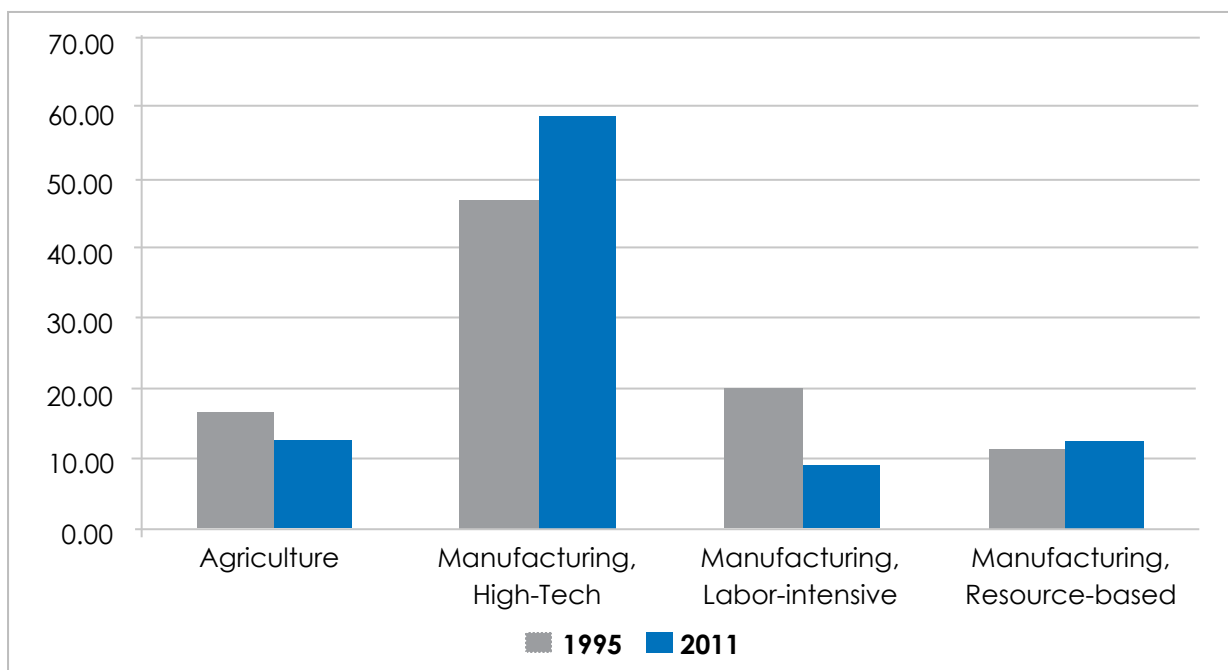


Figure 2. Export Share by Product Groups in 1995 and 2011

Source: Bank of Thailand [2]

The attitude toward foreign multinationals has changed. Foreign companies are now regarded as a contributing factor to Thailand's economic development by providing the country not only with technology and know-how, but also with international sales and procurement networks. A case in point of this changing attitude was seen in the Thai automotive industry, especially the automotive parts sector.

Initially, the policy was specially designed to support the newly established automotive industry in Thailand by multinational corporations such as Toyota, Honda, and Nissan. Today, with the technologies and know-how transferred from these multinational corporations, Thailand's automotive parts producers have developed the expertise to export their products to many automotive producers around the world. Thailand has become a major production hub for many automakers around the world. This was evident by the impact of the 2011 great flood in Thailand, where many Japanese automotive companies around the world faced automotive parts shortage, especially Toyota and Honda.

The Japanese automotive industry worldwide has become dependent on Thai automotive part producers whose factories were severely flooded at the end of 2011.

These outward-oriented policies were logical and can lead to economic development. Most of these policies focus on supply-side adjustments that would stimulate Thailand to build an economic structure suitable for the expansion of production and exports. From 1975 to 2010, the volumes of exports and FDI increased more than 10 times (Figure 3).

However, from the mid-1990s, Thailand's real per capita GDP growth began to decelerate. The real GDP per capita growth reached 8.28% in 1995 and has not recorded such a figure since. Furthermore, the possibility of more political unrests has added to the setback of the economy. The real extraction to growth came in 2011 in the form of a massive flood, where the real GDP growth in 2011 was thought to be less than 1%. Thailand has many challenges to overcome in order to catch up with other East Asian countries.

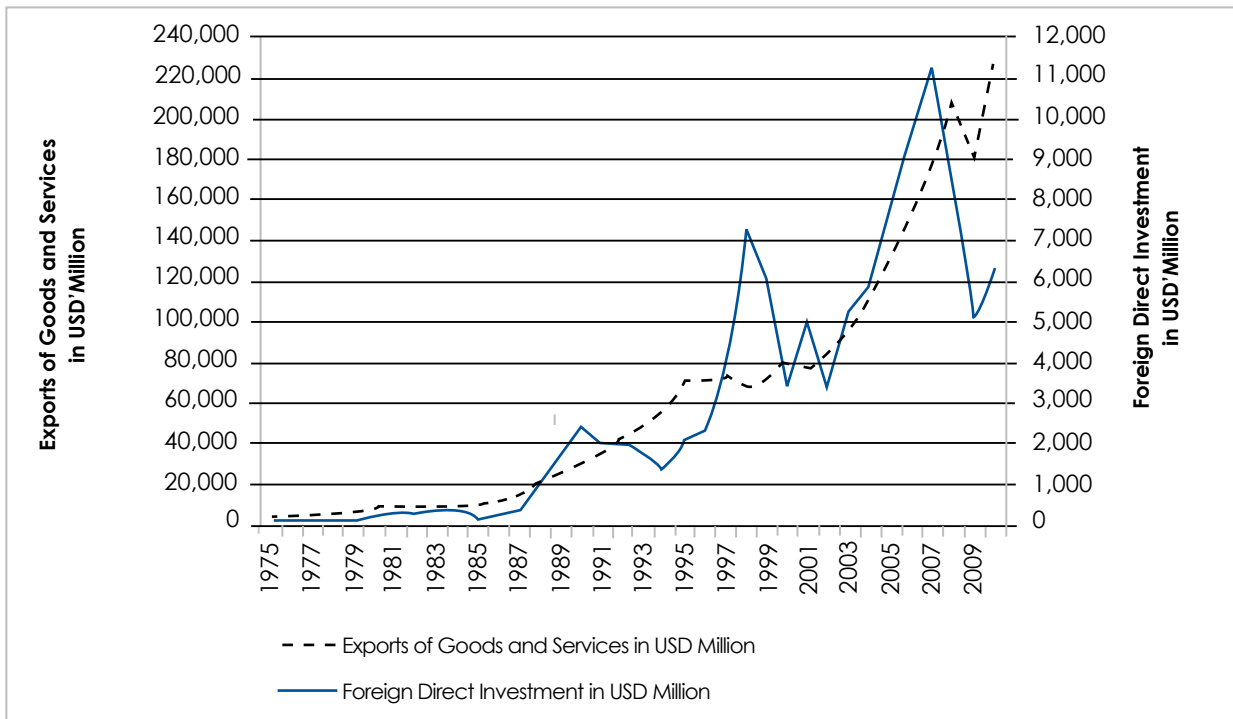


Figure 3. Fast Growth in FDI and Exports  
Source: World Bank [1]

**PRODUCTIVITY DYNAMICS IN THE LAST 50 YEARS**

Politics and natural disasters aside, Thailand still faced a serious challenge of sustaining growth in wanting to transition into a higher-income country status. When the sources of Thailand's rapid growth were carefully examined, it is mainly the result of rapid increases in employment and capital goods. But its productivity growth was low. Thailand's GDP growth from the 1970s to the mid-2000s was largely from the contribution of capital and labor inputs (Figure 4). It was not until 2000 that total factor productivity (TFP) began to influence Thailand's economic growth. It was interesting to note that from 1995–2000, Thailand's economy produced less than it had put in. One reason to explain this phenomenon was during those years, Thailand suffered from either worldwide economic crises or internal political unrests. As for labor productivity growth (Figure 5), the reading was the same as non-IT capital spending, and labor input still played a major role in Thailand's labor productivity growth prospect until 2000.

The prospect of future growth is very questionable for Thailand. Higher prices of input factors of production such as the price of energy, raw materials, and labor shortage have put constraints on Thailand's future growth. As seen in Figure 6, the supply of labor in terms of employment growth has been decreasing in the last few years. To fuel Thailand for future economic growth, the government has very few options; either find new supply of labor by looking to her neighboring countries both to the east and west, or mobilize more Thais from the agricultural sector. Either option satisfies the labor shortage in Thailand only for a short term because these new supplies of labor are low skilled and untrained. In the long run, Thailand must improve its existing labor quality and shift Thai industrial sector to higher value-added production. This can be done through upgrading Thai labor skills and education reform.

**FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY CHANGES**

Can openness of foreign trade and investment lead to rapid economic growth? Can Thailand

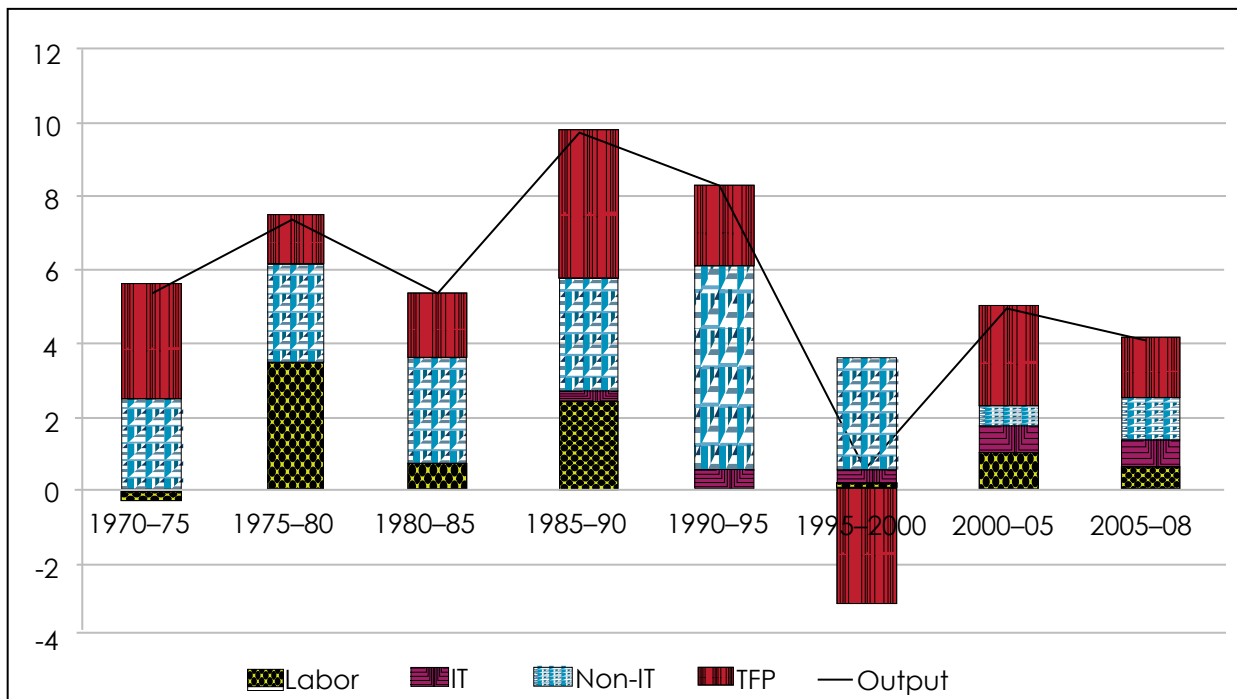


Figure 4. Factors Contributing to GDP Growth  
Source: APO [3]

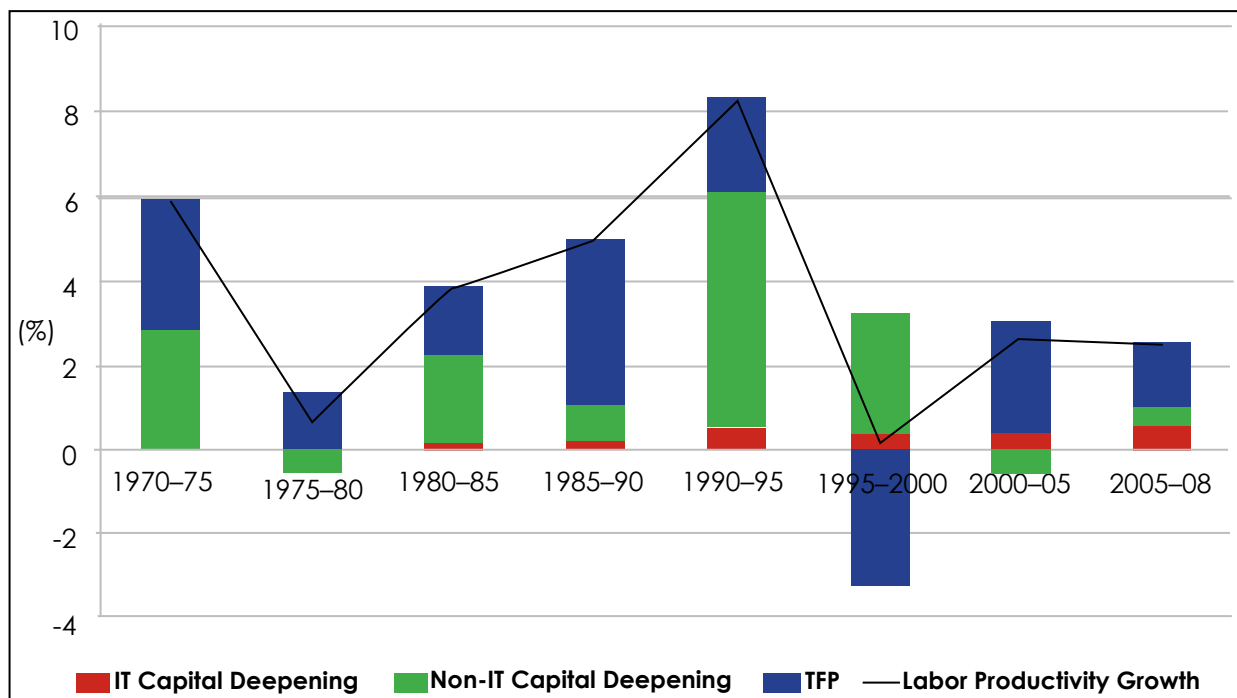


Figure 5. Factors Contributing to Labor Productivity Growth  
Source: APO [3]

sustain economic growth by improving its policy liberalization toward foreign trade and investment? Maintaining economic growth without productivity improvement is self-defeating in the long run. It is indisputable that productivity is the major source of sustainable

economic growth. It means the quality of growth must be supported by efficient use of capitals and resources to produce goods and services. Even without an increase in inputs such as labor, capital, or intermediate inputs, the economy will still grow with an increase

in productivity. It is highly accepted that productivity growth has contributed to rapid economic growth in Thailand since the mid-1980s.

Liberalization of trade and FDI lead to improvement in productivity in many ways. Liberalization increases competitive pressure. Domestic firms have to improve productivity to survive. Firms that are unable to meet increased competition, are forced to exit from the industry. On the other hand, firms operating in a protected environment lack competition, resulting in inefficient production. Firms in noncompetitive environment manipulate the social or political environment in which economic activities occur, rather than by creating new wealth. Resources are shifted away from productive activities to non-productive activities. Trade liberalization enables firms to use high-quality parts, components, and machinery at lower prices that lead to improving productivity.

Favorable FDI policies contribute positively to hosting countries as multinational enterprises bring in not only technology and know-how, but also financial resources and fixed capitals. These resources are crucial to lift productivity, as improvement in productivity leads to greater production, even with equal or less use of input resources.

In 2006 and 2008, the Foundation of Thailand Productivity, the National Economic and Social Development Board, and the World Bank carried out two studies on Productivity and Investment Climate Surveys in Thailand [5, 6]. Many interesting findings emerged from these surveys. Both surveys found that exporting firms performed significantly better than non-exporter firms according to TFP and labor productivity. In fact, exporting firms had an average of 30.5% higher labor productivity than non-exporter firms.

The surveys also found that exporting firms were generally more capital-intensive, therefore,

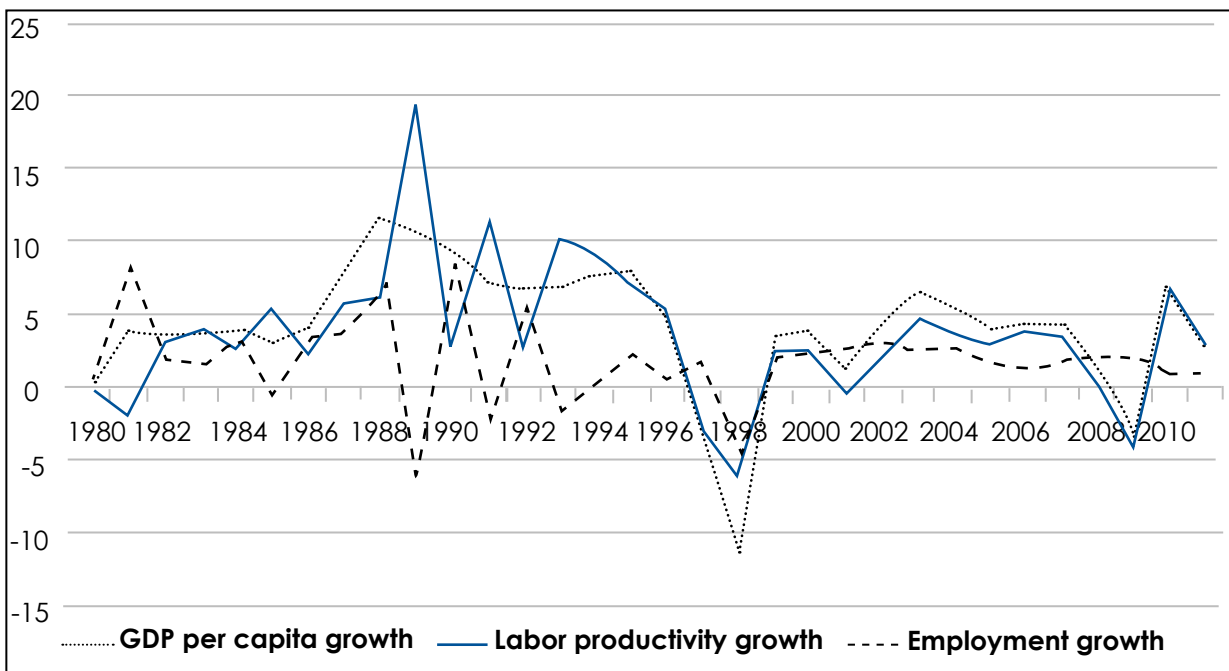


Figure 6. Thailand GDP Per Capita and Labor Productivity Growth

Source: The Conference Board [4] and the World Bank [1]

- Note:
- i. GDP and GDP per capita in 2011 USD (converted to 2011 price levels with updated 2005 EKS PPPs)
  - ii. Labor productivity per person employed in 2011 USD (converted to 2011 price levels with updated 2005 EKS PPPs)

labor productivity must have been higher. It was discovered in the survey that on average, exporting firms scored 8% higher TFP than non-exporter firms, highlighting that exporting firms were more efficient in utilizing resources. The strong performance of exporting firms may be due to their exposure to fierce competition in international markets, to more advanced technology, and to more stringent demand for quality by their foreign buyers.

Interestingly, the survey also uncovered the relationship between foreign-owned firms and productivity. Thai firms with FDI had labor productivity that was on average 53.4% higher than that of domestic firms. While these foreign-owned firms also had high capital intensity, they had higher TFP (13% higher) than domestic firms. The survey suggested that the facilitation of FDI inflows into Thailand might contribute to an improvement in the productivity of domestic economy.

Labor quality is believed to have a high correlation with productivity. Improving labor skills results in higher labor quality. Highly skilled labor forces are able to handle complex machines. They possess the ability to solve production problems in shorter time frames, all of which can lead to waste reduction, shorter setup times, and high-quality outputs.

Government consumption is believed to be ineffective in promoting economic growth. Government transfers, consumption, and total outlays were found to have consistently negative effects on productivity growth. In terms of the effect on private sector productivity growth, the authors also found that government investment had no effect on private productivity growth [7]. Business motivation is driven by profits and losses. Efficient uses of resources by reducing wastes are the activities that are common among private businesses; otherwise, they will be forced to leave the market. Thus, government consumption is expected to have negative effect on productivity growth.

R&D leads to new products and services, innovative production processes, advanced machinery, and many more. In all, R&D helps companies to produce highly innovative products and services with very competitive prices. Even though scholars disagreed on how to measure the real magnitude of R&D (i.e., direct versus the spillover effects) on productivity growth, all studies have confirmed that expenditure on R&D relate to productivity growth [8].

Age dependency has been confirmed to have negative effect on TFP [9]. Kögel's paper found empirical evidence in cross-country data for the thesis that the youth dependency ratio (the population below working age divided by the population of working age) reduced residual TFP growth [9]. On the contrary, increase in life expectancy has been both the driving force and by-product of modern economic growth [10].

Empirical evidence of factors that influence national productivity will shed some light on the dynamics of Thai economy development. The following model is believed to represent the development of Thai economy in terms of productivity from 1990–2009:

$$p = f(G, E, L, A, R, D, I)$$

where  $p$  = TFP growth or labor productivity growth,  $G$  = general government final consumption expenditure as annual percentage growth,  $E$  = exports of goods and services as annual percentage growth,  $L$  = life expectancy at birth as total years,  $A$  = age dependency ratio as percentage of working-age population,  $R$  = R&D investment as percentage of GDP,  $D$  = education attainment, and  $I$  = growth of FDI as net inflows as percentage of GDP.

It is expected that exports of goods and services ( $E$ ), life expectancy ( $L$ ), investment in R&D ( $R$ ), education attainment ( $D$ ), percentage of working population opposite to dependency ratio ( $A$ ), and FDI ( $I$ ) should be associated with improved productivity. On the contrary,



the general government final consumption expenditure (G) is expected to have negative effects on productivity.

Standardized/beta coefficients of the regression analysis of both models are displayed in Table 1. The two models did not suffer from any autocorrelation (Durbin-Watson statistics approaching 2), which usually affects panel data used in this kind of study. For the dependent variable TFP Growth, four variables are significant (< .05): life expectancy, R&D investment, education attainment, and growth in FDI. Out of these, education attainment has the greatest impact on Thailand's productivity growth.

Surprisingly, both life expectancy and FDI had a negative impact on productivity growth in Thailand during the last 20 years. For life expectancy, Thailand must have a policy that focuses on retraining the workforce, especially in life-long learning, so that the Thai will remain productive as they get older.

Thailand has long been the production base of many multinational organizations. The majority are original equipment manufacturers that produce products or components that are purchased by another company and retailed under that purchasing company's brand name. Therefore, the full benefits of having the most production bases here have fallen short for the host country. Thailand must also upgrade its policy on FDI that will encourage greater technology transfers and R&D.

When labor productivity growth was used as a dependent variable, three factors were significant at 0.05: life expectancy, education attainment, and FDI. Education attainment had the strongest contribution to labor productivity growth. The other two factors repeated the same pattern when TFP growth was used as the dependent variable.

Both models have confirmed the need for Thailand to improve her education system to

Table 1. Regression Analysis: Factors Contributing to Productivity Growth in Thailand

Dependent Variable	TFP Annual Growth			Labor Productivity Growth		
	Standardized/ Beta Coefficients	t	Sig.	Standardized/ Beta Coefficients	t	Sig.
General government final consumption expenditure (annual percentage growth)	.155	.990	.324	.219	1.195	.255
Exports of goods and services (annual percentage growth)	.279	1.647	.125	.261	1.312	.214
Life expectancy at birth, total life (years)	-1.248	-3.144	.008	-1.029	-2.209	.047
Percentage of working population (opposite to dependency ratio)	.774	1.960	.074	.843	1.818	.094
R&D as percentage of GDP	.508	2.336	.038	.010	.039	.969
Education attainment	1.513	2.715	.019	1.409	2.154	.050
Growth in FDI, net inflows (% of GDP)	-.621	-4.019	.002	-.534	-2.945	.012
R <sup>2</sup>	.807	F=7.190	.002	.735	F=4.56	.009
Durbin-Watson	2.889			2.119		

be more responsive to the skills needed by enterprises. Improvement in education must be urgently pursued because it has been mentioned by many studies on competitiveness and often been on the priority list requested by the Federation of Thai Industries.

## **PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS**

Thailand's approach to productivity is rather decentralized. There is no single agency that is specifically charged with national productivity improvement. Productivity function is embedded in various ministries. For example, human resource development for government personnel is assigned to the Public Sector Development Commission. National Economic and Social Development Board is responsible for national competitiveness policy. There are also departments in various ministries that are charged with quality improvement. This is not to say that having these agencies is not effective, but Thailand needs a national policy to coordinate all productivity agencies to work together for a common goal, which is to improve the standard of living for all Thais. Thailand has never had a government or political party that includes national productivity improvement in its political platforms. Productivity and quality movements are, therefore largely private sector endeavors to survive in the world market.

As a result, rapid productivity improvement is enjoyed only in certain industries: food, electronic, and automotive. These industries have a strong association and has maintained a long and open dialogue with policy makers. Subsequently, these strong relationships have led to the formation of many policies that are supportive of the industries such as less regulatory burdens, financial accessibility, and tax incentives. However, all of these are only limited to certain industries.

Things are about to change, as clearly reflected in the current Eleventh National Economic and Social Development Plan, which stated, "Thailand is to base its future

development on knowledge, technology, and innovation. R&D in science and technology is the major driving force of the country's development. The focus on R&D will help the restructuring of the production system from a dependence on natural resources, and capital and labor with low productivity, to a focus on knowledge, science, and technology with high productivity."

The focus of this plan is to put human capital at the center of the country's growth strategy and competitiveness. The plan addresses some of the shortfalls in education. The government is working to bridge the gap by working in collaboration with the private sector to provide skills training and to strengthen university-industry linkages. Other recommendations include improving the quality of teachers, encouraging students to innovate, and linking education institutions and training centers with future employers.

## **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

In the short term, Thailand needs policies and stimulus measures to mitigate the short-run downside risk to growth. Short-term policies based on political motivations must be discontinued. Thailand needs to turn to longer-term challenges; it needs to improve its productivity and competitiveness if it wants to follow the ASEAN bandwagon. Here are several suggestions:

- i. First, and most importantly, is political stability and economic certainty, which are prerequisite to other reforms to have a positive effect. Political tensions continue to prevail in Thailand even after three general elections. It has a deleterious effect on investors and economic development.
- ii. Investing in human capital and ensuring that education is in line with the skill needs of enterprises. Thailand's education system, particularly in the higher education sector, is still characterized as centralized at

best. Thailand has to put more effort into reforming of higher education in addition to many other reforms that have been put in place. One of the advantages of having a more centralized and autonomous system include the potential for collaborations with the industry, external funding, and cross-institutional, cross-border partnerships.

- iii. Thailand must promote a wider use of engineering, design, and IT services by targeting fiscal incentives to promote enterprise innovations. Also, a better-coordinated science and technology policy is needed in order to strengthen cooperation between research institutes and firms to effectively use existing technology and knowledge to help build up the capacity to innovate. Foreign companies must also be encouraged to transfer and share their technologies to local companies.
- iv. Thailand must provide a stable and conducive regulatory framework for the private sector to make informed decisions on investments and concentrate resources to improve productivity. It is also necessary to promote greater use of information and communication technology services because it will help reduce the cost and time spent by firms dealing with regulations. Efficient coordination among government agencies is necessary to streamline bureaucratic processes by establishing a single window for exporting and importing services and business registration.
- v. On the whole, Thailand must maintain a larger degree of openness and integration with global markets. Promoting the entry of more enterprises to export markets, or expanding those already in, can increase the competitiveness of the Thai economy.

## REFERENCES

- [1] World Bank. World Development Indicators & Global Development Finance. Washington DC: World Bank; September 2011.
- [2] Bank of Thailand. Statistics: Economic Indices and Indicators (All). <http://www.bot.or.th/English/Statistics/EconomicAndFinancial/EconomicIndices/Pages/index.aspx>. Last accessed on 28 February 2014.
- [3] APO. APO Productivity Databook 2011. Tokyo: Asian Productivity Organization; 2011.
- [4] The Conference Board. Total Economy Database. <https://www.conference-board.org/data/economy-database>. Last accessed on 20 March 2014.
- [5] World Bank. Thailand: Investment Climate, Firm Competitiveness and Growth (report). Washington DC: World Bank; 2006.
- [6] World Bank. Thailand: Investment Climate Assessment Update (report). Washington DC: World Bank; 2008.
- [7] Hansson P., Henrekson M. A new framework for testing the effect of government spending on growth and productivity. *Public Choice* 2004; 81 (3): 381–401.
- [8] Griliches Z. R&D and Productivity: The Econometric Evidence (the National Bureau of Economic Research). Chicago: University of Chicago Press; 1998.
- [9] Kögel T. Youth dependency and total factor productivity. *Journal of Development Economics* 2005; 76 (1): 147–173.
- [10] Garibaldi P., Joaquim O.M., Ours J.V. Aging, Health, and Productivity: The Economics of Increased Life Expectancy. New York: Oxford University Press Inc.; 2011.
- [11] Barro R., Lee J.W. A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics* 2013; Vol. 104, September 2013: 184–198.

## APPENDIX 1

### Sources of Variables

Variables	Descriptions	Sources
TFP Growth	TFP Growth - Estimated As Tornqvist Index	The Conference Board [4]
Labor Productivity Growth	Labor Productivity Per Person Employed In 2011 USD (Converted To 2011 Price Level With Updated 2005 EKS PPPs)	The Conference Board [4]
Government Consumption Growth	General Government Final Consumption Expenditure (Constant 2000 USD)	World Bank [1]
Exports Of Goods And Services As Annual Percentage Growth	Exports of Goods And Services (Constant 2000 USD)	World Bank [1]
Life Expectancy At Birth As Total Years	Life Expectancy At Birth (Years)	World Bank [1]
Age Dependency Ratio As Percentage of Working-Age Population	Age Dependency Ratio (Percentage of Working-Age Population)	World Bank [1]
R&D Investment As Percentage of GDP	R&D Investment As Share of R&D Expenditure (Percentage Of GDP)	World Bank [1]
Education Attainment	Average schooling year for population aged 15 and over in total population	Barro R., Lee J.W. [11]
Growth Of FDI as Percentage of GDP	FDI, Net Inflows (Percentage of GDP)	World Bank [1]

---

# VIETNAM

DR. NGUYEN HUU  
THIEN

## Special Adviser

Quality Association of Ho Chi Minh City

---

### INTRODUCTION

The Socialist Republic of Vietnam was formed with the reunification of the southern and northern parts of the country at the end of the Vietnam War in April 1975. The transformation of Vietnam to a market economy since “doi moi” (renovation) in 1986 has been rapid. Ranked as one of the poorest countries in the world in the 1980s, it now ranks 141st out of 181 countries in GDP (nominal) per capita by the International Monetary Fund [1]. Since 1986, GDP per capita has increased from less than USD100 to USD1,174 in 2010. In the two major cities - Hanoi and Ho Chi Minh City - GDP per capita has increased much faster than GDP per capita in other cities. More than 50% of the country's industrial output is from these two major cities.

Vietnam's GDP per capita should reach more than USD5,000 per year to qualify the country as an industrialized country by 2020. Economic restructuring should help create conditions for industry to account for 45%–50% of GDP, services 40%–50%, and agriculture 10%.

The country's national economic policy has focused on the development of manufacturing industries, services, agriculture, tourism, and retail sales. The GDP growth in Vietnam was last reported at 6.8% in 2010, according to a World Bank report released in 2011. The employment structure of the economy is expected to change significantly between the present and 2020. Employment in the manufacturing and service sectors is expected to increase to 41% and 49%, respectively, with a 10% reduction in the agriculture sector.

From 2011 to 2015, based on the development of sectors with advantages of comparison, it is important to mobilize investment for effective production sectors, develop these sectors to spearhead the economy, and increase the proportion of industrial and service sectors and

non-agricultural labor in GDP to 80%–85% and 50%–60%, respectively.

Between 2016–20, Vietnam aims to realize its set targets to maintain sustainable economic growth and become an industrial country, while the proportion of industrial and service sectors is expected to reach 85%–90% of GDP.

To implement the mentioned roadmap, it is essential to define and qualify the competitive advantages of various sectors and regions in the country so as to boost the modernization process and avoid ineffective industrial development.

National economic policy supports the development of six economic sectors: state, collective, private, private capitalist, state capitalist economies, and foreign investment. A range of incentives and new laws have been provided to encourage the development of new enterprises and private citizens to invest in these sectors. Under the national economic strategy, the country's economy is divided into six economic regions and three focused economic zones. Each region has the power to mobilize resources for development under an open economic mechanism to develop infrastructure and other services. This helps support investment in agriculture, manufacturing, and tourism development to meet the growing demands of domestic and international markets. The national government has given high priority to supporting the development of focused economic zones, thus facilitating and investing appropriately in these.

Vietnam is a developing economy in Southeast Asia. In recent years, the nation has been rising as a leading agricultural exporter and an attractive foreign investment destination. Vietnam's key products are rice, cashew nuts, black pepper, coffee, tea, fishery products, and rubber. Manufacturing, IT, and high-tech

Table 1. GDP Growth Rate and Productivity Growth Rate from 1986–2008

Year/ Period	GDP Growth Rate (at constant market prices)	Labor Productivity Index (year 2000=1)	Labor Productivity Growth (%)	TFP Index (year 2000=1)	TFP Growth (%)
1986	0.4	0.63	-	0.92	-
1987	3.6	0.64	1.53	0.92	-0.38
1988	5.9	0.67	4.04	0.93	1.52
1989	4.6	0.69	2.96	0.94	0.73
1990	5.0	0.69	0.43	0.93	-0.37
1991	5.7	0.72	3.40	0.95	1.64
1992	8.3	0.76	5.66	0.99	4.13
1993	7.8	0.80	4.98	1.02	2.80
1994	8.5	0.82	3.35	1.03	0.84
1995	9.1	0.86	4.19	1.04	1.11
1996	9.0	0.90	4.50	1.05	1.02
1997	7.9	0.95	5.12	1.06	0.76
1998	5.6	0.95	-0.17	1.02	-3.04
1999	4.7	0.96	1.30	1.00	-2.79
2000	6.6	1.00	4.33	1.00	0.39
2001	6.7	1.12	11.10	1.04	4.02
2002	6.9	1.17	4.37	1.05	0.68
2003	7.1	1.21	3.36	1.05	0.19
2004	7.5	1.29	6.77	1.07	2.16
2005	8.1	1.37	6.19	1.10	2.21
2006	7.9	1.39	1.26	1.09	-0.44
2007	8.2	1.49	6.69	1.12	2.61
2008	6.1	1.47	-1.52	1.08	-3.47
1986–90	3.9	-	2.23	-	0.37
1991–95	7.9	-	4.31	-	2.10
1996–2000	6.7	-	3.00	-	-0.75
2001–05	7.3	-	6.32	-	1.84
2006–08	6.9	-	2.09	-	-0.46
1990–2000	7.1	-	3.35	-	0.57
20–2008	7.2	-	4.67	-	0.91

Source: Vietnam Statistics Office [2]; APO [3]

industries constitute a fast-growing part of the economy. Vietnam is also one of the largest oil producers in the region.

The government continues to reform the national finance and monetary system to

ensure more equitable distribution of public revenues. This includes the adoption of a more unified and simpler taxation system, completion of the decentralization procedures relating to financial management in regions and cities, and the promotion of creativity and

innovation in local authorities and industries to enhance the decentralization process.

**PRODUCTIVITY DYNAMICS IN THE PAST 50 YEARS**

The world today realizes the significance of improving productivity, and it has become common for organizations to use different methods and indicators to identify, analyze, and solve problems that affect productivity and performance in the workplace. Trends show that a nation's economic growth and social development are based on productivity improvement. Productivity, which is a unified indicator of economic and social development, is the main foundation of competitiveness and the process of innovation.

**GDP Growth Rate and Productivity Growth**

Economic growth is considered the most important target, not only because the starting point of the Vietnamese economy was low and a stronger economic growth was needed to counter a slowdown, but also because it is the basis for the implementation of many other socioeconomic targets such as prevention of inflation, reduction of unemployment, improvement of balance of payment, increase of revenues of the state budget, and development of education, health care, culture, and poverty reduction, among others.

In reality, the speed of economic growth in Vietnam was considered one of the fastest

compared to other countries and territories in the world. However, it was slower than China in growth during 2000–08.

After the Asian financial crisis in 1997, in parallel with the reform of the economic structure, enhancement of non-state economic sector, and equitization of state-owned enterprises, the Vietnamese economy has grown rapidly, reaching 8.5% in 2007. However, the global economic crisis, which began in 2007 and erupted in 2008, has influenced the economic growth of Vietnam. In 2008, GDP increased only 6.2% with agriculture, forestry, and fishery increasing by 3.8%; industry and construction expanding by 6.3%; and services growing by 7.2%. In comparison with 2006 and 2007, the agriculture, forestry, and fishery industries improved, but industry, construction, and services faced negative impacts of the global economic crisis, especially because the industrial products of Vietnam depended greatly on export markets.

The data of labor productivity showed that in general, productivity increased at a high rate, with an average growth of 4% per year. From 2001–05, the growth rate was the highest at 6.3%. The best year was 2001, with labor productivity growth rate registering 11%.

On the whole, Vietnam's total factor productivity (TFP) growth rate was quite low. During 1991–95, TFP seemed to grow fast at

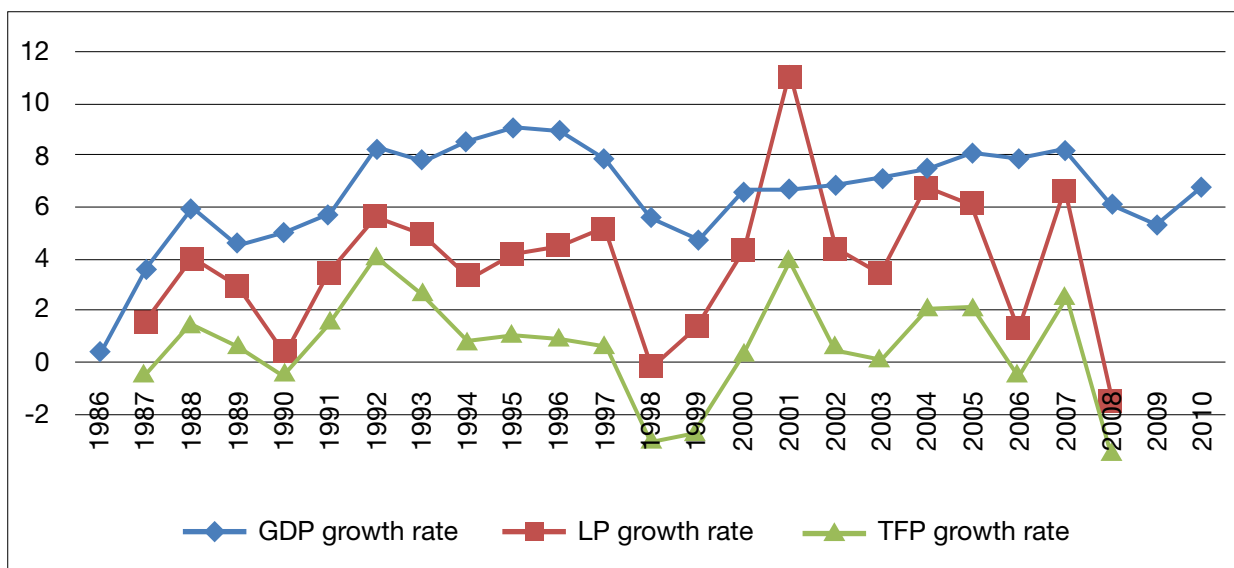


Figure 1. GDP and Productivity Growth from 1985–2010

the rate of 2.1%. For the period of 1996–2000, it decreased -0.75%, but increased again in 2006–10. However, the figure dipped again in 2006–08.

Figure 1 shows that TFP growth rate was not stable. It was high in 1992, 1993, and 2001 (growth rate of 4%). From 1998–2000 and in 2008, TFP was -3%.

### Sources of Growth Analysis

#### Source of GDP Growth

As highlighted in Table 2, the main factors contributing to the growth of GDP were labor growth, capital growth, and TFP growth. Capital growth contributed 60% to GDP growth, followed by labor growth (24%), and TFP at 11% to GDP growth. The statistics revealed that the development of economy depended mainly on the growth of non-IT capital investment.

capital input per hour worked), which reflected the capital-labor substitution and TFP. In other words, these factors were key in fostering labor productivity.

Model B:

$$\text{Labor productivity} = \text{Capital deepening} + \text{TFP}$$

Through the data of three factors contributing to the growth of labor productivity, labor productivity growth was mainly contributed by non-IT capital deepening.

### FACTORS AND GOVERNMENT POLICIES INFLUENCING PRODUCTIVITY

As progress was monitored toward TFP achievement, factors influencing TFP growth in Vietnam over the last decade were

Table 2: Output Growth and Contributions of Labor, Capital, and TFP

Period	Output	Labor	IT Capital	Non-IT Capital	TFP
1986–90	4.74	1.36 (29%)	0.23 (5%)	2.78 (59%)	0.37 (8%)
1990–95	7.88	1.94 (25%)	0.22 (3%)	3.62 (46%)	2.10 (27%)
1995–2000	6.74	1.99 (30%)	0.37 (6%)	5.10 (76%)	-0.72 (-11%)
2000–05	7.27	0.48 (7%)	0.35 (5%)	4.58 (63%)	1.85 (25%)
2005–08	7.38	2.80 (38%)	0.59 (8%)	4.42 (60%)	-0.43 (-6%)
1986–2008	6.84	1.63 (24%)	0.34 (5%)	4.13 (60%)	0.74 (11%)

Source: APO [4]

Unit: Average annual growth rate (%)

Model A:

$$\text{Output} = \text{Labor} + \text{Capital (IT capital and non-IT capital)} + \text{TFP}$$

In the periods of 1990–95 and 2000–05, the economic growth rate was high and the contribution of TFP growth to GDP growth was significantly higher than other periods (over 25%). For the periods of 1995–2000 and 2005–08, TFP hardly contributed to the economic development.

#### Source of Labor Productivity Growth

Average labor productivity growth at the aggregate level can be decomposed into effects of capital deepening (as measured by

identified. In total, four factors were found to be significantly related to TFP and labor productivity growth (educational attainment, R&D investment, trade openness, and government consumption).

$$\text{TFPG} = F(\text{EDU}, \text{RD/GDP}, \text{EX/GDP}, \text{FDI/GDP}, \text{GOV/GDP})$$

$$\text{LPG} = F(\text{EDU}, \text{RD/GDP}, \text{EX/GDP}, \text{FDI/GDP}, \text{GOV/GDP})$$

where:

- EDU: total schooling interpolated
- RD/GDP: R&D expenditure/GDP\*100



Table 3: Role of TFP and Capital Deepening in Labor Productivity Growth from 1986–2008

Period	Labor Productivity	Capital Deepening		TFP
		IT	Non-IT	
1986–90	2.24	0.20 (9%)	1.67 (75%)	0.37 (17%)
1990–95	4.32	0.17 (4%)	2.05 (47%)	2.10 (49%)
1995–2000	3.01	0.30 (10%)	3.44 (114%)	-0.72 (-24%)
2000–05	6.36	0.33 (5%)	4.17 (66%)	1.85 (29%)
2005–08	3.81	0.28 (7%)	2.79 (73%)	0.74 (19%)

Source: APO [4]

Unit: Average annual growth rate (%)

- EX/GDP: Export/GDP\*100
- FDI/GDP: FDI investment/GDP\*100
- GOV/GDP: Government consumption/GDP\*100

In addition to governmental expenditure, other factors such as ratio of export in GDP, FDI in GDP, and R&D investment were low, especially average school years (five years). Due to the limitation in these factors (technical progress, quality of inputs, quality of labor, and other policies for trade openness), TFP growth was low, affecting the quality of improvement (growth). In the next stage, Vietnam should focus on the quality of inputs to ensure stable improvement.

Since Vietnam is still one of the lowest performers in terms of labor productivity levels in the world, there is a need for a bigger focus on improving labor skills and knowledge in the years to come.

## PRODUCTIVITY ORGANIZATIONS AND MOVEMENTS

### Organizations Leading the Productivity Movement, their Mandates, Structures, and Programs

The government of Vietnam has acknowledged the importance of productivity improvement initiatives for the eradication of poverty and the optimum use of scarce economic resources. One such initiative is the establishment of the Vietnam Productivity Centre (VPC) after joining the Asian Productivity Organization (APO)

in 1996. The formation of VPC was based on the recommendations of the Directorate for Standards, Metrology and Quality, which falls under the Ministry of Science and Technology.

### Major Productivity Campaigns and Activities Initiated by the VPC in the Past 15 Years

1. To promote productivity and quality by:

- Acting as the core of the national productivity movement; conducting research, and providing guidance and measures for quality and productivity enhancement in Vietnam
- Carrying out workshops for information exchange among different industrial sectors to share and learn experiences, and organizing conferences and seminars on productivity improvement for entities and social-economic organizations
- Creating member networks at home and abroad, and building and monitoring the movement of productivity and business environment across the country

Some milestones are:

a. Productivity and Quality (P&Q) Forums  
 Since the first forum on ISO 9000 in 1996, the VPC has organized 15 P&Q Forums on various themes, from Products in Vietnam to Knowledge Management and Developing Entrepreneurs for Productivity Breakthrough. The annual P&Q Forum has become a special event for hundreds of domestic

and international experts, together with Vietnamese enterprises and communities, to share ideas, knowledge, and experiences, and to get updates on productivity and quality for the best performances and competitiveness.

b. Fomnet

Established in 1997, the Productivity and Quality Forum Network (Fomnet) has attracted nearly 400 members throughout the country. They come from various companies, institutions, and associations with the same goal of promoting productivity and quality toward sustainable development. Fomnet is considered an effective channel to share knowledge and information on advanced management solutions. It also provides updated publications and shares useful techniques to its members.

2. To implement and coordinate projects by:

- Managing a great number of projects with international partners and sponsors such as the European Commission, the APO, the Asian Society for Environmental Protection, the Asia-Pacific Economic Cooperation, the Japan New Energy and Industrial Technology Development Organization, and Japan Electronics and Information Technology

Industries Association, among others. These projects encompass different sectors, from management, ICT fields to environmental protection, community development, and hunger alleviation.

- Leading various important projects for the Vietnamese government, the Ministry of Science and Technology, the Directorate for Standards and Quality, and other related ministries and authorities to improve the living standards of communities and organizations.

Some major projects:

- Green Productivity in rural communities and the cement industry (1998– 2000)
- Environmental Management System (EMS), EMS Audit and ISO 14000 Certification for SMEs in Indonesia, the Philippines, Thailand, and Vietnam (2000)
- Environmental Performance Assessment in Industry in Asian countries (Indonesia, the Philippines, Thailand, and Vietnam) (2000)
- Enhancing Environmental Awareness in Primary Schools (2010)

Table 4. Regression Analysis of Determinants of TFP and Labor Productivity Growth from 2000–08

Factor	TFP Growth	Labor Productivity Growth
Intercept	-28.434 (156.546)	-65.296 (296.938)
(EDU)	10.370 (52.820)	26.603 (100.189)
(RD/GDP)	15.100 (20.996)	29.631 (39.825)
(EX/GDP)	-0.0756 (0.892)	-0.3507 (1.693)
(FDI/GDP)	-0.1433 (0.181)	-0.233 (0.343)
(GOV/GDP)	-0.906 (3.201)	-2.182 (6.072)
R <sup>2</sup>	0.713	0.626
Obs	9	9

Source: Educational Attainment for Total Population, Vietnam General Statistics Office [2], and Barro & Lee [5]

- Knowledge Management (KM) (2007–09)
  - Promotion of “One Village One Product movement” in Vietnam (2008–10)
  - Lean Six Sigma in manufacturing and service companies (2010–11)
3. Provide high-quality training and consulting programs
- To improve the management systems and competitiveness of Vietnamese organizations and enterprises. The training and consulting programs cover a wide range of areas: ISO 9000, ISO 14000, SA8000, HACCP, TQM, SPC, Kaizen & 5S, CRM, CSM, HRM, KM, TPS, and TPM.

### **Organizations      Monitoring      Productivity Improvement**

1. The Directorate for Standards, Metrology and Quality (STAMEQ)

STAMEQ is an agency attached to the Ministry of Science and Technology. It exercises its authority according to the provisions of law on standardization, metrology as well as product and goods quality, upholds other relevant law provisions, and performs specific tasks. Among other roles, STAMEQ:

- Organizes and conducts scientific research, and professional and technical training; fosters technology testing and transfer; provides information, propagation, and consultancy on standardization, metrology, quality, productivity, numeral codes, and bar codes
- Enters into international cooperation on standardization, metrology, quality, productivity, numeral codes, and bar codes according to law provisions; represents Vietnam in international and regional organizations under decisions of competent state agencies

### 2. The General Statistics Office (GSO)

The GSO is an institution directly under the Ministry of Planning and Investment, that performs the advisory function of assisting the Minister of Planning and Investment in its task of state management in the field of statistics, conducting statistical operations and providing socioeconomic statistical information to all agencies, organizations, and individuals in accordance with the law

### **Cooperation between the VPC and the APO in the Last 10 Years**

Since becoming a member of the APO in 1996, Vietnam has cooperated actively with the APO and other national productivity organizations (NPO).

In the last 10 years (2001–20), Vietnam has hosted more than 50 APO projects in the country, and has sent hundreds of participants annually to attend various APO projects held in other member economies. These projects have included researches, study meetings, forums, conferences, observational study missions, seminars, workshops, training courses, etc. Individual country projects such as Technical Expert Services, Observational Study Missions, Bilateral Cooperation Between NPOs, and Institutional Strengthening of NPOs, among others, were well implemented to enhance the productivity movement in Vietnam.

### **ISSUES AND CHALLENGES IN IMPROVING PRODUCTIVITY**

The open integration policies of Vietnam have brought great success, but the country still faces many challenges in improving productivity.

#### **Attracting a Larger Volume of Export-oriented Foreign Direct Investment (FDI)**

While Vietnam enjoys export-oriented FDIs, its figures are far smaller when compared to the accumulation in southern China, Thailand, or Malaysia. For Vietnam to deeply engage in regional production network, substantial FDIs must be attracted into the country.

Vietnam should rapidly improve on all these fronts: i) regular dialogue with enterprises to understand their requirements, ii) guarantee of policy stability and transparency, and iii) a display of strong policy commitment and active PR, with due attention given to details and overall consistency in order to become the best business location in the world.

### **Selection and Enhancement of Import-substitution Industries**

Policy for import-substitution industries is more difficult than export-oriented industries, as it requires more information and delicate measures. This applies to both local and FDI firms of import-substitution. These firms face the double problem of i) a small domestic market in terms of demand and ii) the lack of supporting industries in terms of supply side - both contributing to high cost and weak competition.

While these firms are currently protected from foreign competition, it will be for a limited period with the future implementation of the ASEAN Free Trade Area and the proceeding accession of the World Trade Organization, which will threaten their survival. To cope with rising competitive pressure, the combined strategy of selection and enhancement is advisable, where some firms exit and those who can improve productivity survive (instead of trying to keep them all).

The ultimate fate of each industry will be decided by market and entrepreneurial efforts, but the government has a vital role to play in that process, including i) designing an appropriate tariff reduction schedule for each industry to encourage bad firms to leave and good firms to become efficient, ii) pre-announcing this schedule and adhering to it even under political pressure, and iii) temporarily supporting firms with realistic plans without breaching external trade commitments. However, such conditional protection entails substantial risks if it is carried out without sound information and analysis. Should it occur, the selection and enhancement process will not succeed, and

the national economy may incur a large and unnecessary cost.

### **Intensive Policy for Attracting and Fostering Supporting Industries**

Vietnam constantly drafts and revises a large number of policies for localization and related incentives as well as penalty measures for the purpose of creating supporting industries. Support for specific industry must be done in a realistic way, not forced. Instead of penalizing firms with low localization, the government should offer a free and low-cost business environment for all firms, and additionally assist firms with high contribution.

### **Importance of Dialogue in the Policy-making Process**

In Vietnam's policy process, there is no effective mechanism to collect detailed and up-to-date information on domestic industries and global markets, which is vital for industrial promotion and FDI attraction. Under globalization, the vicissitudes of firms and industries are determined by international competitiveness - price, quality, speed, service, product design, etc. - and not by a list of inward-oriented quantitative targets of production and investment. While international competitiveness is hard to attain immediately, the proposed first step is to institutionalize regular dialogue between policy makers, and domestic and foreign firms for policy formulation. At present, policies drafted by a few officials at relevant ministries are circulated among other ministries for comment. This process lacks input from the business community and is devoid of vital information and analysis. Vietnam needs a system to regularly survey the needs and impediments of domestic and foreign firms, share this information with all stakeholders, and use it for policy formulation.

### **A Special Team under the Prime Minister for Directing Economic Policies**

Vietnam's decision-making process takes place in a complicated web of vertical and horizontal authorities. Responsibility is diffused and the process is not transparent. Policies lack clarity

and consistency, and response is slow when speed is required. FDI and Official Development Assistance (Ministry of Planning and Investment), industrial strategy and trade negotiations (Ministry of Industry and Trade), tariff structure (Ministry of Finance), and technical standards (Ministry of Science and Technology) are dealt with by different ministries without coordination on substance. There exists a lack of communication within the departments of a ministry. Under these circumstances, it is impossible to introduce policies for individual industries and products in an economically meaningful manner. For a more fundamental solution, the establishment of a small group of highly capable professionals is needed. With the full confidence and support of the prime minister, this group should be given the authority for economic policy-making and supervision of all economic ministries and organizations. Such top-down decision-making has been adopted by many East Asian countries for several decades in order to sustain an economic catching up. It should also work well for a latecomer country such as Vietnam, which is just experiencing the process of high growth.

## REFERENCES

- [1] International Monetary Fund, World Economic Outlook Database. Available at <http://www.imf.org/external/pubs/ft/weo/2010/01/weodata/weoselgr.aspx>, accessed on 21 April 2010.
- [2] Vietnam General Statistics Office, Government of Vietnam. Vietnam Statistical Yearbook 2010. Hanoi: Vietnam General Statistics Office; 2010.
- [3] APO. APO Productivity Databook 2011. Available at <http://www.apo-tokyo.org/about/files/>.
- [4] APO. APO Productivity Database 2011. Available at [http://www.apo-tokyo.org/about/files/apo-p-database\\_2010data.xls](http://www.apo-tokyo.org/about/files/apo-p-database_2010data.xls).
- [5] Barro R., Lee J.W. Educational Attainment for Total Population, Barro-Lee Educational Attainment Dataset. Available at <http://www.barrolee.com>.

---

# **PART 2: PRODUCTIVITY IN FOCUS**

---



---

# SUMMARY - PRODUCTIVITY IN FOCUS

DR. FENG-SHANG  
VINCENT WU

## Professor

Graduate Institute of Technology, Innovation  
and Intellectual Property Management  
National Chengchi University

---

## INTRODUCTION

Productivity in Focus covers six strategic themes that the Asian Productivity Organization (APO) has focused on in its productivity drive over the past five decades. They are Green Productivity (GP), aging society and productivity, small- and medium-sized enterprise (SME) competitiveness in a globalized economy, rural community development, public-sector productivity, and agricultural productivity. Each themed report roughly includes four sections: Introduction, Case Studies, Conclusion, and Recommendations.

In the Introduction section, the authors address the general concept of the theme and prevailing understanding in the APO region. The authors also attempt to address theme-related questions such as the concept and fundamental principles of GP, how it contributed to the productivity movement and economic development of the country/region, how SMEs can gain competitiveness in a globalized economy, and what public-sector productivity means. Additionally, the authors elaborate on the progress made under the theme and its development cycle in the region/country. Major activities of the APO and national productivity organizations (NPO) under the themes are also highlighted.

In Case Studies, the authors provide detailed examples related to the theme based on their respective countries and other APO member countries with which they are most familiar. The content of Case Studies includes a description and discussion of the ways the country resolves challenges that arise from growing popularity and involvement with

theme-related activities and how a country initiates appropriate programs and sets the right policies and instruments to respond to change. The authors then analyze how these initiatives and policy instruments contribute to improvements in productivity and socioeconomic development. The writers also describe the role and contributions of the APO and NPOs in promoting the corresponding activities and eventually enhancing the productivity and competitiveness of APO members.

In the Conclusion section, the authors summarize the key findings and success factors learned from the Case Studies. In Recommendations, the authors provide specific suggestions for future course of action for the APO, derived from the findings and theme-related activities and development.

## SNAPSHOT OF THEMED REPORTS

The Green Productivity and Economic Development article begins with the introduction on the history and origin of GP. It mentions that since the Rio Summit in 1992, the APO was convinced that in order to harmonize economic development and environmental protection, GP should be adopted and promoted in the Asia-Pacific region, home to half of the global population. In 1994, a special program for the environment was established within the APO through a special grant from the Japanese government to promote GP. The APO, therefore, organized the first World Conference on Green Productivity in Manila from 4–6 December 1996. With the Manila declaration on GP, the APO would embrace the concept of GP and integrate it in many

of its activities such as human resource development, technical assistance, and information dissemination.

Since 1996, the APO has initiated and supported many GP-related activities throughout the region. The article gives a few examples of successful cases among APO member countries. The selected examples are GP implementation in Thailand's food industrial sector, in Vietnam's community development, and in various sectors in Malaysia through Training of the Trainers Practicum Workshop. The paper concludes that GP could be used as a strategy in promoting economic development in many APO member countries. It also emphasizes the promotion of GP consultants' network and recommends that all available GP networks collaborate closely with their NPOs and the APO.

The Demographics and Productivity: Aging Society paper presents the argument that global aging will be a major determinant of economic and social development in industrial and developing countries in the long run. The speed of the demographic changes in East Asian countries is dramatic and will deeply affect the future labor market, social security, and welfare in the region. The expected strain on public budget and especially public pension for old-age income has already received prominent attention. But population aging poses many other economic challenges that will threaten productivity and growth if they remain unaddressed.

The phenomenon of rapid demographic aging brings forth numerous challenges to a society and its economy, among which is the generally perceived economic unproductivity. Nevertheless, the paper brings up the interesting fact that there are more debates than consensus between researchers on the effect of population aging on economic growth. According to the pessimistic view mentioned in the paper, population aging, driven by low fertility and longer life expectancy, has negative effects on economic growth through

a set of interrelated mechanisms: i) decreasing labor input due to low population growth and aging, ii) decreasing savings rate and capital accumulation due to increasing dependency ratio and social cost of a prolonged-care of the old-aged, iii) decreasing investment in the human capital of the young generation due to increasing social welfare cost, and iv) increasing foreign debt due to falling interest rates.

In contrast, scholars point out the positive effects of population aging and low economic growth such as development of labor-saving technology and increased investment in human capital, which are posited to compensate for the loss of growth rate due to quantitative decrease in labor input. As such, social policy concerns and reactions are focused on how to mitigate the possible negative impact of population aging on economic growth and social wellbeing.

The paper describes best practices of the Republic of China (ROC), Singapore, Japan, and Republic of Korea (ROK) in Case Studies from six angles: i) reforming retirement policies and practices, ii) rationalization of wages and compensation system, iii) subsidizing wages of older workers, iv) increasing labor force participation of women, v) improving skills and productivity through job training and life-long learning, and vi) remodeling working conditions and workplaces to adapt to aging work force.

The paper concludes that population and labor-force aging bring about both challenges and opportunities to economic growth and social wellbeing, and that productivity should be viewed in a wide spectrum. It is recommended that APO member countries follow best practices to minimize the adverse effects and maximize the positive outcomes of population and labor-force aging on productivity and economic growth.

The SME Competitiveness in a Globalized Economy article indicates the important role



of SMEs in many national economies around the world and points out that SMEs typically account for 95% or more of enterprises, 50% or more of formal employment, and 30%–60% or more of GDP, though these figures vary across countries. For developing countries in East Asia, SMEs have made significant contribution to de facto regional economic integration via their participation in global value chains (GVCs) and/or global production networks (GPNs), which in turn has become an important source of national economic growth. What's more, evidence gathered from the advanced countries suggests that SMEs, small firms in particular, can make a disproportionate contribution to the creation of new jobs.

The paper further mentions that over the last few decades or so, issues such as SME competitiveness in a globalized economy and internationalization of SMEs have drawn considerable attention of international organizations. The article notes specifically that SME competitiveness in a globalized economy may hold different meanings across countries, depending on the role of SMEs in their economies and their stages of economic development. While for countries such as Japan and ROC, a central focus is foreign direct investment (FDI) of SMEs and their links to the domestic economy, other developing APO member countries may find SME participation in GVCs and/or GPNs to be a crucial issue. The paper then provides information on the national effort carried out in assisting SMEs in the globalized economy and SME policy framework in selected APO member countries.

In Case Studies, the paper presents three examples gathered from ROC and ROK to highlight the different ways in which SMEs may grow and prosper against the trend and backdrop of globalization. The paper concludes that efforts should be made to tailor programs for SMEs, as they may be particularly vulnerable to the challenges posed by globalization. In addition, policy design may go beyond the traditional scope, incorporating a broader perspective and context. An innovative policy

design to promote competitive SMEs in a globalized economy is recommended in the final section.

The Out-of-the-Box Rural Development article points out the impractical traditional method through which the wealthier countries throw money at poorer ones in the hope of removing longstanding problems. The author uses the Population and Communication Development Association as the major study subject to address the issues of rural development. The underlying assumption that the only road out of poverty is through business enterprise is eventually realized. By working directly with people who are seen as "part of the problem" and can be transformed into solution-makers, it is possible to help impoverished people to move toward a path of self-help and self-determination.

The article indicates that it is important to partner with multinational companies (MNCs) that possess business and marketing skills. By leveraging their institutional capacity and financial resources, the association was able to implement what is now called the Village Development Partnership. It is considered a serious endeavor to empower communities to eradicate poverty and improve their quality of life. It is a genuine partnership between villagers and sponsoring companies, organizations, or individuals, implemented successfully for over 25 years throughout Thailand. Further, by promoting Individual Social Responsibility in companies, a culture of philanthropy is promoted, something desperately needed in the Asia-Pacific region.

In the Case Studies section, two programs are described - the Village Development Partnership and the School-Based Integrated Rural Development (School-BIRD). The former provides a structured approach toward sustainable poverty alleviation through a three-phase process that addresses issues within five development areas: community empowerment, economic development, environment, health, and education. The latter provides high-quality

secondary education to underprivileged children in northeastern Thailand, offering access to education that goes beyond the role of learning literacy and numerical skills, and the necessary life skills needed to move their communities out of poverty. The report concludes that the Village Development Partnership has evolved into providing support for a large number of vulnerable groups and can also be adapted to other institutions. Finally, empowering the underprivileged in providing marginalized groups access to credit and business training is recommended in order to enhance rural development.

The Public-Sector Productivity article highlights a common perception that wasteful expenditure, inefficiency, and low productivity are characteristics associated with government activities. In addition, the public sector's lack of profit-seeking incentives, excessive red tape, and government decisions based on political motivations rather than rationality are additional features that lead to perceptions of the public sector's fundamental inefficiency. As a result, many countries have pursued public-sector reforms deemed "reengineering or reinventing governance". The essence of the reform is to improve public-sector productivity, which means producing efficient and effective performances out of limited government resources.

In the Case Studies section, public-sector innovation and reform initiatives of five APO member countries, namely, Singapore, Hong Kong, Japan, ROK, and ROC were studied. It turns out that six main principles stood out from the five member countries, i.e., government that costs less, quality government, professional government, digital government, government with regulatory reform, and honest and transparent government. The article also indicates that many activities have been initiated by the APO, although its engagement in this area is relatively new compared to other fields. Finally, the paper concludes and reemphasizes the importance of six factors: cost efficiency, high quality, competence and

professionalism, deployment of ICT, regulatory reform, and transparency. Some actions such as establishing performance measurement schemes, utilizing ICT to integrate government services online, and conducting continuous education and training are recommended to enhance public-sector productivity.

The Agricultural Productivity and Sustainability paper begins with an interesting history of agriculture's role in the APO. Although the APO "founders" paid little attention to agriculture when the APO was established in 1961, the situation changed quickly, as developing member countries requested the inclusion of agriculture as it was a main sector in their economies. The APO set up the Agriculture Department in 1966 and launched the Agricultural Program. In fact, various workshops, seminars, and observation missions were organized throughout the 1970s and 1980s. They cover mainly production-oriented topics such as farm management, horticulture, irrigation, mechanization, rural credit, cereal processing, and cooperatives. In the late 1980s and 1990s, issues such as food processing, marketing, and rural employment gained momentum as national economies and consumer income grew in many member countries.

The paper further indicates two important trends of "green" concerns in production and marketing, and acknowledges "community forces" as a means of enhancing agricultural productivity and reducing mass poverty. Food safety has become a central issue for the entire agro-food chain in the APO region in recent years. The paper then investigates the performance of the agricultural sector in APO member countries and concludes that it had performed fairly well over the last several decades. Food production expanded faster than population, and labor productivity in agriculture improved in all countries.

In the Case Studies section, the paper emphasizes the Green Revolution as it represents the phenomenal upsurge in rice and wheat production

that occurred in Asia from the mid-1960s to 1980s. The driving force behind it was the technical innovation generated by the combination of high-yield varieties, increased fertilizer input, and expansion in irrigated areas. Despite its outstanding success, some criticism, particularly from the Western community on the use of chemicals, resultant monoculture, neglect of small holders, and lopsided benefits were also mentioned.

The paper draws a few key conclusions: i) the agricultural sector in the APO countries exhibited remarkable performance, ii) the speed of growth in labor productivity varies by country, iii) the Green Revolution helped many APO member countries to not only solve their food problems but also put their economy on the path of sustainable economic development, and iv) the APO has made an apt judgment on the role and importance of agriculture in the economic development of member countries.

Finally, the study recommends that: i) the APO pay more attention to the Agricultural Program, ii) the APO and NPOs broaden the scope and topics of agricultural projects, and iii) the APO direct the Agricultural Program's effort on the areas that member countries have little capacity or little knowledge of.

## **CONCLUSION**

Part 2: Productivity in Focus describes six important themes: GP, aging society and productivity, SMEs in a globalized economy, rural community development, public-sector productivity, and agriculture productivity. Each theme presents its role differently from one APO member economy to another. As for the APO, it tailors different kinds of efforts to assist member countries for different theme-related activities in different time periods. For instance, the APO has been holding workshops, seminars, and observation missions in the areas of agriculture productivity since 1966, five years after the APO was established in 1961.

On the contrary, the APO's engagement in public-sector productivity is relatively new compared to other themes. The APO sponsors research projects and study missions for member economies to learn from one another. From the snapshot described above, it can be concluded that each theme is in a different stage with various degrees of maturity and will bring different challenges to all member countries. Therefore, APO member countries should work together closely to continuously manage these important issues with the assistance of the APO.

---

# GREEN PRODUCTIVITY AND ECONOMIC DEVELOPMENT

DR. SUPORN KOOTTATEP

Environmental Consultant

---

## HISTORY AND ORIGIN OF GREEN PRODUCTIVITY

The Asian Productivity Organization (APO) has promoted productivity improvement for its member countries since 1962. Since the Rio Summit in 1992, the APO has been convinced that in order to harmonize economic development and environmental protection, Green Productivity (GP) should be adopted and promoted in the Asia-Pacific region, which is home to half of the global population. In 1994, a special program for the environment was established within the APO through a special grant from the Japanese government to promote GP. APO, therefore, organized the first World Conference on Green Productivity in Manila, held from 4 to 6 December 1996. With this Manila declaration, the APO would embrace the concept of GP and integrate it into all its programs on human resource development, technical assistance, and information dissemination. Since 1996, the APO has initiated and supported many GP-related activities throughout the region.

GP was defined by a group of APO experts as “a strategy for enhancing productivity and environmental performance for sustainable socioeconomic development. It is the application of appropriate productivity and environmental management tools, techniques, and technologies to reduce the environmental impact of an organization’s activities for products and services.”

The principles of GP have been drawn from both productivity and environmental domains. The Manila declaration stated clearly that environmental protection should be promoted without sacrificing productivity. Thus, the APO promoted GP in such a way that it created a paradigm shift among the stakeholders for productivity enhancement and harmony with

the environment. The implementation of GP has been executed in all industrial, agricultural, and service sectors throughout the region.

## GP EXPERIENCES IN APO MEMBER COUNTRIES

The APO has promoted GP activities among its member countries through the Green Productivity Promotion Mission, Green Productivity Demonstration Projects, and Green Productivity Dissemination Assistance. Since 1995, hundreds of projects have been promoted and implemented in APO member countries. This article illustrates a few examples of successful cases, selected based on the outcome of the projects and the multiplication effects of the projects within the country and/or the region. The examples chosen are GP implementations in the food sector in Thailand, community development in Vietnam, and various sectors through the Training of the Trainers Practicum Workshop in Malaysia.

Apart from the promotion of GP, the APO realized the importance of supply chain management (SCM) and started to promote SCM activities in its member countries. Based on the Sendai declaration in October 2004, the International Green Purchasing Network (IGPN) was launched in April 2005. The mission of the network was to promote the development of environment-friendly products and services and Green Purchasing activities around the world, to collect and share information on global Green Purchasing activities, and to harmonize these efforts.

Apart from IGPN, many countries in Asia have also created their own GPN, including Republic of China, PR China, Malaysia, Thailand, and India. The APO has also extended its

activities on Eco-products International Fairs (EPIFs), whose objectives are: i) to educate and engage the public to protect the environment by utilizing eco-products, ii) to provide a marketing platform for companies and industry players to showcase the latest eco-technologies and eco-products to the government, industry, public, and interested parties, iii) to encourage the local as well as international industry players to produce more environment-friendly products in the region, and iv) to provide a platform to explore business collaborations and joint ventures among local and international industries. To date, the APO has organized a number of EPIFs in Malaysia, Thailand, Singapore, and Vietnam, among others. The organization has also published annual copies of the Eco-products Directory from 2005 to 2012.

### GP Implementation in the Food Industry in Thailand

This is a good example of the multiplication of GP implementation in Thailand. In 1998, the APO in collaboration with the Thailand Productivity Institute supported a GP demonstration project at the Chiang Mai Food Industry Company, a medium-scale canning factory that produced canned fruits and vegetables such as longan,

lychee, bamboo shoots, and mushrooms for both domestic and export markets.

The outcome of this project, carried out from 1998 to 1999, clearly stated that with systematic data monitoring and analysis, the root causes of the factory's problems could be identified and taken care of. Raw materials such as water and chemicals used were reduced by 30–50%. Apart from the improvement in manufacturing processes, the APO was able to produce effective training materials for the GP program. A classical Mushroom Case Study was drafted to be used in APO training programs, written in such a way that trainees could easily understand the GP concept and follow its implementation throughout the training module. It has been used in APO training programs since 2001.

The success of the demonstration project caught the interest of the Thailand Research Foundation (TRF), which proceeded to support a research project on GP for Thailand's food sector, producing about 18% of Thailand's total export value. It was estimated that Thailand's food export would reach THB1 trillion in 2011. The majority of food factories in Thailand are SMEs with limited human and financial resources. The GP program was introduced to 11 food

Table 1. Number of Options Generated and Implemented

Factory	Number of Options Generated	Number of Options Implemented	Investment Cost (THB)	Savings, (THB/month)	Degree of Support from Top Management
1	4	1	1,200	1,890	Low
2	7	6	7,950	1,860	Medium
3	4	4	25,400	9,334	High
4	8	6	19,300	5,330	Medium
5	5	3	10,200	3,465	Medium
6	5	5	26,200	3,400	Medium
7	4	4	7,960	32,466	High
8	4	4	18,620	68,793	High
9	9	8	473,700	97,782	Very high
10	7	7	171,300	13,650	High
11	4	4	6,650	216	Medium

factories in the northern part of Thailand [1]. Its objectives were to reduce waste at source, to improve efficiency of used resources, and to reduce unnecessary energy consumption at the factories. Six canning factories and five food preservation factories were involved in the project with most of them falling under the SME category. Their investments were in the range of THB5–THB180 million, while the number of employees were from 17 to 1,500. The outcome of the project is shown in Table 1. It clearly demonstrated that those with high management commitment and proper financial support enjoyed good benefits.

The results of the GP implementation were enough for the National Food Institute (NFI) to jump on board in support of the GP project. The NFI believed this strategy should be used to support Thailand's SME food sector. The institute sent at least two of its staff to join the GP training program in the Philippines and Malaysia. Upon their return, the NFI, in collaboration with the Chiang Mai University, created a GP network consisting of four regional universities and two private companies. The Chiang Mai University took care of the food factories in the north, while Khon Kaen University and Prince of Songklanakarin University oversaw factories

Table 2. Categories of Options Used in GP Implementation

Improving Techniques		Number of Options
1.	Good housekeeping	5
2.	Improve operating procedure	2
3.	Recycle, reuse, and recovery	5
4.	Resources conservation	1
5.	Input material changes	1
6.	Process and equipment changes	1
7.	Design for environment	-

The categories of GP options generated in the project are shown in Table 2. Simple options such as good housekeeping were the highest in use. Waste reduction utilizing the 3R techniques (recycle, reuse, and recovery) were commonly used. More complicated options such as improving operating procedure, resources conservation, input material changes, and process and equipment changes were the least used.

in the northeastern and southern regions, respectively. Thammasat University and two private companies supervised the factories in the central region.

From 2008 to 2012, the NFI and its network implemented GP in 165 factories throughout the country. Details of the outcome are shown in Table 3. Based on the results obtained from 130 factories (2008–2011) [2, 3], the total cost

Table 3. Outcome of GP Project Implemented by NFI from 2008–11

Year	Number of Factories	Total Cost Savings (THB/year)	CO <sub>2</sub> Reduction (kg CO <sub>2</sub> /year)
2008	25	21,073,279	740,141
2009	30	36,623,940	3,742,845
2010	35	60,194,703	7,226,715
2011	40	49,064,913	3,224,326
Total	130	116,956,835	11,709,701

savings were estimated to be about THB117 million per year. Greenhouse gases were reduced through energy-saving methods and reduction of fossil fuel was about 11,709 tons CO<sub>2</sub> in the said period.

The options generated from this project can be classified into three categories: improving energy efficiency, waste reduction and recovery, and improving manufacturing processes.

The most-used options in improving energy efficiency were: i) changing to energy-saving bulbs and energy-saving ballast, ii) reduction of main voltage, iii) lighting management, iv) monitoring and controlling the ventilation system, v) maintenance of steam pipes, vi) improving the combustion efficiency of boilers, vii) reduction of humidity of solid fuel (coal, chip woods, etc.), viii) changing of steel fan blades to plastic blades, ix) making use of all LPG in tanks, x) maintenance of the compressor system, xi) insulation of equipment (steam pipes, hot water tanks, etc.), and xii) production of biodiesel from used oil, among others.

The options in waste reduction that were commonly used in the project included, among others: i) reducing the size of water hose for washing, ii) implementing spray guns in the washing process, iii) reusing water from different processes, iv) recycling water from reverse osmosis rejection, v) using automatic control valves in the processes, vi) reducing raw materials by improving the efficiency of the manufacturing processes, and vii) producing by-products from high potential wastes.

The options in improving the manufacturing processes depended on the nature of manufacturing. A few options obtained from the projects were, among others: i) raw material reduction through the changing of filter sizes in fish production processes, ii) changing the methodology in material cooling in the fish processes, iii) changing of operating

procedures in the noodle factory to reduce production loss, iv) improving productivity through the Critical Path Method analysis, and v) reduction of alcohol evaporation rate during storage process.

### **GP Implementation in Community Development in Vietnam**

The APO's GP demonstration project on community development in Vietnam was very successful [4]. GP is not merely suitable for production processes, it can also be applied to other disciplines such as service, agriculture, and community sectors. The Vietnam Productivity Center (VPC), with support from the APO, implemented the GP demonstration project in community development in 1998. Its main objectives were to improve the living standards of people in the community and its environmental condition. Three villages were selected—two from the north near Hanoi and one from the south close to Ho Chi Minh City. The options generated from the project included, among others: i) the utilization of small-scale biogas in households, ii) the construction of a central water supply plant for the village, iii) the application of integrated pest management to reduce the use of pesticide and chemical fertilizers, and iv) the application of natural farming technology to reduce chemical fertilizers.

After the success of the three demonstration villages, the VPC implemented GP in another eight villages between 2000 and 2001. By the end of 2002, more than 70 villages had applied GP at the community level. The results showed that 67% of the villages adopted biogas in treating their animal and human wastes. Biogas was used for cooking and lighting in their households. They could have saved between VND700,000–VND1,000,000 per household for fuel. The villagers also built 524 hygienic latrines for their use.

### **GP Implementation through the Training of the Trainers Workshops in Malaysia**

The Training of the Trainers Workshops have been organized in Malaysia since 2001. To date, the Malaysian Productivity Center (MPC) has

organized 11 training courses. The one-month course provides hands-on experience for its participants, who are assigned to implement GP in factories and organizations. At least 44 factories and organizations have been used for GP implementation case studies for specific training purposes.

In the training course in 2011, participants were divided into four groups, each responsible for implementing GP in one factory. The four factories were a cable manufacturing factory, a burger and meatball factory, a car spare part manufacturing company, and a slaughterhouse. The participants spent two weeks working with each factory's GP team. Collected information was analyzed, problems were identified, and options for improvements were generated for further implementation.

Altogether, the participants generated 62 options for implementation in all four cases. Even though there was insufficient time to implement the options generated during the training program, the factories agreed that in implementing the proposed options, the factories could reduce the use of energy, save raw materials, and reduce production cost.

## CONCLUSION

GP could be used as a strategy in promoting economic development in many APO member countries. With high competition in the world today, those who can "produce more with less" can survive in the game. The APO has supported many demonstration projects in the region and most of them clearly recorded the benefits of GP implementation schemes. However, the multiplication effect is still far from perfect. The APO has organized many training courses in the past, but there is a lack of GP practitioners in the field. To counter this, the GP consultants' network such as the one in Thailand should be promoted. The APO has also created a number of networks such as the Green Productivity Association and the Green Purchasing Network, which should get involved in expanding GP activities in the

region. With the support of governments, as witnessed in Vietnam, GP practices can spread widely. Budgets should be available for GP implementation, and if possible subsidies should be provided to factories.

## RECOMMENDATIONS

In order to promote GP in the region, a few points should be considered. It is very important that all available GP networks should collaborate closely with their national productivity organizations (NPOs) and the APO. GP consulting networks should be available in all APO member countries and granted funds from their respective governments to assist the SMEs in their own country to implement GP.

## REFERENCES

- [1] Koottatep S. Waste minimization program in cannery and vegetable/fruit preservation in northern part of Thailand. Research report for the Thailand Research Fund, Nonthaburi, Thailand, 2001.
- [2] Koottatep S. Best practices on green productivity. Final report submitted to the National Food Industry, September 2011.
- [3] Koottatep S., Pratoomtong U. Best Practice on Green Productivity. Thailand: National Food Institute, Ministry of Industry, Thailand; 2011.
- [4] Asian Productivity Organization. Green productivity-integrated community development for poverty alleviation, APO demonstration project in Vietnam 1998–2001. 2002.



# DEMOGRAPHICS AND PRODUCTIVITY: AGING SOCIETY

DR. HANAM S. PHANG

Senior Research Fellow  
Korea Labor Institute

## INTRODUCTION

Global aging will be a major determinant of long-run economic and social development in industrial and developing countries [1]. The speed of the demographic changes in East Asian countries is dramatic and will deeply affect the future labor market, social security, and welfare in the region. The expected strain on public budgets and especially public pension for old-age income has already received prominent attention. But population aging poses many other economic challenges that will threaten productivity and growth if they remain unaddressed.

While population aging is a global megatrend, there are considerable differences in the speed and pattern of the aging process across countries. These differences are likely to generate different issues and challenges and therefore policy responses [2]. Aging in the Asian region is most prominent in the more

developed countries like Japan, Republic of Korea (ROK), Singapore, Hong Kong, and Republic of China (ROC)—countries that have commonly experienced a rapid economic and social development in the 20th century. The speed and extent of the aging process in these countries are so dramatic that their economy and society are facing much pressed challenges in terms of economic growth, labor productivity, and social welfare (Table 1).

It only took less than a quarter century for these countries to become an “aged” society since they entered the initial stage of “aging” society, and it took only 6–8 years to turn into a “hyper-aged” society from an “aged society” in ROK, ROC, and Singapore. As of 2006, Japan had already become a “hyper-aged” society. If this process of rapid population aging continues, it is expected that by 2050 most East Asian countries (except for PR China) will find more than one-third of their population are old-aged ( $\geq 65$ ) (Figure 1).

Table 1. Process of Population Aging in East Asian Countries Along with Major European Countries

Country	Year Reached			Time Elapsed	
	7% (Aging)	14% (Aged)	20% (Hyper-aged)	7%→14%	
ROK	2000	2019	2026	19	7
ROC	1993	2018	2026	25	8
Japan	1970	1994	2006	24	12
Singapore	1999	2017	2023	18	6
UK	1929	1976	2020	47	44
Germany	1932	1972	2010	40	38
France	1864	1979	2019	115	40

Source: United Nations [3], Werding [4], and Population Projections for ROC Areas (Medium Variant): 2008–2056 (2008), Council for Economic Planning & Development, Executive Yuan, ROC

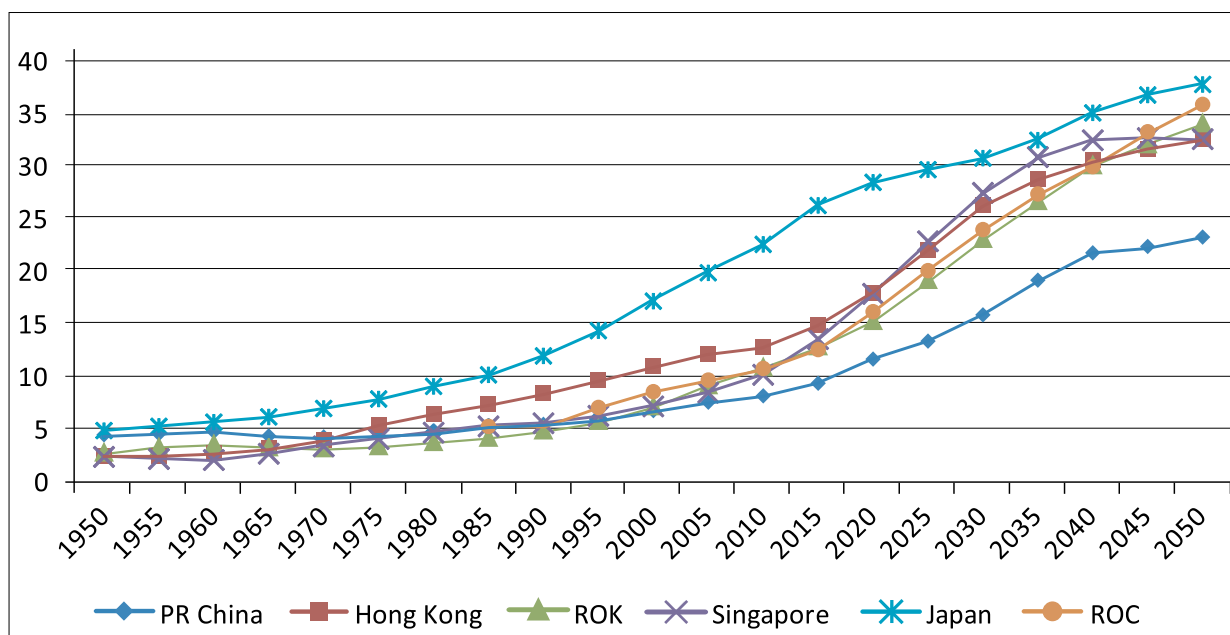


Figure 1. Long-term Trend in the Proportion of the Old-aged ( $\geq 65$ ) in the Population: East Asian Countries

Source: United Nations [3], Werdning [4], and Population Projections for ROC Areas (Medium Variant): 2008–2056 (2008), Council for Economic Planning & Development, Executive Yuan, ROC

This paper reviews the theoretical perspectives of the potential impact of population and labor force aging on productivity and economic growth in the Asian context. It is observed that population aging is a megatrend and an unavoidable challenge to policy makers in the region. But it could be turned into an opportunity for a second demographic dividend if well adapted. The key to a sustainable growth is how to improve productivity up to a level that could compensate for the loss due to aging. As such, policy initiatives and measures are needed to mitigate the possible negative impact of population aging on productivity and economic growth are reviewed, and the best practices within the APO member countries are discussed. This paper concludes with some policy recommendations to be followed and practiced.

### IMPACT OF POPULATION AGING ON ECONOMY AND SOCIETY

The rapid demographic transition to an “aged society” is expected to have serious economic and social repercussions. It is a

concern that an aging population will lead to critical manpower shortage, a decline in productivity as well as an undesirable impact on the economy since resources will have to be channeled into supporting the pension and healthcare expenses of the older population. As such, population aging is normally expected to affect economic growth and social welfare negatively. As the proportion of the old and/or retired is ever increasing and that of the young (workforce) ever decreasing, it will induce, first of all, changes in the quantity and quality of the labor force and its productivity in a negative way if other conditions remain the same. As the old-age dependency ratio increases, it will also put severe pressure on public finances for old-age income and health security.

As already noted in the OECD [5] and ADB studies [6], one of the economic consequences of slowdown in labor force growth is likely to be slower growth in output. According to the OECD [5] projections for ROK, real GDP growth could decline by about 1.5% per annum over the next 50 years, relative to the growth rates experienced over the period 1980–2000. But

it is also noted in balance that the impact of slower or negative labor force growth on economic growth could be offset by either a rise in total factor productivity growth or faster growth in capital input. However, in most Asian countries, productivity growth is expected to be slower, not faster, in the future, as it had been relatively high and is likely to drop to the lower levels observed in other advanced economies.

On the effect of population aging on economic growth, however, there is still more debate than consensus between researchers. While the majority of scholars uphold a pessimistic view, quite a few scholars advance an optimistic view, pointing out over-simplifications ingrained in the pessimistic views so far advanced [7].

According to the pessimistic view [8–12], population aging driven by low fertility and longer life expectancy has negative effects on economic growth through a set of interrelated mechanisms: i) decreasing labor input due to low population growth and aging; ii) decreasing savings rate and capital accumulation due to increasing dependency ratio and social cost of prolonged care of the old-aged; iii) decreasing investment into the human capital of the young generation due to increasing social welfare cost; iv) increasing foreign debt due to falling interest rates.

On the positive side, scholars point out that the effects of population aging and low economic growth such as the development of labor-saving technology and increased investment into human capital compensate for the loss of growth rate due to quantitative decrease in labor input. Scarth [13], for example, asserts that population aging could lead to productivity growth by motivating increased investment into human capital as labor becomes a relatively scarce production factor. The Cutler et al. [14] cross-national comparative study using panel data came up with the conclusion that decreasing labor force growth results in increasing labor productivity.

As such, social policy concerns and responses are focused on how to mitigate the possible negative impact of population aging on economic growth and social wellbeing. The APO research project [15], "Issues and Challenges Facing Productivity in Aging Societies," was commissioned to national experts from APO member countries (Japan, ROK, Singapore, and ROC) to undertake an in-depth examination of the key issues in the productivity of aging societies. It was intended to create a comprehensive understanding of aging and its long-term effects on the member countries and their economies. In particular, the participating experts were commissioned to examine and evaluate long-term trends and prospects of population aging in their countries and its implications for economic growth and social wellbeing in the future. To that end, national experts addressed the issues and challenges facing productivity in their home countries from three perspectives: i) supply, i.e., issues of the elderly workers' motivation to remain in the job market and continue working; ii) demand, i.e., the willingness of employers to continue hiring elderly employees and the implications for employers and employment in general; iii) policy, i.e., the relationship between public policies on the employment of older persons and productivity.

To accomplish the research mission, each country report described long-term trends (i.e., 1960–2009 (flexible)) and prospects (2010–2050 (flexible)) of population and workforce aging in each member country and discussed related labor market issues and challenges, if any, from the angles of supply and demand. In particular, national experts introduced relevant retirement policies and regulations, and discussed how they affect continued employment and active status of the old-aged in each country. In each country report, participating experts addressed and discussed productivity issues and challenges in the context of aging population and workforce. In conclusion, public policies and measures aimed at maintaining and enhancing the

productivity of aging workforce (such as targeted job training and/or life-long learning programs and policy incentives) in each member country were recommended.

One of the most promising policy alternatives to cope with rapid population aging and its potential negative impact on productivity is to induce more active participation of married women and the old-aged in the labor market. But it is well-observed that there are still many institutional obstacles to be overcome.

To address the related issues, the APO convened a study meeting on "Participation of Women and Retirees in the Workforce" in December, 2009 (Seoul, ROK) to review the current status of APO member countries and to discuss employment policy initiatives that could help boost "increased and active participation" of married women and the old-aged retirees in the workforce. To that end, national strategies for increasing participation of these target groups were discussed and policy recommendations were exchanged between participants from each member country.

It was pointed out in the APO-commissioned study meeting that i) married women in Asian countries are still facing many market and institutional barriers to active and continued participation in paid employment such as insufficient social support for motherhood, lack of accessible public childcare facilities, limited opportunities for decent jobs, and flexible work arrangements, and that ii) many old-aged workers in Asian countries are forced to retire early from their jobs and face dim prospects for decent reemployment that could provide financial security in their old age.

Currently, the labor force participation of women in East Asian countries is considerably low relative to other advanced countries. It has been increasing over the long term, but it's still below the 50% mark. Thus, it is advisable to strengthen gender-fair policies to keep the threshold of labor market low so that the first entry (after school) and reentry (after childbirth)

into the labor market can be achieved without incurring much transition costs. Also, labor market institutions and practices need to be reformed in the direction that enables working women to successfully harmonize work and family, and develop their career more consistently.

Low fertility and aging population could lead to labor force shortage in the future. The European (i.e., France, Sweden, Norway, etc.,) experience in aging society and policy drive could be a good benchmark in that regard, where family-friendly employment policies and strong social support for childcare resulted in both increased labor force participation of married women and total fertility level.

Activation and utilization of the old-aged could also serve as a viable policy alternative. In that sense, East Asian countries are advantaged. The work attitudes and behavior of the old-aged in the East Asian countries are found to be different from those of the old-aged in European aging societies [16]. More than 60% of the old-aged and retired wanted to continue working even after they reached normal retirement age. The main reason they wanted to keep working was to earn their own living. That could also reflect their unpreparedness to retire completely, as their pension rights were insufficiently secured or not secured at all. In which case, they would have no other option than to keep working until their physical and mental capacities are no longer permitting.

The availability of flexible part-time jobs surfaced as one of the most needed for the old-aged, who could productively participate in the labor force [15, 16, 18, 19]. Part-time jobs could serve as a "bridge job" for the old-aged before they finally retire. In many Asian countries, where workers retire from their jobs earlier than normal retirement age, flexible part-time jobs could provide work opportunities to the early retirees so that they could stay longer in the labor market and save more for their retirement.

Table 2. Proportions of the Old-aged Who Want to Work and Their Reasons

Age	Want to Work			Don't Want to Work
	To Earn Living	For Active Life	Other Reasons	
ROK 55–64	40.5	24.6	6.3	28.5
ROK 65–79	21.4	14.6	5.7	58.3
ROC (50+)	70.6	38.7	8.7	35.3
Singapore (50+)	77.9	12.4	9.7	32.5

Source: Korea National Statistics Office [17], ROC, Chu (2010); Singapore, Thang [18]

Keeping the old-aged in the labor market through part-time jobs will also contribute to the social security system, as they stay as contributors rather than pensioners. Thus, policy initiatives should create more part-time jobs with flexible work arrangements and jobs with low stress levels that are not physically demanding. Given the work motivations of the old-aged, there are pressing needs for employers to proactively redesign their workplaces and personnel policy to meet the requirements of older workers. Old-aged employees themselves need to change their attitudes to accept changes that may come with a new work environment such as reduced work hours and lower compensation, and actively participate in training and retraining programs.

### CASE STUDIES AND BEST PRACTICES

The general objective of the labor force policy in most Asian countries is to reinforce the potential of a sustained economic growth by preventing and/or mitigating the possible negative impacts of population aging and labor force shortage. The motto of the policy drive is to set up a labor market environment in which old-aged individuals could keep working as long as they are healthy and strong enough to work, and women could continue their careers in a more consistent manner.

The following are the major policy measures that should be taken up to reform the labor market and employment relations in order to achieve sustainable growth and social wellbeing in an aging society.

#### i. Reforming retirement policies and practices

In many APO member countries, old-aged workers are forced to retire early from their main jobs. As such, early retirement in most Asian countries is more a demand-side than a supply-side issue, as in Western countries. For instance, mandatory retirement is a common practice among Korean firms, and regulated retirement age is often set very low at an average of 55, well below both the official pensionable age of 60 and the effective retirement age of 67 [16, 19].

In ROC, the proportion of those aged 60 and above who are still actively working had consistently decreased from about 74% in 1991 to about 33% in 2005 [15]. This clearly indicates a trend of early retirement, whether it is forced or voluntary, which should be tackled in order to cope with aging population and labor force.

In this regard, Japan, whose population is already hyper-aged, was an early starter in policy intervention. In 1994, the Japanese government revised its Act for Promotion of the Employment of the Old-aged to raise the mandatory retirement age to 60, and then re-revised and raised it up to 65 in 2004. According to the revised act, employers are required to a) set up their firms' retirement age to above 65, b) abolish mandatory retirement policy, or c) adopt reemployment policy for their retirees so that they can continue working until they reach the formal pensionable age.

These interventions in employment policy are part of the Japanese government's response

to their oldest population and especially to their 8.6 million baby boomers (born between 1947 and 1949) who turn 65 in 2013 and begin retiring. To cope with the public pension pressure, the Japanese government reformed the Employees' Pension System to extend the normal retirement age (for basic pension) from 61 (effective 2001) to 65 (effective 2013). Currently, the Japanese government has taken a step further to encourage firms to keep their workers until they reach age 70. According to the Survey of the Aged Employees (2004) by the Japanese Ministry of Welfare and Labor, more than 16% of firms extended their mandatory retirement age to 70 and over [20].

The legislation of Re-employment Act by the Singapore government should be taken as another best practice in policy intervention. The statutory retirement age in Singapore was 60 at the introduction of the Retirement Age Act in 1993. In 1999, it was raised to 62, with the long-term objective to increase it progressively up to age 67. However, the Tripartite Committee (2007), inspired by the case in Japan, has recommended the adoption of a "reemployment of the retirees" policy rather than push up mandatory retirement age forcefully to 67. It is believed to be more effective and efficient in raising the employment rates of the old-aged while allowing for more flexibility in work arrangements, as well as wage and benefits adjustments during reemployment.

The opponents to extending retirement age point out that keeping old-aged workers longer in employment would reduce job opportunities for younger generations due to a trade-off effect. But it is well observed in OECD's [21] comparative international study (Figure 2) that employment rates of the old vs. young are not in a trade-off but in a complementary positive relationship; if the employment rate of youth is high, then, that of older people is also high and vice versa. Some European countries in the mid-1980s pursued early retirement policy funded by social security programs to reduce youth unemployment. But they failed to achieve what they wanted; early retirement

increased, but youth unemployment rates were not reduced.

ii. Rationalization of the wage and compensation system

Measures are also required to adapt wage-setting practices to the aging workforce in order to tackle discrimination and negative attitudes toward working at an older age, and to improve the job skills of older people to better "activate" older jobseekers.

Wage and compensation is governed by a seniority system in many Asian countries, which has its own merits in that it potentially increases economic efficiency by strengthening incentives for employees to work more diligently as to remain with the firm or to invest in firm-specific skills. Older workers also generally benefit by employment contracts of this type, since both lifetime and current earnings are increased [11]. But such efficient match between demand and supply of labor would no longer be readily available in the future labor market with the aged workforce.

In this system, difficulties may arise for future older workers who attempt to delay retirement or change jobs in order to remain in the labor market after early retirement because a) employers will find it costly to hire older workers who have a limited period of time during which compensation exceeds productivity and b) it is infeasible to offer a compatible wage compensation to experienced old workers because of the fixed cost of hiring under the seniority pay system. At the same time, firms may prefer to shed older workers first when downsizing [11].

To reduce the cost of keeping older workers in employment, the current wage-determination system needs to be transformed from a seniority-based one to productivity- and performance-based wage system. One of the interim policy tools for insuring the old-aged decent job opportunities until normal retirement age is to set up a "wage adjustment option" system,

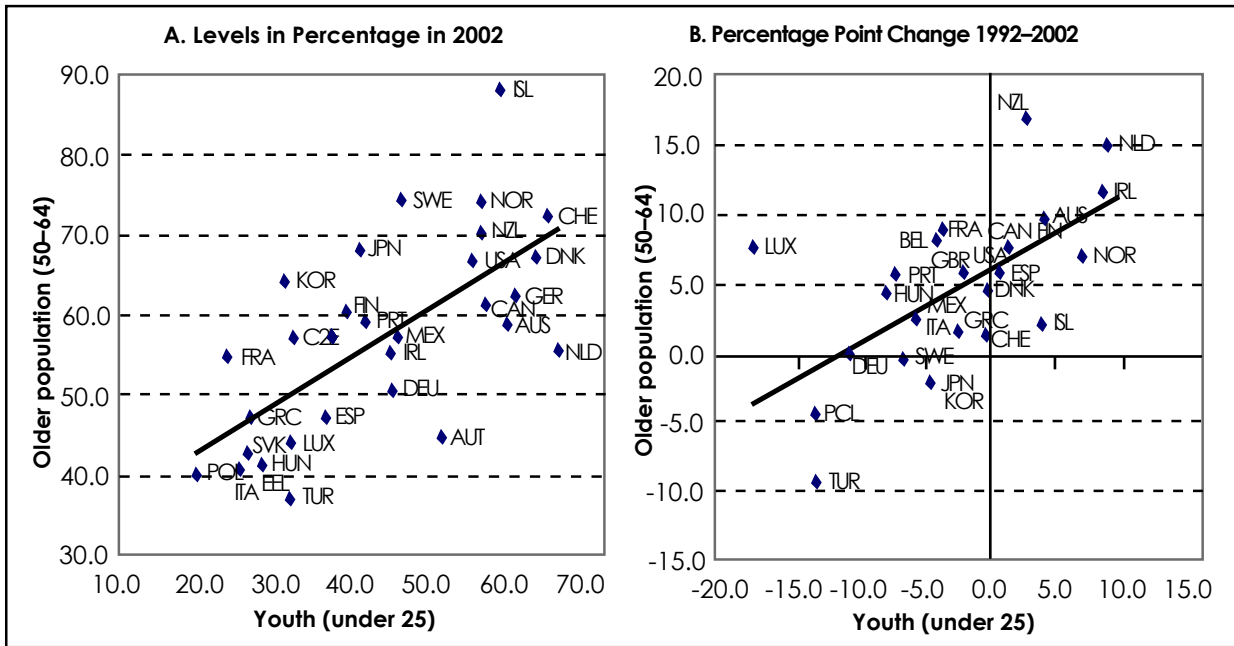


Figure 2. Empirical Relationship Between the Employment Rates of Youth and Older Population in Cross-sectional and Longitudinal Perspective  
Source: OECD [22]

by which employers could negotiate wage increases with their old-aged employees for an extended employment over a certain age limit. It is recommended that labor market reform efforts should be pursued in favor of employment longevity over compensation, and active work life can become longer for average workers. In many Asian countries, including ROC, Singapore, Japan, and ROK, governments are setting up incentive programs for employers to keep old-aged employees longer by extending their firms' retirement age.

iii. Subsidizing wages of older workers

Another way of making it more attractive for employers to hire and retain older workers is to subsidize the cost of employing and keeping them. The Korean government, for example, has set up incentive programs through the Promotion of Employment for the Old-aged Act and Employment Insurance for employers to retain old-aged workers longer. In ROK, under the Employment Insurance System (introduced in 1995), four types of wage subsidies are available: subsidy to promote over-quota (6%) employment of older workers, subsidy

to promote newly employed older workers, subsidy to promote extended employment of retiring workers, and subsidy to promote employment of older workers upon completion of subsidized job training. The objective is to induce firms to gradually increase retirement age up to the age at which National Pension benefits are paid (e.g., 60 by 2008 to less than 65 by 2033).

The government of Singapore provides financial grants to induce companies to adopt the "reemployment of the retiree policy". Grants up to SGD400,000 are payable to employers who recruit, retain, or reemploy old-aged workers.

These initiatives include Human Resource Management practices in which flexible work schemes, job redesign projects, counseling for older workers, and wage-restructuring as to move away from seniority-based system. This funding scheme is implemented within the ADVANTAGE! (Add Value and Tap on Age!) program under the charge of the Singapore Workforce Development Agency.

In the long term, it is well recognized that these retirement-age extension efforts need to be further reinforced with measures against age-discriminating layoffs and retirement policies widely practiced at firms so that the length of tenure is determined not by age but by the individual worker's productivity and ability. This is also the direction of the reform that is pursued in many advanced countries.

iv. Increasing labor force participation of women

With the relatively low participation of female workers in the labor force in many Asian countries, particularly married women in their childbearing and child-rearing stages, gender-fair policies need to be strengthened to keep the entry and reentry points lower and more accessible.

Faced with extremely low fertility rate and rapid aging population, the Korean government initiated a series of policy measures for work-family balance under the Employment Insurance scheme in 2001. They include: a) extended paid leave for childbirth (from 60 to 90 days), b) subsidized leave for child-rearing (for children under age 6, maximum 1 year), and c) subsidizing workplace child-care facilities. The take-up rate of these subsidized programs was very low in the initial stage, but it has been increasing in recent years. The low take-up rate could be attributed to the qualification conditions attached to the scheme such as meeting employment insurance membership and minimum contribution period (180 days for the last 18 months). So those working in small firms and/or irregularly employed are likely to

be uncovered or unqualified, even when they are in need of these assistance and subsidies more than others.

v. Improving skills and productivity through job training and life-long learning

While the industrial map is ever-changing in today's global economy, the ongoing shift away from manufacturing to service industry, together with technological change, is well recognized. These changes have increased the need for more skilled and flexible workforce and constitute another challenge that aging population poses to governments, employers, and individual workers, i.e., for government to reform education and training systems, for employers to provide more on-the-job training, and for individuals to engage actively in life-long learning.

An important aspect of how aging affects productivity is whether older workers have greater difficulty in learning new skills and thus, whether they tend to be overpaid. This point is critical for the extended employment of older workers, especially in the context of policies designed to gradually raise the effective age of retirement.

The key challenge is in finding ways to keep older workers productive and employable in a time when the workforce is getting older rapidly. Policy researchers point out that life-long learning and job-training systems need to be reformed in a way that increases old workers' incentive to participate and employers' incentive to provide them fair training opportunities.

Table 3. Female Labor Force Participation: OECD, ROK, and Japan

Country	2008	2005	2002
ROK	54.7%	54.5%	53.5%
Japan	62.2%	60.8%	59.7%
USA	69.3%	69.2%	70.1%
OECD Average	61.4%	60.4%	59.6%

Source: OECD [23]



In ROK, job-training subsidies are paid to employers who provide training opportunities to workers under the Employment Insurance (Occupational Skill Development scheme). But participation rates are still low and largely dependent on employers' choice. According to the OECD report [21], older workers in ROK are, in fact, much less likely to participate in job-training programs, on or off the job, relative to younger workers (8% vs. 21%). It is much lower when compared to other advanced economies. The participation rate of those aged 50–64 in ROK is under 10%, while it is about or over 40% in the USA, Denmark, and Norway. The low participation rate may be, in large part, due to limited opportunity or poor program contents available under the current system. Thus, in balance, there is a large scope for government intervention to improve and expand training opportunities, strengthen incentives for participation, and enrich the types of job training available.

In terms of lifelong learning opportunities, ROK also compares unfavorably to most other OECD countries. Whereas just over 10% of Koreans aged 50–64 participated in some form of lifelong learning activity in 2000, the corresponding proportion was around 36% in the USA and 46% in Sweden. The gap between ROK and other advanced OECD countries is equally large for the younger age group of 25–49. There is also a considerable gap between men's and women's participation in lifelong

learning in ROK, which is much larger than in the other OECD countries shown in Table 4.

vi. Remodeling working conditions and workplaces to adapt to aging work force

Policy interventions and institutional reforms should be followed by remodeling and resetting workplaces and working conditions to be more open and friendly to the aging workforce. By 2050, it is expected that about 50% of the workforce in ROK will be aged 50 and over, which will be similar in Japan, Singapore, and ROC.

Decent part-time jobs and flexible work arrangements are recommended as one of the priority policy goals to maintain the old-aged in work and productive activities in an aging society.

According to labor force surveys in Asian countries, older people prefer part-time rather than full-time jobs. For example, in a survey by the Singapore Ministry of Manpower (MOM), it was found that three main factors that would motivate older inactive people to work were a) availability of part-time/flexible work arrangements, b) having jobs near home, and c) jobs with low stress levels and work environments that are more open and friendly to older workers (MOM, 2008: A6). Similarly, the 2006 HSBC Retirement Research found that 71% of the respondents in Singapore regarded

Table 4. Participation in Job-related Training and Lifelong Learning Activities in OECD Countries

Country	Lifelong Learning Activities (all persons) (%)			Job-related Training (employees) (%)		
	Total	Age		Total	Age	
		25–49	50–64		25–49	50–64
ROK	18.8	21.6	10.8	14.3	15.7	9.6
USA	43.6	47.2	35.7	44.3	45.9	39.9
Denmark	56.2	63.6	41.4	52.5	55.6	44.5
Sweden	54.2	58.1	45.9	-	-	-
UK	44.9	47.2	35.7	44.3	45.9	39.9
Italy	22.1	27.1	12.6	24.6	25.2	22.5

Source: International Adult Literacy Survey; Korea Social Statistics Survey [17], and OECD [24–25]

flexible working as ideal to achieve a balance in leisure, work, and money in later life [18].

Such preferences reflect the need for employers to proactively redesign and develop flexi-time and part-time work systems to accommodate the desires of older workers. Moreover, workers also need to change their attitude about working in a new environment and be open to accepting lighter work, lower compensation, and retraining to better equip themselves.

## CONCLUSIONS AND RECOMMENDATIONS

Through varied national experiences of the advanced aging societies [26] and the APO research projects and study meetings, it was concluded that population and labor force aging bring about both challenges and opportunities to economic growth and social wellbeing. Among those challenges faced in the APO member countries, for instance, are concerns about the demographic changes that portend a shortage of replacement workers along with a burgeoning population of “unproductive” retirees, the changing nature of pension coverage among old-aged workers, the health care of an aging society, and lower economic growth. Opportunities that may be emerging include a fundamental shift in the very nature of work, productivity, and retirement.

Also well noted is that productivity should be viewed in a wider spectrum than it has been in the past. It should be considered in an organizational and societal context, where individuals actually work and produce. Moreover, old-aged workers could bring experience and skill into the workplace even when their physical strength is weak and their adaptability to new technology is lower. This signifies that aging could open up a new window of opportunity if individuals, organizations, and society are rightly adapted to the changes and challenges it brings.

While the general objective of the labor force policy in aging societies is to reinforce the

potential of a sustained economic growth in an aging society, the motto of the policy drive is to set up a labor market environment in which old-aged individuals could keep working as long as they are healthy and strong enough to work.

It is recommended that to turn the challenges of aging society into new opportunities, APO member countries need to follow best practices to minimize adverse effects and maximize the positive effects of population and labor force aging on productivity and economic growth.

The challenges of aging society should be addressed both on the demand and supply side of the labor market. On the demand side, employment contracts (including mandatory retirement policies) should be changed gradually to adjust to the aging of the population and the labor force. On the supply side, workers' initiative and choice should be directed toward lowering the cost of long-duration employment contracts such as seniority wage and retirement allowance so that long tenure (normal retirement) with a productivity-based wage system could make a soft landing in place of short tenure (early retirement) with a high-wage system. Otherwise, current trends toward involuntary early retirement could not be easily reversed.

Lastly, the cost of population aging on economy and society should be borne fairly between the government, employers, and employees. It is strongly advised that APO member countries pursue a wide range of reform policies in a consistent and efficient manner, especially reforms in labor market institutions and social welfare systems that could face a rapidly aging population and labor force, which could enable their economy and society to stay on the path of sustainable growth [5].

For policy recommendations to be successfully adopted and implemented, the APO and NPOs are advised to keep making research and awareness initiatives for years to come. These will help APO member countries achieve

“active and productive aging” in the 21st century.

## REFERENCES

- [1] Auer P., Fortuny M. Ageing of the Labor Force in OECD Countries: Economic and Social Consequences. Geneva: International Labor Office; 2002.
- [2] Auerbach A.J., Hagemann R.P., Nicolette G. The Economic Dynamics of an Ageing Population: The Case of Four OECD Countries. *OECD Economic Review* 1989; 12: 97–130.
- [3] United Nations. World population prospects 1950–2050 (2008 revision), available at <http://www.un.org/esa/population>.
- [4] Werding M. Ageing, productivity and economic growth: A macro-level analysis. Ifo Institute for Economic Research, Technical Paper 2007–10; 2007.
- [5] OECD. Older but wiser: Achieving better labour market prospects for older workers in Korea, Paris; 2002.
- [6] Kawai M. Economic Challenges of Ageing in East Asia: Prospects of Regional Cooperation. PPT presentation, Ageing East Asia: Policy Responses and Regional Cooperation, Tokyo, 1 June 2006.
- [7] Gee E., Gutman G., eds. The overselling of population aging: Apocalyptic demography, intergenerational challenges, and social policy. Oxford: Oxford University Press; 2000.
- [8] Bloom D.E., Canning D., Finlay J.E. Population aging and economic growth in Asia. In: Ito T., Rose A., eds. *The Economic Consequences of Demographic Change in East Asia*. Chicago, IL: University of Chicago Press; 2010.
- [9] Bloom D.E., Canning D., Sevilla J. Economic growth and the demographic transition. National Bureau of Economic Research [Working Paper No. 8685]. Cambridge, MA; 2001.
- [10] Borsch-Supan A. Labor market effects of population aging. *Review of Labour Economics and Industrial Relations*; 2002; 17: 5–44.
- [11] OECD. *Maintaining prosperity in an ageing society*, Paris; 1998.
- [12] World Bank. *Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth*. Oxford: Oxford University Press; 1994.
- [13] Scarth W. Population ageing, productivity and living standards. In: Sharpe A., St-Hilaire F., Banting K., eds. *The Review of Economic Performance and Social Progress: Towards A Social Understanding of Productivity*, Montreal: IRPP; 2002, 145–156.
- [14] Cutler D.M., Poterba J.M., Scheiner L.M., Summers L.H. An aging society: Opportunity or challenge. *Brooking Papers on Economic Activity*; 1990; 1: 1–73.
- [15] Chou W-C. Implications of Population Ageing on the Labor Market and Productivity in Taiwan. Paper presented at the APO research project (2009–2010), Issues and Challenges Facing Productivity in Aging Societies meetings, Seoul, Korea, 2009.
- [16] Phang H. Demographic dividend and labor force transformations in Asia: The case of the Republic of Korea. In: Rajagopalan S., ed. *Demographic dividend: Concepts and experiences*, Andhra Pradesh: The ICFAI University Press; 2008, 59–90.
- [17] Korea National Statistical Office. *Population Projections for Korea: 2005–2050 (Revised)*. Seoul: Korea National Statistical Office; 2006.
- [18] Thang L.L. Population Aging, Older Workers and Productivity Issues: The Case of Singapore. Paper presented at the APO research project, Issues and Challenges facing Productivity in Aging societies meetings, Seoul, Korea, 2009.
- [19] Phang H. Issues and Challenges Facing the Productivity of Ageing Societies: The Case of the Republic of Korea. Paper presented at the APO research project, Issues and Challenges Facing Productivity in Aging Societies meetings, Seoul, Korea, 2009.
- [20] Fujimura H. How to Manage Aging Problems? Japanese Challenges to Make the Society More Productive. PPT Presentation; 2010.

- [21] OECD. Ageing and employment policies: Korea, Paris; 2004.
- [22] OECD. Promoting adult learning, Paris; 2005.
- [23] OECD. Employment Outlook, Paris; 2008.
- [24] OECD. Live longer, work longer, Paris; 2006.
- [25] OECD. Labour force statistic, Paris; 2008.
- [26] Martin J.P., Grubb D. 2001. What works and for whom: A review of OECD countries' experiences with active labour market policies. Swedish Economic Policy Review 2001; 8(2): 9–56.

# SME COMPETITIVENESS IN A GLOBALIZED ECONOMY

DR. SHIN-HORNG CHEN

**Research Fellow and Director**

International Division

Chung-Hua Institution for Economic Research

## INTRODUCTION

It is widely acknowledged that small and medium enterprises (SMEs) play an important role in many national economies around the world. SMEs typically account for 95% or more of enterprises, 50% or more of formal employment, and 30%–60% or more of GDP, though these figures vary across countries [1, 2] (Table 1). Even in the Republic of Korea (ROK), which is known for its dominance of conglomerates in the industrial structure, SMEs represent 99.9% of all enterprises, 87.8% of all employees, and 49.2% of value added in manufacturing [3].

Bearing in mind the fact that SMEs are a heterogeneous group, the significance of SMEs can be better appreciated by referring to a few well-documented trends and patterns. For developing countries in East Asia, SMEs have made significant contribution to de facto regional economic integration via their participation in global value chains (GVCs) and/or global production networks (GPNs) [4–

7], which in turn have become an important source of national economic growth. A typical example refers to the GPNs led by a few brand marketers in ICT hardware and software and involves countries such as the Republic of China (ROC), Malaysia, Thailand, PR China, India, and the Philippines. What's more, evidence gathered from advanced countries suggests that SMEs, small firms in particular, can make a disproportionate contribution to the creation of new jobs [8, 9].

Over the last few decades or so, issues such as SME competitiveness in a globalized economy and internationalization of SMEs have drawn considerable attention from international organizations (for OECD, see [13, 14]; for Asia Pacific, see [4]; for the EU, see [15]; for APEC, see [10]) as well as academic discussions [5, 6, 16]. Noteworthy is the fact that SME competitiveness in a globalized economy may mean something different across countries, depending on the role of SMEs in their respective economies and stages of economic development.

Table 1. Profile of SMEs in Selected APO Member Countries

APO Member	SMEs		
	Enterprises (%)	Employment (%)	GDP Contribution (%)
Hong Kong <sup>1</sup>	>98.0	48.0	50–60
Japan <sup>1</sup>	99.3	79.0	56.8
Malaysia <sup>1</sup>	99.2	56.4	32.0
Philippines (2006) <sup>2</sup>	99.7	66.8	20.0
ROC (2009) <sup>3</sup>	97.9	78.5	n.a.
ROK (2008) <sup>4</sup>	99.9	87.7	49.2
Singapore <sup>1</sup>	99.1	60.0	51.0

Source: Spring Singapore (2011); Aldaba (2008); SMEA (2010); SMBA (2011). GDP contribution refers to the manufacturing industry only.

### Box 1. Spring Singapore: SME Barriers to Internationalization

- Internal (e.g., lack of organizational resources, capabilities, and management approach) and external (e.g., the business environment of current and potential overseas markets)
- Internal barriers are perceived as greater impediments to internationalization compared to external barriers
- Top five main barriers to internationalization are:
  - i. Limited financial resources
  - ii. Limited access to capital
  - iii. High costs of selling abroad
  - iv. Limited knowledge of overseas market opportunities
  - v. Limited government assistance
- Barriers differ at various internationalization stages

Source: Spring Singapore (2011).

However, for countries such as Japan and ROC, a central focus is the outward direct investment of SMEs and their links with the domestic economy (for Japan, see [17]), while for other developing member countries of the APO, SME participation in GVCs and/or GPNs may be a prominent issue [4–6,11]. In addition, many tend to address this issue by starting with an examination of SME barriers to internationalization [10, 15] and constraints on the (international) competitiveness [6, 16]. For example, in its comprehensive studies on SME internationalization best practices in eight APEC member economies, Spring Singapore [10] has identified SME barriers to internationalization, as shown in Box 1.

Such knowledge is useful to unveil the peculiar problems of SMEs versus large firms in dealing with internationalization and the trend of globalization, but one has to be careful with the potential problem of not seeing the wood for the trees. In other words, the SME barriers and constraints that have already been identified look similar across different contexts. On the other hand, SMEs are, after all, part of a larger ecosystem in a specific context. Therefore, the issue of SME competitiveness in a globalized economy is addressed in a way that is different from previous studies. Instead of asking what problems the SMEs face when dealing with internationalization and the trend of globalization, the focus should be more proactive such as figuring out how SMEs

may grow and prosper against the trend and backdrop of globalization. Three case studies will be presented to highlight these main points and findings. Though there is no one-size-fits-all policy and panacea for all APO member countries to promote SME competitiveness in a globalized economy, the aim is to shed new light on policy design.

#### **SME POLICY FRAMEWORK IN SELECTED APO MEMBER COUNTRIES**

Before getting into the case discussions, the following provides a snapshot of SME policy framework in these countries.

##### **Malaysia**

Based on case studies conducted over a period of more than a decade, the Central Bank of Malaysia [18] identified key success factors of SMEs in a globalized environment, including i) sound management capability and integrity, ii) sound business culture and entrepreneurial spirit, iii) prudent financial management, iv) high-quality products and services, v) effective programs for human resource development, vi) strong support from financial institutions, vii) strong marketing strategies, and viii) continuously looking for opportunities to expand. The government's commitment in promoting the development of a competitive and resilient SME sector was outlined in the Ninth Malaysia Plan (2006–2010) and the Third Industrial Master Plan.

As a result, the National SME Development Council (NSDC) was established by the Malaysian government in 2004 to set a strategic direction for government policies on SME development and to ensure coordination and effectiveness of the government programs involved. The NSDC, chaired by the Prime Minister, comprises 16 members of the Cabinet and heads of four key agencies involved in SME development [19]. One of the key initiatives developed by the NSDC is the National SME Development Blueprint, an annual action plan for SME development with a structured approach.

Each year, key programs for SME development in Malaysia are designed under three strategic thrusts, namely: building the capacity and capability of SMEs, strengthening the enabling infrastructure, and enhancing SMEs' access to financing. A flagship government initiative for the development of SMEs in Malaysia is the Industrial Linkage Programme (ILP), which is complemented by the Global Supplier Programme (GSP). Both of these initiatives serve to help Malaysian SMEs integrate with the global supply chain of multinational corporations (MNCs), with the former focusing on the formation of the industrial linkages required, while the latter on skill development and training.

### **The Philippines**

The Magna Carta for Small Enterprises, passed in January 1991, was considered a significant milestone for SME legislation and policy development in the Philippines with the aim of consolidating all government programs for the promotion and development of SMEs into a unified institutional framework. The Magna Carta resulted in: i) the creation of the Small and Medium Enterprise Development Council to consolidate incentives targeting SMEs, ii) the creation of the Small Business Guarantee and Finance Corporation to address SME financing needs, and iii) the allocation of credit resources to SMEs with a mandatory ratio of 8% for all lending institutions' total loan portfolio [11].

The cluster-based approach has been an important feature of the government's strategy for the development of SMEs and industrialization. Apart from the "Big Brother-Small Brother" program, the Philippine Export Development Plan (PEDP) has over time identified industrial clusters for export promotion. In the 2005–2007 and 2008–2010 PEDPs, a few national clusters were selected for development, including electronics, textile and apparel, automotive products, food products, home-style products, natural and organic products, IT-enabled services, construction services, and emerging services. In this movement, various governmental supports, including technology, training, financing, marketing and so on were implemented by a few public bodies.

### **Republic of China (ROC)**

Substantial credit was given to SMEs for their contributions to ROC's early export-led industrialization. However, the share of exports accounted for by SMEs had fallen to less than 17% in 2009 from 26.4% in 1997. This was associated with the country's transformation of economic structure toward technology and capital industries, and waves of overseas investment and expansion of SMEs dating back to the late 1980s. The Small and Medium Enterprise Administration (SMEA) was established as early as 1981 and it has worked together with a few government bodies to promote the development of SMEs.

The major government policies and measures related to SMEs in ROC can be categorized into five areas: i) assistance in upgrading business management, ii) strengthening SME financing and investment capabilities, iii) strengthening business start-up capabilities, iv) revitalizing local economies, and v) making it easier for SMEs to participate in international SME activities. In particular, to help SMEs develop new business opportunities both at home and abroad, SMEA, together with other public bodies, has formulated a variety of

business opportunities and marketing plans that approach this issue from the viewpoints of markets, industries, individual companies, industrial associations, and branding, among others [12].

### **Republic of Korea (ROK)**

Due to its success in conglomerate-led industrialization, the traditional Korean policy perception toward SMEs tends to take the position that they are disadvantaged and are in need of governmental support. As a result, the Small and Medium Business Administration (SMBA) was founded in 1996 to be in charge of major policies for the development of SMEs. There are currently more than 100 programs and policy measures for SMEs in the country, dealing with financing, marketing, business start-up, micro-enterprises, and so on.

INNO-Grips [20] recently reported the following noticeable changes in the direction of SME policies in ROK. First, the policy flavor for SMEs has turned to promotion of competitive SMEs rather than protection of the weak. Second, a new category of “mid-sized enterprises” (MSEs) of 300–1,000 employees was introduced for policy purposes. Thirdly, partnership between large firms and SMEs for mutual growth is being actively promoted. Such transition implies a major shift in SME policy focus toward promotion of innovative high-growth SMEs or Global Star SMEs with international competitiveness [3]. Specifically, Global Star SMEs, referred to as “hidden champion” in Germany [21], function as independent global players rather than just participating in GVCs. Together with the “300 Global Stars” Program, launched by the Korea Export and Import Bank in 2010, SMBA has formed a comprehensive support package, which include technology, financing, networking, and international marketing survey [20]. In addition, another policy goal of SMBA incorporates the grooming of one-person creative companies to match the new industrial paradigm of emerging knowledge economy [3–22].

Although the above review covers a limited number of APO member countries, it is observable that many of the member countries have established competent authorities at different levels to promote the development of SMEs. This has much to do with a general appreciation of SMEs as a vehicle for integration with global economy (specifically GVCs and GPNs), export promotion, job creation, productivity enhancement, and poverty reduction. As a result, a variety of measures are taken and tailored to the national circumstances to support the development of SMEs, including technology, marketing, entrepreneurship, training, and financing. In particular, the promotion of clusters and industrial linkages of SMEs and wMNCs have been a characteristic flavor in SME policy in APO member countries, especially in developing member countries [4, ww5]. Typical examples include the ILP and GSP in Malaysia, and the ECOP-Big Enterprise Small Enterprise Program in the Philippines.

On the other hand, some member countries have gone beyond the traditional policy focus on SME participation in GVCs and GPNs, showing different policy directions. ROK's new strategy to promote GlobalStarSMEs is obviously an example of this movement. In addition, and among other things, the Japanese government is promoting internationalization of SMEs to take advantage of economic integration in the region [17] and exploit overseas market potentials of creative industries (Cool Japan) such as anime, design, and fashion [23].

On top of that, the APO has for years endeavored to provide platforms for dialogue, mutual sharing, and learning among the member countries in the matter of SME development. For example, strengthening of SMEs is a key theme of the APO's recent activities. Under this theme, particular attention has been given to issues such as entrepreneurship in Asia, strategic mergers and acquisitions of SMEs, financing of SMEs, service-sector productivity on SMEs, and high-growth innovative SMEs, among others [2, 24].



## KEY ISSUES FOR THE DEVELOPMENT OF SMES IN A GLOBALIZED WORLD

Globalization as an accelerating trend has been shaped by political, economic, and technological forces, with key drivers that include policy liberalization, accelerating technological change, increasing mobility of capital, and demands of increasing competition [4]. It is well documented that globalization is transforming the nature and location, and hence, networking of international production, trade, and investment [5, 7, 25, 26]. In production terms, outsourcing and offshoring by MNCs have brought about prevailing cross-border production schemes of GVCs and GPNs in which various stages of a manufacturing process are undertaken at different geographic locations, where they can be carried out most efficiently [27]. This has resulted in increased task and/or product-related specialization by firms in the production of goods and services, leading to substantial growth in intra-industry and intra-product trade, rather than just traditional trade in final goods [4].

While GPNs are widely seen in many industries, ranging from ICT (hardware and services), automotive, food to garment sectors, their openness to external suppliers depends on a few factors such as modularity of the product architecture involved and the dominant power of key suppliers. More recently, such cross-border networking has extended from manufacturing to services and even design and R&D activities, and it is increasingly involving latecomers in the Asia Pacific. As a result, different layers of industrial players within GVCs are required to interact closely with one another for innovation, giving rise to global innovation networks (GINs) [28, 29].

Globalization of production has been changing the competitive environment in both international and home markets for SMEs in the region. The OECD [4, 13, 14] has watched closely the impact of GVCs on the prospects of SMEs and suggested that the effect may occur in three ways. First, a relatively small

group of SMEs (around 5%–10% in the sample countries) with international competitiveness would benefit from globalization in terms of access to international market, especially through business linkages of SMEs and MNCs. Second, for a larger group (25%–50%), globalization would pose challenges at home, requiring them to upgrade their capabilities in order to remain competitive in the domestic market. Third, the remaining SMEs, which tended to be local market-oriented and underperforming in technology and business terms, would be relatively immune from the effects of globalization, at least in near terms. By implication, a substantial portion of SMEs in the Asia-Pacific region should awaken to the realization that although they are not in the export marketplace, they are nonetheless in the international marketplace, thanks to globalization.

Without denying the importance of SME participation in GVCs or GPNs to tap into the international market [4], attention should be drawn to some qualifications. First of all, GVCs or GPNs vary in their degree of openness to external suppliers. For those sectors featuring integral (versus modular) product architecture, their GVCs tend to be closed [30, 31]. Even serving GVCs with an open network can mean competing in a crowded market. Secondly, it is essential for SMEs to continuously upgrade their capabilities along the value chain in order to secure their positions within the GVCs, especially in those sectors with technological dynamics [32]. Thirdly, there would be a reverse trend of offshoring activities by MNCs from advanced countries, especially taking into account the fact that the USA has turned to the strategy of “reindustrialization” [33].

There are grounds to suggest that the rise of PR China has accelerated the pace of globalization [34] and even posed “Chinese challenge” ([4], p. 50), in terms of Chinese firms flocking to GVCs with cost advantages. Indeed, PR China's remarkable economic achievement and growing economic strengths have stimulated hot debates on the Chinese

model of economic development. Arguably, the surge of PR China's economy has much to do with its export-oriented industrialization [35], which has been driven substantially by FDI and technology transfer [35–39]. A substantial body of literature, therefore, tends to attribute PR China's economic achievement and industrial innovation to factors such as FDI, the offshoring of manufacturing and R&D by MNCs, and more recently the promotion of indigenous innovations and industrial standards. These factors are by nature derived from the supply side and quite often related to well-established firms both domestically and internationally.

However, some studies have begun to draw attention to the role of domestic demand [40–42] and entrepreneurs in non-state sectors [43, 44] in PR China's economic and industrial development. For example, Brandt and Thun [41] have shown that after PR China's accession to the World Trade Organization, domestic firms (mostly private SMEs) in a few sectors (such as automotive and machine tool) are able to compete with well-established foreign firms, leading to local industrial upgrading. They are able to do so by taking advantage of the sheer size of the low-end segments and the growing “good enough” market segment—“home of reliable-enough products at low-enough prices to attract the cream of PR China's fast-growing cohort of midlevel consumers” [42].

Professor Prahalad [45] was among the leading authors to draw attention to the possibility of innovation and creation of new business models around the Bottom of the Pyramid (BOP), which initially referred to the largest but poorest socioeconomic group with the potential of becoming the middle-class of tomorrow in emerging markets. In the same vein, Christensen, Craig and Hart [46] argue that “Globalization's real market opportunity lies with the billions of poor who are joining the market economy for the first time... Exactly what kinds of disruptive technologies might emerge within countries such as India and PR China cannot be easily extrapolated from the market needs and success stories of developed

economies...technologies emerging from these countries may have profound but unpredictable implications for the rich world's markets.” In other words, even PR China's and other emerging markets' severe and uneven development in both spatial and social terms can be leveraged to generate BOP Innovation and “good enough” innovation, in which local SMEs and entrepreneurs can play an important role [47].

The current global economic turmoil is an aftermath of the global financial crisis of 2008. This has resulted in the waning and waxing of the global north and south, with the global economic center of gravity shifting toward Asia. The global economy and international export market may not return to the basics soon, given the current economic downturn in the EU and the USA. It is, therefore, essential for Asian countries to exploit the intra-regional market by unleashing its own market potentials. In doing so, there could be limitations of traditional macro fiscal and liberalization policies in the emerging market. On the other hand, from the perspective of BOP and “good enough” innovation, this can be done through the creation of a massive market space, which used to be underserved or underexplored in the emerging markets.

## CASE STUDIES

This section presents three case studies gathered from ROC and ROK to highlight the different ways in which SMEs may grow and prosper against the trend and backdrop of globalization. They are different from the so-called “best practices” policy studies, which tend to look at the way in which specific government initiatives are performed [10, 15, 22, 48]. In addition, in these three cases, policy design may not have started with a central focus on SMEs, but it ended with a positive impact on the prosperity of the SMEs involved.

### **ROC's Semiconductor Engine for Innovation: Integrated Circuit (IC) Design Industry**

The development of ROC's IC industry has

been driven by organizational innovation, with foundry (fabrication) services pioneered by Taiwan Semiconductor Manufacturing Corporation (TSMC) in 1987 as a market niche to specialize in production for external customers. By disintegrating the IC value chain, the rise of foundry services in ROC has facilitated the proliferation of SMEs engaged in other market segments such as IC design, testing, and packaging, giving rise to a balanced and vertically disintegrated industrial structure. In particular, fabless IC design houses proliferated in the country in part because access to external fabrication capacity lowered the barriers to entering the IC design market. In addition, the concentration of IC and computer-related firms in the Hsinchu Science Park generated agglomeration effects that allowed these firms to exploit the benefits of proximity and outsourcing. Therefore, even though they specialize in one segment of the value chain or another, IC firms in ROC are networked by social and business connections.

Venture Capitals (VCs) - initially specialized VCs and more recently corporation-based VCs - also serve as an important facilitator. Specialized VCs used to be very active in ROC,

once reaching the second largest in scale worldwide, but more recently, major Taiwanese ICT firms have established corporation-based VCs for diversification and expansion of corporate networks. Taking the IC industry as an example, it was the Industrial Technology Research Institute (ITRI) spin-offs and related-personnel (ITRI staff) networks that triggered the proliferation of IC industrial players at the very early stage in ROC.

Together with this, a few VCs helped to channel the capital required by the start-ups to expand the breadth of the industry with ancillary services. Later on, leading players such as TSMC, with accumulated capital, began to cultivate affiliated firms (mostly IC design start-ups) through external equity investments, intra-corporate ventures, and corporation-based VCs (Figure 1). Since IC foundries can set their own design rules - namely, restrictions on the type of designs that will be manufactured in the foundries to be followed by IC design houses to ensure "fabricability" - TSMC's external investments can help firms expand their customer base, serving as a seedbed for high-growth SMEs, particularly in the IC design industry [32].

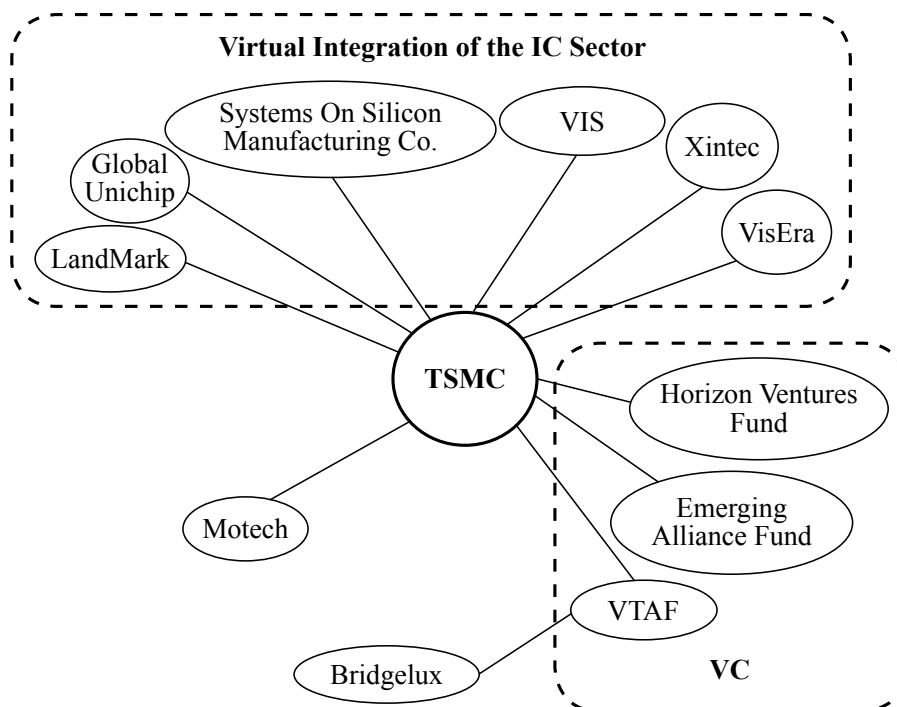


Figure 1. TSMC's VCs and External Equity Investment Relationships and Networking  
Source: Chen S. H., Wen P., Chen H-C. [32]

Note: The information contained in this figure may not be comprehensive

In other words, TSMC's foundry business has become a platform, based on which SMEs, both at home and abroad that specialize in IC design as well as other industrial segments, have proliferated and prospered. More importantly, these platforms can take various forms, a famous example being Apple's iTunes and App Store, which have helped the Finnish creators of Angry Birds revitalize their business. In the same vein, Korea's SMBA had planned to nurture 10,000 one-person innovative student mobile enterprises by 2012 through 11 app creations and global support centers [48].

### A-Team and Cycling Island Initiative

The A-Team was initiated by local firms, Giant and Merida, with partial support from the Ministry of Economic Affairs (MOEA) to upgrade the bicycle industry in ROC. Due to the A-Team's persistent efforts, ROC has become a manufacturing base and leading exporter of high-end bicycles, not only by industrial upgrading, but also stimulating local demands via public-private partnership (PPP). As a result, the average unit price of bicycles exported from the country has climbed to about USD330 in 2011, compared to USD112 in 2001.

The ROC's export volume of bicycles dropped drastically in 2000 (-28.98%) due to escalating competition that resulted from globalization as well as industrial offshoring. At that time, Giant and Merida, two international bicycle brands in the country, were reluctant to follow their peers' footsteps to relocate production overseas. Instead, they worked together with a few component suppliers (SMEs) to form the A-Team in 2003, based on the model of Toyota Production System. Its members today are made up of more than 20 major companies both at home and abroad in the industry; they are not only partners but also competitors.

The A-Team has gone through three stages of development. In the first stage, a "Just-In-Time" management system was introduced to integrate upstream and downstream resources to tighten the partnerships among factories, suppliers, and distributors. In the second stage, a joint design platform of product data management was set up to develop new products in a collaborative design manner to shorten the time to market. In the third stage, the A-Team worked closely with independent bicycle dealers rather than warehouse stores

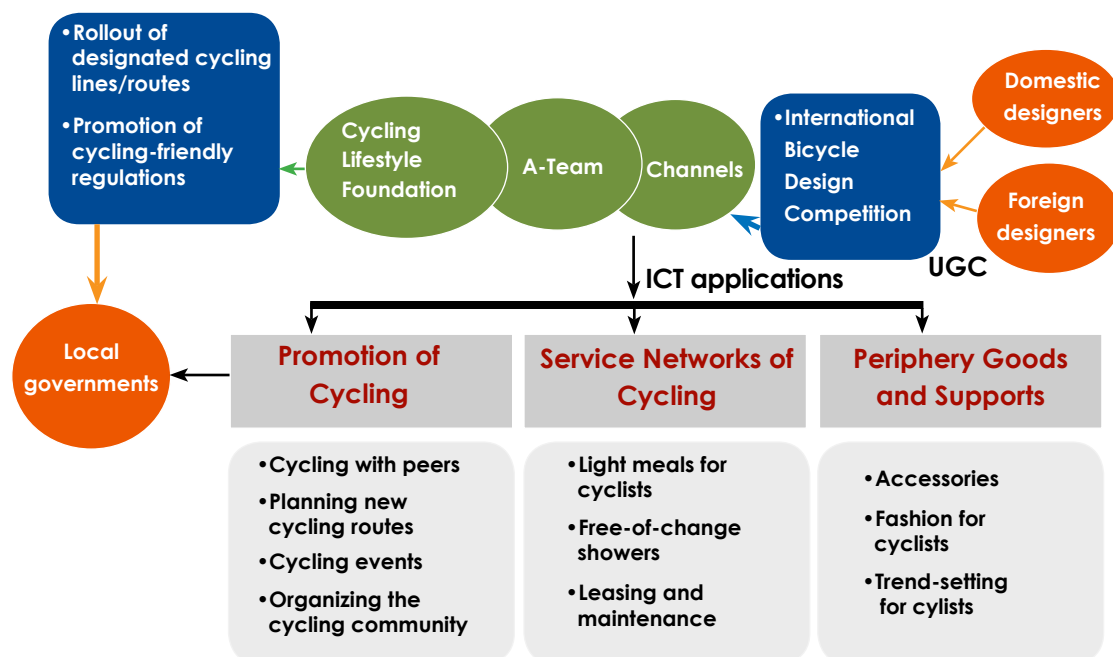


Figure 2. A-Team and Cycling Island Initiative  
 Source: The author (October, 2011)  
 Note: UGC = user-generated content

to segment A-Team's products from those of warehouse stores. According to Brookfield, Liu, and MacDuffie [49], the A-Team has created integrated and coinnovative supplier networks with two features that differentiate them from traditional modular, symbiotic supplier networks. First, whereas traditional supplier systems emphasize cost control, the A-Team's supplier networks appear to focus more on value creation through coinnovation. Second, by adopting a more integrated network structure, supplier networks appear to have a greater ability to resist imitation.

With the aim of cultivating the market for premium and trendsetting bicycles, the A-Team has worked together with the central and local governments to implement the Cycling Island Initiative. As a result, a new lifestyle of cycling has gained popularity and has been highly appreciated by the country's general population. Research institutes as well as nonprofit foundations have been mobilized to facilitate the rollout of designated cycling lines around the country and to organize the International Bicycle Design Competition to capitalize on innovative design ideas both at home and abroad (Figure 2). This new lifestyle is actually being "exported" to China.

The MOEA in ROC has proposed a 2020 vision with four reference models as a set of portfolio for the country's future development. One of them is the "Pioneer of New Lifestyle" model, which refers to a new development mode that takes advantage of the local milieu and social settings to form influential innovative solutions with elements of "Experience Economy" to serve both domestic and international customers. The A-Team and the Cycling Island Initiative can be considered a similar model to "Pioneer of New Lifestyle", thanks to their essence of industrial upgrading and market cultivation. Currently, a few other sectors in the country are trying to replicate the success of the A-Team. Likewise, the Department of Industrial Technology at the MOEA has helped China Steel Corporation to form a consortium with a few downstream customers (SMEs) so

that they can grow simultaneously by joint-value innovation and manage niche markets together to create demand.

### **Dongdaemun Market and SME Fashion Cluster in Seoul**

The Dongdaemun (East Gate) Market in Seoul successfully stands out as a main hub for the creation and distribution of non-brand fashion products in ROK. On the surface, the Dongdaemun fashion market is a product of urban renovation after the Asian financial crisis in 1997, filled with high-rise shopping malls spreading around 1 km. Underlying this is a strategy of supplying young casual (and "good enough") fashion with trendsetting designs based on a (mini) cluster of small firms and apartment-type factories that have formed an ultrafast production system and a comprehensive supply chain, ranging from fashion planning, design, production to sales, all in one location [50, 51]. It is also part of the country's political will and effort to transform the city from a "hard city" to a "soft city" against the backdrop of globalization [52].

The wholesale market and shopping malls in Dongdaemun Market provide a wide variety of value-for-money and stylish garments, which attract young people and garment operators from ROK and other countries around the world. According to the Korea Federation of Textile Industries [53], "over 300,000 people visit the area every day, with daily sales exceeding KRW40 billion and yearly sales estimated to be over KRW10 trillion". In particular, out of the daily visitors, over 2,000 are foreigners and foreign garment vendors, making Dongdaemun a fashion export outpost. Arguably, the popularity of the "Korean Wave" in Asia has facilitated the development of the Dongdaemun fashion market.

The fashion cluster is equipped with everything related to fashion, including an ultrafast production system, stylish costume development ability, diverse low-scale production, and rapid response system to ensure delivery in the shortest time and at

reasonable prices [50, 51]. Kim and Lee [53] have compared the Dongdaemun fashion market and the Korean original equipment manufacturing producers and have praised Dongdaemun for its "strong, but flexible vertical networks based on trust versus vertical integration within a firm". Thanks to this, the Dongdaemun fashion market can become a seedbed for young and upcoming fashion designers. To facilitate its future prospects, the city government of Seoul has established a few support organizations such as the Seoul Fashion Center for marketing and workforce training, and the Dongdaemun Market Information Center for export facilitation and market guide.

Although such a shopping mall-based cluster with wholesale function is not unusual in East Asia, the Dongdaemun fashion market has a distinct flavor. For example, Yiwu in Zhejiang Province, PR China, is described by the UN and World Bank as the world's largest small commodity wholesale market, making the city of just 1.2 million people a vibrant free market, and a regional and international tourist destination. Both Yiwu and Dongdaemun fashion market tend to focus on "good enough" and/or BOP market segments, but the latter has demonstrated that the source of value creation for a small-firm cluster can come from intangible assets (Korea Wave), even in the garment sector, which is often considered a "sunset" industry in relatively advanced countries. In the same vein, the government of ROC has set up a fashion design base for up-and-coming designers in Wanhua, Taipei, hoping to bring together local talent and wholesalers clustered in the district, much like the Korean Dongdaemun fashion market.

## CONCLUSION

Globalization is a far-reaching trend, affecting a wide spectrum of national economic activities, regardless of the size of the firms involved. Admittedly, SMEs may be particularly vulnerable to the challenges posed by globalization, hence it is advisable that efforts be made to tailor innovation programs for

SMEs [15, 24, 48]. In addition, the key dynamics shaping the prospects of Asia-Pacific SMEs in the past and foreseeable future relate to the globalization of production [4–6]. However, for SMEs to come to terms with the trend of globalization and go international, policy design may in many cases go beyond the traditional scope, incorporating a broader perspective and context.

The three cases presented above are not "SME policy" in the traditional sense, but they have shown new ways for SMEs to prosper against the backdrop of globalization—different from the mode of participation in GVCs and GPNs. Although it is generally perceived that market access is a barrier for SMEs to grow and internationalize, with appropriate governmental support in the form of PPP, markets can be created and cultivated for SMEs, as demonstrated by the case of the A-Team and the Cycling Island Initiative. The market opportunities for SMEs to take advantage of also involves "good enough" and/or BOP market segments at home, which can later become a seedbed for exports, as shown by the case of the Dongdaemun fashion market in Seoul.

Without denying the importance of SME participation in GVCs or GPNs to tap the international market, it is suggested that policy design for the promotion of competitive SMEs in a globalized economy needs to be innovative. For example, ROC is indeed shifting its SME policy focus toward the promotion of innovative high-growth SMEs or "hidden champions" (Global Star SMEs) as the backbone of the economy [3]. The A-Team case study from ROC suggests that "hidden champions" such as Giant and Merida can cultivate a new lifestyle based on the local milieu and social settings, which both of them have been actively promoting. As suggested above, platforms for SMEs to proliferate and grow can take various forms, not just the foundry business for the IC design industry in ROC, but also Apple's iTunes and App Store, and even the Dongdaemun fashion market, serving as a seedbed to cultivate

young entrepreneurs and upcoming fashion designers.

Therefore, even though many APO member countries have established competent authorities at different levels to promote the development of SMEs, it is still essential for the formation and implementation of such policies to involve other governmental bodies. This way, there would be good opportunities for the formation of SME policies to incorporate a broader perspective and context, especially when it comes to issues such as SME competitiveness in a globalized economy.

## RECOMMENDATIONS

The APO has been consistently concerned about the prosperity of SMEs in member countries, addressing issues such as entrepreneurship in Asia, strategic mergers and acquisitions for SMEs, SME financing, service-sector productivity with the focus on SMEs, and high-growth innovative SMEs, among others [2, 24]. In a different way, the report has tried to demonstrate the value of discussing the development of SMEs in a broader developmental context. The argument has been put forth that policy design to promote competitive SMEs in a globalized economy needs to be innovative. It has proven useful to focus on the ways SMEs may grow and prosper in order to keep up with the trend of globalization instead of focusing on the problems and barriers that SMEs have to face in dealing with internationalization and the trend of globalization. More case studies and policy benchmarks along this approach among APO member countries may help to stimulate innovative policy design, especially regarding SME competitiveness in a globalized economy.

## REFERENCES

- [1] International Finance Corporation. *The SME Banking Knowledge Guide*. Washington DC: International Finance Corporation; 2009.
- [2] Goh M. High-growth innovative Asian SMEs for international trade and competitiveness: Challenges and solutions for APO member countries. Tokyo: Asian Productivity Organization; 2007.
- [3] Small & Medium Business Administration. *Global Inspiration and Aspiration*. Seoul: Small & Medium Business Administration; 2011.
- [4] Economic and Social Commission for Asia and the Pacific. *Globalization of Production and the Competitiveness of Small and Medium-sized Enterprises in Asia and the Pacific: Trends and Prospects*. Bangkok: Economic and Social Commission for Asia and the Pacific, United Nations, Bangkok, Thailand, 2009.
- [5] Lim H., Kimura F. The internationalisation of SMEs in regional and global value chains. Paper presented at Fifth LAEBA Annual Meeting, Singapore, 15 July 2009.
- [6] Harvie C. East Asian production networks - the role and contribution of SMEs. *International Journal of Business and Development Studies* 2010; 2 (1): 27–62.
- [7] Chen S-H. Global production networks and information technology: The case of Taiwan. *Industry and Innovation* 2002; 9 (3): 247–264.
- [8] Birch D. *The Job Generation Process*. MIT Program on Neighborhood and Regional Change. Cambridge, MA: MIT; 1979.
- [9] URS Corporation. *The City's Role in Providing for the Public Equity Financing Needs of UK SMEs*. London: City of London; 2010.
- [10] Spring Singapore. *Study on SME Internationalisation Best Practices Across Selected APEC Economies*. Singapore: BDO Pte Ltd; 2011.
- [11] Aldaba R. M. SMEs in the Philippine manufacturing industry and globalization: Meeting the development challenges. Discussion paper series No. 2008-15. Makati City: Philippine Institute for Development Studies; 2008.
- [12] Small and Medium Enterprise Administration. *White Paper on Small and Medium Enterprises in Taiwan*. Taipei: Small and Medium Enterprise Administration; 2010.
- [13] Organisation of Economic Co-operation Development. *Globalization and Small*

- and Medium Enterprises Vol.1. In: Synthesis Report 1997. Paris: Organisation of Economic Co-operation Development. 1997.
- [14] Organisation of Economic Co-operation Development. Enhancing the Role of SMEs in Global Value Chains. Background report for the OECD Global Conference, Tokyo, Japan, 31 May–1 June 2007.
- [15] DG for Enterprise and Industry. Supporting the Internationalisation of SMEs: Final Report of the Expert Group. Brussels: Directorate-General for Enterprise and Industry, European Commission; 2007.
- [16] Lim H. SMEs development policy environment and challenges in Singapore. In: Lim H. ed. Asian SMEs and Globalization. ERIA Research Project Report 2007. No.5, Chiba: IDE-JETRO; 2008.
- [17] Suzuki T. SMRJ's Support to Japanese SMEs engaged in FDI. Powerpoint presentation at the Organization for Small and Medium Enterprises and Regional Innovation, Japan, 2007.
- [18] Central Bank of Malaysia. A comprehensive framework for the development of small and medium enterprises in Malaysia; 2003. Available at: <http://www.bnm.gov.my>, accessed on 24 August 2013.
- [19] Muhammad M. Z., Char A.K., Yasoa M.R., Hassan Z. Small and medium enterprises (SMEs) in the global business environment: A case of Malaysia. *International Business Research* 2010; 3 (1): 66–75.
- [20] INNO-Grips. Korea: Shifting SME policies towards competitiveness and growth. Bonn: Global Review of Innovation Policy Studies; 2011a. <http://www.proinno-europe.eu/innogrips2>, accessed on 24 August 2013.
- [21] Venohr B., Meyer K.E. The German miracle keeps running: How Germany's hidden champions stay ahead in the global economy. In Working Paper No. 30. Berlin: Institute of Management Berlin; 2007, 1–31.
- [22] APEC SME Innovation Center. APEC SME Innovation Briefing. December, 2010/ No.10. Seoul: APEC SME Innovation Center; 2010.
- [23] INNO-Grips. Current development in Japan's SME policies and their relevance for fostering high-growth innovative SMEs. Global Review of Innovation Policy Studies; 2011b. <http://www.proinno-europe.eu/innogrips2>, accessed on 24 August 2013.
- [24] Asia Productivity Organization. APO Annual Report 2010, Tokyo: Asian Productivity Organization; 2010
- [25] Baldwin R. Globalisation: The great unbundling(s). Paper prepared for the project Globalisation Challenges for Europe and Finland, organized by the Secretariat of the Economic Council of Finland; 2006.
- [26] Dicken P. Global Shift: Mapping the Changing Contours of the World Economy. 5th ed., London: The Guilford Press; 2007.
- [27] United Nations Conference on Trade and Development. World Investment Report 2005: Transnational Corporations and Internationalization of R&D. Geneva: United Nations Conference on Trade and Development; 2005.
- [28] Chen S-H. Taiwanese IT firms' offshore R&D in China and the connection with the global innovation network. *Research Policy*; 2004; 33 (2): 337–349.
- [29] Ernst, D. Innovation offshoring: Asia's emerging role in global innovation networks. East-West Center Special Reports No. 10. 2006; Honolulu: East-West Center.
- [30] Fujimoto T. Architecture-based comparative advantage in Japan and Asia. In: Ohno K., Fujimoto T., eds. *Industrialization of Developing Countries: Analysis by Japanese Economics*. Tokyo: National Graduate Institute of Policy Studies; 2006, pp.1–10.
- [31] Ulrich K. The role of product architecture in the manufacturing firm. *Research Policy* 1995. 24 (3): 419–440.
- [32] Chen S-H., Wen P., Chen H-C., et al. Industrial upgrading and global innovation network: The case of Taiwanese ICT industry. Paper presented at the 15th Shizuoka Asia-Pacific Forum by the Shizuoka Prefectural Government, Shizuoka, Japan, 4–5 December 2010.
- [33] President's Council of Advisors on Science and Technology. Report to the President on Ensuring American Leadership in



- Advanced Manufacturing, Washington D.C.: Executive Office of the President, 2011.
- [34] Jacques M. *When China Rules the World: The Rise of the Middle Kingdom and the End of the Western World*. London: Penguin; 2009.
- [35] Lemoine F., Unal-Kesenci D. Assembly trade and technology transfer: The case of China. *World Development* 2004; 32 (5): 829–850.
- [36] Chen C., Chang L. The role of foreign direct investment in China's post-1978 economic development. *World Development*; 1995, 23 (4): 691–703.
- [37] Ge Y. Globalization and industry agglomeration in China. *World Development* 2009; 37 (3): 550–559.
- [38] Liu X., Buck T. Innovation performance and channels for international technology spillovers: Evidence from Chinese high-tech industries. *Research Policy* 2007; 36: 355–366.
- [39] Liu X., Wang C. Does foreign direct investment facilitate technological progress? Evidence from Chinese industries. *Research Policy* 2003; 32: 945–953.
- [40] Christensen C. M. *The Innovator's Dilemma*. New York: Harper Paperbacks; 2003.
- [41] Brandt L., Thun E. The fight for the middle: Upgrading, competition, and industrial development in China. *World Development* 2010; 38 (11): 1555-1574.
- [42] Gadiesh O., Leung P., Vestring T. The battle for China's good-enough market. *Harvard Business Review* 2007; 85 (9): 81–89.
- [43] Minagawa T, Trott P., Hoecht A. Counterfeit, imitation, reverse engineering and learning: Reflections from Chinese manufacturing firms. *R&D Management* 2007; 37 (5): 455–467.
- [44] Yueh L. China's entrepreneurs. *World Development* 2009; 37 w(4): 778–786.
- [45] Prahalad C. K. *The Fortune at the Bottom of the Pyramid*. Philadelphia: Wharton School Publishing. 2005.
- [46] Christensen C. M., Craig T., Hart S. The great disruption. *Foreign Affairs* 2001; 80 (2): 80–95.
- [47] Chen S-H., Wen P., Tai C., China's good enough innovation: Shanzhai handsets and Shanzhai economy. Paper presented at the Economic Geography of the IT Industry in the Asia Pacific Region, University of Queensland, Brisbane, Australia, 28–29 April 2011.
- [48] APEC SME Innovation Center. Part III: Best practices of SME innovation policies in APEC. Seoul: APEC Small and Medium Enterprise Working Group and Korea Technology; 2006.
- [49] Brookfield J., Liu R., MacDuffie J.P. Taiwan's bicycle industry A-Team battles Chinese competition with innovation and cooperation. *Strategy and Leadership*, 2008; 36 (1): 14–19.
- [50] Choo H., Jung J., Chung I., et al. Buyer-supplier relationships in Dongdaemun fashion market: Relationship quality model. *Journal of Fashion Marketing and Management* 2009; 13 (4): 481–500.
- [51] Yun J. Re-globalizing Seoul: construction of the Dongdaemun market as the 'world design market'. The University of Warwick; 2011, available at <http://www2.warwick.ac.uk/fac/arts/history/ghcc/research/esrccitiesnetwork/activities/conference/papers>, accessed on 24 August 2013.
- [52] Kim H., Lee J. From crisis to opportunities? Korea's fashion industries in changing global production networks and upgrading towards the Dongdaemun fashion cluster. PowerPoint presentation presented at Science and Technology Policy Institute, Korea. 2011.
- [53] Korea Federation of Textile Industries. Fashion industry cluster: Success story. In: *Textile & Fashion Korea, 2007 Annual Edition*. Seoul: Korea Federation of Textile Industries; 2007, pp. 20–25.

---

# OUT-OF-THE-BOX RURAL DEVELOPMENT

MECHAI VIRAVAIIDYA

## Chairman

Population and Community  
Development Association

---

## INTRODUCTION

A significant number of people who work in the field of rural development envision it as a form of welfare given by various international organizations and governments. History is filled with examples of wealthier nations throwing money at poorer ones in the hope that long-standing problems will go away. This methodology rarely works because welfare does not foster new skills and it does not empower the individual. The Population and Community Development Association (PDA) adopted an out-of-the-box approach to rural development over the past 30 years that begins with the underlying assumption that the only road out of poverty is through business enterprise. By working directly with people who are seen as "part of the problem" to be solution makers, it is possible to help impoverished people toward a path of self-help and self-determination.

Poverty-stricken people are, in fact, trying to make a profit by conducting business enterprises. However, they remain poor due to a lack of business skills and no access to credit. Recognizing this root cause of poverty is the first step toward implementing a successful rural development program. While providing welfare and infrastructure in some capacity may be considered an initial solution, it is important to understand the entrepreneurial spirit that lingers within the poor, trying to make a better life for their families and loved ones. The PDA has a mission similar to the Asian Productivity Organization's (APO) vision of empowering people through small enterprise.

Recognizing that it was important to partner with organizations that possess business and

marketing skills, cooperation was gained with a number of companies operating in Thailand that include Swedish Motors, Halcrow, Chevron, Microsoft, and numerous others. By leveraging their institutional capacity and financial resources, the Village Development Partnership was implemented. This is a serious endeavor to empower communities to eradicate poverty and improve their quality of life. It is a genuine partnership between the villagers and the sponsoring company, organization, or individual that has been implemented for over 25 years throughout Thailand. Furthermore, by promoting individual social responsibility in companies, a culture of philanthropy is promoted, something desperately needed in the Asia-Pacific region [1].

## CASE STUDY: THE VILLAGE DEVELOPMENT PARTNERSHIP

The Village Development Partnership is an integrated rural development project model that combines PDA's diverse developmental expertise and extensive rural network with the financial and human resources of a sponsoring partner. This program provides a structured approach toward sustainable poverty alleviation through a three-phase process that addresses issues within the five development areas: community empowerment, economic development, environment, health, and education.

Community empowerment, in the form of an elected, gender-balanced Village Development Committee, ensures that rural communities understand, manage, and lead their own development. Business skills training and access to microcredit through the Village Development Bank (VDB) provides villagers

with the opportunity to start or expand income-generating activities by the use of a locally owned and operated microcredit fund. Loan repayments then go toward increasing the available pool of credit and funding further development activities.

Once a suitable village and sponsoring partner are selected, the PDA guides the village through the following steps:

### **Phase I: Institutional Development and Planning**

#### **1. Building a Common Understanding**

PDA's rural development staff visit the village and organize meetings, during which the Village Development Partnership concept is introduced and questions are answered.

#### **2. Forming the Village Development Committee**

A gender-balanced committee (at least 50% women) is democratically elected, comprising both adults and youths from within the village to manage and guide the long-term development project.



Figure 1. Election of the Village Development Committee

Source: PDA– Krabi Development Center, 2005

#### **3. Training the Village Development Committee**

PDA's rural development staff train the newly elected leaders in project management, bookkeeping, communication skills, environmentalism, community outreach, and public health awareness.

#### **4. Bamboo Ladder Assessment**

This assessment is a powerful tool to analyze the quality of life of each villager in the past, present, and future. The Bamboo Ladder evolved from the Self-Anchoring Striving Scale (SAS) [2], developed in the 1960s by Hadley Cantril, a professor of Social Psychology at Princeton University. Used in more than 20 countries, the 10-point scale was a culture-free means of assessing perceptions, concerns, and future aspirations of previously marginalized individuals.

The Bamboo Ladder, a Thai adaptation of the SAS, was developed in the early 1980s in cooperation with the PDA as a barometer of perceived changes in wellbeing in relation to actual changes in socioeconomic status. The Bamboo Ladder permits respondents to express their perceptions without imposing forced choices through questionnaires, while allowing comparisons over time. Each respondent is asked to define, on the basis of his or her own assumptions, the top and bottom rungs on the picture of the ladder (anchoring points), which would represent the best and worst possible personal life conditions. Subsequently, respondents are asked to indicate on the ladder where they believe they stand now, where they think they stood three (or more) years ago, and where they expect to stand three (or more) years hence in terms of personal, familial, and community wellbeing (or any other life dimension) in relation to their previously defined ladder anchoring points.

While individual ratings are subjective, coding schemes can provide an empirical basis for assessing the spectrum of values with which persons are presently concerned, their perceptions of their quality of life, and their progress toward a higher level of development. Therefore, the Bamboo Ladder Assessment articulates progress over time and is an effective monitoring and evaluation tool.

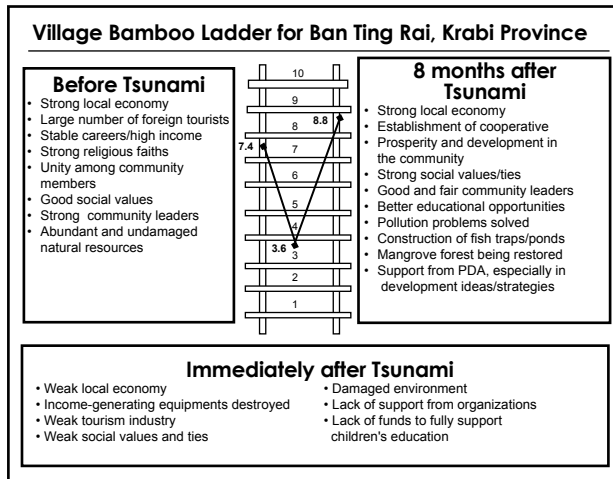


Figure 2. Example of a Bamboo Ladder Assessment

Source: PDA Krabi Development Center, 2005

### 5. Community Needs Assessment

Following the Bamboo Ladder Assessment, the community is brought together to facilitate a multi-day brainstorming session, during which villagers create an overarching Community Needs Assessment (CNA). The CNA provides a unique opportunity for the community to understand its situation and determine future objectives, as well as map out what the community must do to realize their goals. This learning process is a crucial building block toward long-term self-sustainability and away from dependence on outside donors.

The Village Development Committee facilitates this process to involve the entire village. Villagers exchange ideas about priority needs and goals, what changes are viable in the community, who will be responsible, and what the appropriate activity rollout schedule will encompass. In the preliminary planning, a focus group discussion is facilitated in order to obtain primary data about the overall situation of their village. The objective of this activity is to engage community members in assessing the current climate within their village, and then to set a plan for how they would like to improve their overall situation. Topics discussed during preliminary planning are:

- General quality of life in the village
- Economic development (e.g., income generation, primary and secondary occupations, labor, employment, and debt burden)
- Social needs (e.g., village population, education, and health)
- Environmental (e.g., access to potable water and land usage)
- Health (e.g., common health ailments in the village)
- Education (e.g., access to and conditions of schools and daycare centers)

The resulting output from this initial brainstorming session is a community map that provides identification of basic needs for quality of life and economic improvement.



Figure 3. Example of a Community Needs Assessment Session

Source: PDA Lamplimat Center, 2010

### 6. Eye-opener Trip

Members of the Village Development Committee are taken to see existing Village Development Partnerships within the rural network. This ensures that villagers understand that their goals are achievable.

The output from these initial steps of the Village Development Partnership process is a clearly articulated idea of the future village the community aspires to. It focuses on prioritized goals and activities, and an implementation plan that breaks down the steps and resources necessary to achieve the desired village. Actual implementation begins in Phase II.

## **Phase II: Implementation of Development Activities**

### **1. Tree Planting and Establishment of the VDB**

A microcredit fund that provides small loans to villagers called the VDB is established in the village and managed by the villagers themselves. The initial capital for the bank is provided by the sponsoring company or organization, and the villagers repay this donation with labor by planting trees. The tree-planting activity has three tangible benefits:

- i. Promotes environmentalism in Thailand, a country that has seen significant deforestation [3]
- ii. Ensures villagers take ownership of the VDB
- iii. Fosters community togetherness. For each tree planted, approximately THB40 (USD1.25) is deposited in the VDB. Typically, villagers plant between 10,000 and 30,000 trees to provide initial capital for their community microcredit fund

### **2. Barefoot MBA**

Prior to villagers being able to take out small loans from the VDB to start enterprises, they go through an extensive training process organized by the PDA staff to improve their business skills and financial management capacity. The business skills are practical in nature (e.g., teaching villagers how to produce organic fertilizer) to ensure that they can succeed with small-scale enterprises within their community. Villagers from other Village Development Partnerships are brought in as experts to provide training.

### **3. Launch of the VDB and Local Enterprises**

Following training in the Barefoot MBA, villagers are able to take out small loans to begin enterprises. The locally-owned microcredit fund is supervised by a committee of villagers with oversight from our rural development staff. The bank is open once a month from within the village. Individual loans typically range from USD150 to USD400, and the interest rate is 12%. Due to the direct community involvement with the VDB, loan defaults are extremely rare.



Figure 4. Example of an Income-Generating Activity (Mushrooms)

Source: PDA Lamplimat Center, 2009

## **Phase III: Monitoring and Evaluation**

This final phase is accomplished by the Research and Evaluation staff of the PDA. Furthermore, follow-on mentoring and coaching is also provided by the PDA team, who regularly visit the village to discuss issues with the various committees and councils, provide advice, and request updates on activities. Eventually, a successful Village Development Partnership will no longer need the assistance of the PDA because the village will be self-sufficient.

Through the Village Development Partnership, rural communities develop the knowledge, skills, and capacity to analyze and respond to their needs. Once a community has become experienced with the social and economic institutions of the Village Development Committee and the VDB, it possesses the tools and funds necessary to sustain its own future development out of poverty and improve their quality of life. This approach has been recognized by the Bill & Melinda Gates

Foundation as a best practice [4] and has been conducted in over 450 villages over the past 25 years.

### **NEXT STEP: SCHOOL-BASED INTEGRATED RURAL DEVELOPMENT (SCHOOL-BIRD)**

In 2009, the PDA established the Mechai Pattana School (MPS), also known as the Bamboo School. It is located in Lamplaimat district, Buriram province, the second poorest area in Thailand. The school provides high-quality secondary education to underprivileged children in northeastern Thailand, offering access to an education that goes beyond the rote learning of literacy and numerical skills. The Bamboo School teaches its students the necessary life skills needed to transform their communities out of poverty.

After having launched integrated development activities in communities and villages around the Bamboo School, it is deemed timely to expand into other areas further from the school through distant medium-sized government-operated schools. Schools that were contacted have expressed great interest in participating in the Bamboo School. Major steps to be taken cover poverty eradication in communities surrounding the school through community empowerment, business skills, and access to credit. In these endeavors, villagers in rural communities will partner with the Bamboo School to address improvements in education and the quality of life.

The School-BIRD is an integrated social and economic development endeavor to raise the quality of life and educational standard of students and their families in and around schools operated by the government. The activities to be introduced through the school will comprise skills training for teachers and students' families, income generation, health improvement, educational progress, gender equality, democracy, environmental protection, and volunteerism. In order to attain a level of financial sustainability in the long

run, a social enterprise or business arm will be established at the school and a microcredit fund will be established at the village.

These activities will generate genuine partnerships between surrounding villages and the sponsoring organization to provide a unique opportunity to tackle the root cause of inequality and poverty. This project will enable the schools to become modest lifelong learning centers and hubs for economic and social advancement similar to the Bamboo School.

The two key components of the School-BIRD project are:

- i. Utilization of a school as a natural entry point and coordination for rural development
- ii. Focus on community empowerment and sustainability with a village-owned microcredit fund

### **CONCLUSION**

The process of the Village Development Partnership was originally designed to be a partnership between a Thai company and a rural village in Thailand. However, universities, families, newlyweds, philanthropists, and other institutions have recognized the importance of eradicating poverty and fostering a culture of sustainability for the underprivileged. Furthermore, the Village Development Partnership has evolved to provide support for a large number of vulnerable groups. One particular group is people living with HIV, who are typically stigmatized within their communities in Thailand. By providing microcredit loans for an HIV-positive person and an HIV-negative person to form a business partnership, they can improve their quality of life while providing sufficient income for themselves. This was evidenced by the Positive Partnership Program that the PDA has implemented with sponsorship from Pfizer, recognized as a UNAIDS best practice [5].

The Village Development Partnership can also be adapted to be based at other institutions such as schools (a School-Based Integrated Rural Development program or School-BIRD to promote quality rural education), prisons (Jail-Based Integrated Rural Development program or Jail-BIRD to help ex-convicts), and even temples (Temple-Based Integrated Rural Development program or Temple-BIRD to support monks). As an example of a sustainable, income-generating activity that can be deployed in rural areas beset by poverty, one acre of land can yield USD1,500/month if high-value crops such as mushroom, lime, cantaloupe, and asparagus are planted. The improvement in the quality of life will ultimately provide the villagers with better education, improved access to health care, and a cleaner environment.

## RECOMMENDATIONS

Following numerous lessons learned over the years in Thailand, the PDA has developed four best practices for the consideration of organizations looking to tackle poverty eradication. The PDA believes that adopting these recommendations can help ensure success:

1. Promote individual social responsibility for company management and staff to foster a culture of philanthropy in the Asia-Pacific region
2. Implement rural development programs that focus on empowering the underprivileged rather than a welfare-based approach
3. Eradicate poverty by providing marginalized groups access to credit and business skills training
4. Foster innovative, out-of-the-box approaches to development that are scalable rather than relying on centralized bureaucracies to tackle the problem

## REFERENCE

- [1] Bangkok Post. Thailand in need of a Bill Gates and a George Lucas. 1 September 2010. <http://is.gd/pg4K1A>
- [2] Cantril H. Pattern Of Human Concerns Data, 1957-1963. IPCSR. Inter-university Consortium for Political and Social Research [producer and distributor], 1977. doi.org/10.3886/ICPSR07023.v1
- [3] Bangkok Post. Prawase says floods due to deforestation. 2 December 2011. <http://is.gd/VvlsfB>
- [4] Bill & Melinda Gates Foundation Blog. Mechai Viravaidya: Condoms and creativity by Melinda French Gates. 15 September 2010. <http://is.gd/AT2r2e>
- [5] UNAIDS. UNAIDS best practice collection; The positive partnerships program in Thailand: Empowering people living with HIV. Geneva: Joint United Nations Programme on HIV/AIDS; 2007. E-Report.

## BIBLIOGRAPHY

Viravaidya M., Hayssen J. Strategies to Strengthen NGO Capacity in Resource Mobilization Through Business Activities. Geneva: Joint United Nations Programme on HIV/AIDS; 2004.

---

# PUBLIC-SECTOR PRODUCTIVITY

DR. SHIN KIM

**Research Fellow and Director**

Office of International Cooperation  
Korea Institute of Public Administration

---

## INTRODUCTION: THE PERFORMANCE MOVEMENT

Since the late 1970s, there has been much discussion dealing with the role of the public sector. As the economy worsened due to high unemployment rates, inflation, and low economic growth, intense debate about public sector has begun to surface. A common perception regarding the public sector is that the government is too large and wasteful in terms of financial management, and that the state is excessively involved in economic activities.

As the frequent use of terms such as small government, private initiatives, and liberalization demonstrate, arguments have been centered around decreasing the size of public sector and limiting government involvement in economic activities. Wasteful expenditure, inefficiency, and low productivity are characteristics associated with government activity. In addition, the public sector's lack of profit-seeking incentives, excessive red tape, and government decisions based on political motivations rather than rationality are additional features that lead to perceptions of the public sector's fundamental inefficiency.

As a result, many countries have pursued public sector reforms deemed "re-engineering or reinventing governance" [1]. The influence of neoliberal policies for downsizing government and introducing market forces in order to overcome inefficiency, stagnation, and unemployment have been especially prominent in advanced capitalist nations [2]. In light of the successes achieved in these countries, many developing and transitional economies have sought to emulate such public-sector reform initiatives.

The essence of the reform is to improve public-sector productivity, which means producing efficient and effective performances out of limited government resources. As citizens demanded value for their money, input or process-based government activities were replaced by output or result-based performance management. For more than four decades, productivity in the public sector has become the norm in almost all countries, regardless of the status of development.

## STATUS OF DEVELOPMENT AMONG ASIAN PRODUCTIVITY ORGANIZATION (APO) MEMBER COUNTRIES

The development stages among APO member countries vary in terms of productivity and innovation. Broadly defined, these two terms can include advancement in a number of areas such as government, economics, business, sociology, and science and technology. But the main focus will be on productivity in the public sector, namely, policies or programs geared toward governmental reforms.

To compare the relative development of member countries, the global rankings of the 20 APO member countries were examined based on the three indicators of Government Effectiveness, Doing Business, and Global Competitiveness Index (GCI). Table 1 shows the rankings of the 20 APO member countries according to the above indicators.

The World Bank's Worldwide Governance Indicators (WGI) [3] compiled data according to a total of six broad dimensions of governance, but for the purpose of this study, only government effectiveness was selected in order to examine the capacity



of the public sector for implementing sound policies. More specifically, this research sought to focus on “the quality of public services, the quality of the civil service, and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies” [4].

The “Doing Business” indicator benchmarks the government regulations in 183 economies according to the following 10 areas of the business life cycle: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting

investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency [5].

The GCI is a comprehensive indicator measuring the microeconomic and macroeconomic foundations of national competitiveness, defined by the World Economic Forum as “the set of institutions, policies, and factors that determine the level of productivity of a country” [6]. Since productivity and competitiveness are broad terms that can be measured through a number of factors, the GCI comprises a total of 12 subcategories that are weighted averages of many different components of an economy.

Table 1. Ranking of the 20 APO Member Economies

Member Economies	Government Effectiveness	Doing Business	GCI
Bangladesh	165	122	108
Cambodia	163	138	97
Republic of China (ROC)	33	25	13
Fiji	154	77	NA
Hong Kong	12	2	11
India	95	132	56
Indonesia	110	129	46
Islamic Republic Of Iran (IR Iran)	133	144	62
Japan	25	20	9
Republic of Korea (ROK)	34	8	24
Lao PDR	175	165	NA
Malaysia	38	18	21
Mongolia	143	86	96
Nepal	157	107	125
Pakistan	156	105	118
Philippines	102	136	75
Singapore	1	1	2
Sri Lanka	107	89	52
Thailand	88	17	39
Vietnam	118	98	65
Total countries surveyed	213	183	142

Source: Worldwide Governance Indicators 2010, World Bank; Doing Business 2012 report, World Bank; Global Competitiveness Report 2011–2012, World Economic Forum

While these three indicators are distinct measures that assess different aspects of a country's public- and private-sector performances, there are tendencies underlying these indicators. Singapore and Hong Kong are at the most advanced stages, with Japan, ROK, and ROC are very close to them. Malaysia, Thailand, and Indonesia, in some respect, are following the top five members. The rest of the member countries are behind the above countries.

The GCI provides a broad-based assessment of a country's level of competitiveness and innovation. In addition, the 12 subcategories of the GCI are incorporated into three broader categories that coincide with the three stages of economic development. In the first stage, the economy is "factor-driven," which means that countries compete mainly using unskilled labor and natural resources, and maintaining competitiveness requires well-functioning institutions, well-developed infrastructure, stable macroeconomic environment, and a healthy workforce with basic education. Second is the "efficiency-driven" stage, where increased competitiveness requires higher education and training, efficient goods markets, well-

functioning labor markets, development of financial markets, technological readiness, and a large domestic or foreign market. Finally, the third "innovation-driven" stage is characteristic of significantly high wages and standards of living, which can only be maintained through highly skilled production processes and innovation of new businesses. Table 2 illustrates the distribution of APO member countries at each stage of development using the 12 GCI subcategories for 2008 and 2011, respectively.

Comparing 2008 and 2011 in Table 2, IR Iran, Mongolia, the Philippines, and Sri Lanka are at the "transition stage between 1 and 2", while Indonesia leaped from stage 1 to 2. ROC moved beyond the transition stage to land a spot in stage 3. While stages 1, 2, and 3 are obvious in revealing the important components for a country's progress, the "transition" stages depict changes in the significance of weights as a country develops and provides information as to which weights are becoming more or less important for a country's competitiveness.

This three-stage analytical framework, in addition to the comprehensiveness of the

Table 2. APO Countries at Each Stage of Development in 2008 and 2011

Year	Stage 1	Transition from Stage 1 to 2	Stage 2	Transition from Stage 2 to 3	Stage 3
2008	Bangladesh Cambodia India Indonesia Mongolia Nepal Pakistan Philippines Sri Lanka Vietnam	IR Iran	Malaysia Thailand	ROC	Hong Kong Japan ROK Singapore
2011	Bangladesh Cambodia India Nepal Pakistan Vietnam	IR Iran Mongolia Philippines Sri Lanka	Indonesia Malaysia Thailand	- -	ROC Hong Kong Japan ROK Singapore

Source: World Economic Forum (2008), Global Competitiveness Report 2008–2009; World Economic Forum (2011), Global Competitiveness Report 2011–2012; APO (2008) Innovation Framework and Strategies: An APO Perspective

GCI, provides a general platform for the APO to assess member countries according to the level of competitiveness and innovation, more specifically for the purpose of developing the APO Innovation Framework and Strategy that will “facilitate the charting of national and collective policies and programs, and serve as a platform for exchanges and sharing of best practices” between APO members [7].

## **GOVERNMENT INNOVATION AND REFORM INITIATIVES OF APO MEMBER COUNTRIES**

This section examines the public-sector innovation and reform initiatives of countries in stages 2 and 3. Also, a couple of notable countries from stage 1 and transition stage such as the Philippines and India are briefly reviewed.

Public-sector innovation refers to a variety of policies. Despite the differences in historical backgrounds, political systems, and stages of development, Kamarck [8] points out six main principles that are common to the innovation efforts of governments: a government that costs less, a quality government, a professional government, a digital government, a government with regulatory reform, and an honest and transparent government. This will be the basic framework for examining the innovation initiatives of the top five APO members.

### **Singapore**

Singapore is widely known for its efficiency and competence in governance and provides an excellent case for studying reforms in the public sector [8]. The Public Service Division (PSD), part of the Prime Minister’s Office, is in charge of public-sector innovation through the promotion of best practices and continuous learning, maintenance of a competitive human resource pool, efficient management of financial resources, and other objectives [9]. Within the PSD is the PS21 Office, which is in charge of the Public Service for the 21st Century (PS21) movement. Introduced in 1995, the office is tasked with building the capacity of and enhancing the work efficiency and environment of public servants.

One initiative is the “Continuous Improvement and Innovation,” which encourages public servants to participate in improving public service [10]. PS21 provides two mechanisms for public officials to suggest and implement innovation: the Work Improvement Teams (WITS) and the Staff Suggestion Scheme (SSS). WITS creates an environment for continuous improvement by encouraging questioning, experimentation, and collaboration, while SSS gives public officers the opportunity to provide opinions for improvement. The Enterprise Challenge (TEC) provides support for the trial implementation of innovative ideas that have the potential to create new value and improve the delivery of public services.

PS21 also seeks to improve customer satisfaction by enhancing the quality of service provision through a variety of venues. For example, the development of ICT increased the speed and accessibility of information and services. One-stop mechanisms such as the Online Business Licensing Service allow for the submission of license applications to relevant government agencies through a single portal. The Online Reporting Centre also allows reports to be submitted to a single location and transferred to the relevant agency. Singapore’s e-Government Action Plans as well as iGov2010 and the current eGov2015 (2011–15) program further endeavor to enhance the quality of e-services by deploying applications such as mobile government (mGov) services and other modern apparatus [11].

Guidelines and policies on service provision require that public relations, feedback, communication with the public, consultation, and e-services are maintained at a consistent level of quality. Regular service audits and surveys ensure that standards are kept high, and public opinion polls are initiated periodically to gauge public perception of the service levels. The Government Feedback mechanism, Reaching Everyone for Active Citizenry @ Home (REACH), contains a consultation portal, where policy papers and proposals are made available online for public feedback and suggestions.

Moving beyond the focus of PS21, other important areas of innovation that the PSD as a whole strives to improve include employee training and development. This is important for supplying a steady pool of capable and committed talent for delivering quality public service. All employees must receive 100 hours of training and development yearly for maintaining and acquiring new skills, and are required to develop an individual training roadmap to guarantee adequate job skills and long-term employability. The Civil Service College (CSC) also plays a crucial role in identifying human resource capabilities and competencies that are critical to public services.

Finally, the PSD's initiative for cost-effective government is to gain operational efficiency and clear accountability of the budget allocated, and to promote sustained and noninflationary economic growth. The government's budgeting system has transitioned from line-item budgeting to a block budget system, where ministries have the autonomy and flexibility to determine adequate means for achieving results within the allocated block budget. Also, the Resource Management Framework helps ministries account for the full cost of using public funds, including the cost of capital.

### **Hong Kong**

The Hong Kong government set up the Efficiency Unit (EU) in 1992 in order to improve the efficiency and effectiveness of public services and public management processes. The EU operates under the following directive: "To pursue the government's commitment to improve services to the community and to achieve openness and accountability by formulating, securing support for, and coordinating the implementation of programs for Public Sector Reform" [12].

The EU works in partnership with organizations across the Hong Kong government and implements a number of programs containing coordinated management initiatives for

efficient and effective delivery of public services. In order to achieve these goals, the EU identifies the following areas for innovation.

- i. The promotion of private-sector involvement to utilize its ideas and resources to maintain a small and efficient government. Globalization and increasing market demands require synergizing ideas and programs available from public- and private-sector partnerships. The EU supports a number of proposals and projects aimed at increased commercialization and private-sector involvement in the delivery of public services.
- ii. The goal of organizational reengineering across the Hong Kong government is to increase productivity and improve cross-functional collaboration. The EU works with bureaus and departments to develop programs and conduct studies to enhance the government's public-service delivery, introduce best management practices, and utilize other innovative strategies. The innovative use of ICT to improve service delivery identifies technology-enabled business applications that can greatly improve organizational performance and effectiveness. The 1823 Call Centre (1823) is a "one-stop round-the-clock" telephone service for handling a range of enquiries and complaints on behalf of 19 government departments. Such common service models have proven to be cost-effective operations with streamlined procedures and improved service qualities.
- iii. The EU developed a service-wide performance management framework for assisting bureaus and departments. It consists of several target setting and organizational restructuring initiatives to review their business operations and implement major changes for improving organizational performance. Licensing review is important for proposing measures to reduce compliance costs and administrative burdens on trade. The goal is to enhance the efficiency,

transparency, and customer friendliness of the existing regulatory system in order to improve the overall business environment and level of competitiveness.

- iv. The Citizen-Centric Services Program, which channels the design and delivery of government services around the needs of citizens across departments and agencies, incorporates the following key elements: a) customer feedback, which enables a better understanding of the needs and expectations of citizens and identifies the service gaps that government departments should include, b) an assessment framework for providing departments with an integrated and structured approach to review customer-related activities and identify improvement opportunities for delivering quality services, and c) a one-stop youth portal to facilitate the interaction of all types of activities related to popular youth services.

## Japan

The Administrative Management Bureau (AMB), part of the Ministry of Internal Affairs and Communications (MIC), seeks to make administrative organizations and service provisions more efficient and reliable for citizens. For this purpose, the AMB strives to streamline administration, increase efficiency, and utilize ICT to promote e-government. The bureau also makes appropriate use of laws to ensure fairness and clarity in administration through such means in protecting personal information and disclosing information when needed [13].

In order to enable a simple and efficient administrative organization and to optimize the number of personnel and placements, the AMB employs various programs to determine adequate personnel capacity. In terms of the number of employees for the central government, the AMB conducts "strict head count management" that limits increases in personnel, and administers structural reviews regarding specific operations and projects.

The AMB carries out thorough reviews of all government operations, including those concerning ICT installations in response to the Administrative Reforms Law. The AMB summarizes these efforts on a yearly basis, which is revealed in the examination of administrative organization and staff size in the form of "Streamlining and Efficiency Enhancement Policy".

The AMB conducts reviews of independent administrative agencies, entities that are tasked with the implementation of central policies and programs. The Reorganization and Rationalization Plan for Incorporated Administrative Agencies released in December 2007 consisted of drastic evaluation of incorporated administrative agencies, including the reduction of the existing 101 corporations to 85 through a process of elimination and consolidation, and a reduction of JPY156.9 billion in financial expenditures.

These plans include a review of the shift of noncompetitive negotiated contracts to general competitive bidding, review of assets owned by incorporated administrative agencies, and clarification and visualization of relations with related corporations. These programs were selected for improving the efficiency and autonomy of operations of the administrative agencies.

The e-Government Promotion Plan strives to make administrative management simpler and more competent. About 13,000 (94%) applications and notifications handled by the central government were made online by March 2007 [13]. In order to radically increase Internet connectivity, the central government set up the Action Plan for Expanding Online Use in September 2008.

The government also focused its efforts on promoting online use by citizens through advertisements and the broad deployment of e-government, monitoring opinions and requests, and developing one-stop services that utilize the Government Portal site "e-Gov" [14]. The Basic Policy for Public Procurement of

Information Systems concerns the acquisition of information systems by the central government and the gearing up of efforts toward reducing costs and enhancing the transparency of procurement procedures.

Regarding information disclosure and open administration, the Act on Access to Information Held by Administrative Organs (April 2001) and the Act on Access to Information Held by Independent Administrative Agencies (October 2002) guarantee the right to claim disclosure of documents owned by administrative agencies, independent administrative agencies, and other organizations in order to make the central government provide full accountability to citizens.

In addition, the Act on Protection of Personal Information Held by Administrative Organs and the Act on Protection of Private Information Held by Independent Administrative Agencies were promulgated to handle private information by limiting the ownership of private information, clarifying its purposes of use, limiting its use and provision, and ensuring its accuracy and security.

These laws provide for a mechanism for the central administrator's intervention as a guarantee for the implementation of these rules in the form of rights to claim disclosure, correction, and use suspension, among others. Also, the Administrative Procedure Act seeks fairness and transparency by prescribing common rules for managing applications, conduct, guidance, notifications, and public comment procedures.

### **Republic of Korea (ROK)**

The Ministry of Public Administration and Security (MOPAS) sets out a number of national goals, among which "a smaller and more efficient government" constitutes one of its main agenda [15]. Under this banner are three sub-agendas consisting of strengthening the government's capacity by streamlining government organizations, promoting an efficient and transparent civil-service system,

and e-government initiatives that improve the efficiency and quality of public-service delivery.

In streamlining its organizations, the government abolished 11 central administrative agencies (5 ministries, 1 office, 5 commissions) with the onset of the Lee Administration in 2008, and in 2009, 235 divisions were eliminated across central government agencies. In terms of a flexible personnel management system, each government organization is required to reserve 5% of its total human resources for reallocation to new tasks, since reassignment is considered to enhance the efficiency and productivity of work without increasing the total number of staff.

The goal of paperless administration through online services anytime and anywhere was implemented through the "e-hanaro" civil petition service, which enabled citizens to file civil petitions electronically, and various government web portal services were integrated into "Minwon 24" [16].

To promote an efficient and transparent civil-service system, MOPAS provided venues for citizens to participate in the policy-making process through a citizen suggestion web portal, and ensured the public's right to know through online information disclosure systems [17].

The "customized recruitment system" matched the needs of each ministry and carried out comprehensive management of government personnel, with a particular focus on increasing the number of women in the civil service [18]. Flexible work programs such as part-time work, alternative work schedule, telework, and free dress code were geared toward granting greater flexibility to promote organizational effectiveness, increase productivity, and encourage balance at work. The ministry required the reporting (for Grade 4 and above) and disclosure (for Grade 1 and above) of personal assets of civil servants to prevent corruption and to improve transparency.

Finally, the e-Government initiatives carried out over the past two decades improved both the speed and efficiency of public services. A central and local business processing system called On-Nara BPS handled public documents electronically and increased transparency and efficiency. In 2009, 74 administrative agencies used On-Nara BPS compared with 44 agencies in 2007, and the number of civil servants using On-Nara BPS showed an almost threefold increase in the same period [19]. The hometax system processes all tax collection activities, including filing, billing, and payment online; information can be retrieved anytime by taxpayers. All procurement procedures were also handled online, and a single window was opened to improve efficiency and transparency of public procurement.

In terms of public information resources management, the National Computing and Information Agency (NCIA) was established in 2005 under MOPAS to integrate and share public information resources, and to increase security and decrease error time. This can be observed where, despite the fivefold increase in the number of security systems, the monthly system error time was drastically reduced from 3.58 minutes in 2006 to just 0.11 minutes in 2009. This e-Government experience was exported in the form of several international activities and programs such as Information Access Centers (22 centers in 22 countries), the Korea IT Learning Program (2,790 participants from 114 countries), and the IT Policy and Advisory Program (four centers in four countries), all of which were offered to assist global IT development [20].

### **Republic of China (ROC)**

The Research, Development and Evaluation Commission (RDEC), under the auspices of the Executive Yuan, was established in 1969 as a staff organization for policy research and development, policy planning, policy supervision and evaluation, government's IT management, circulation of government publications, archives, and other tasks assigned by the prime minister [21]. Good

governance being the overall objective for the RDEC, its four strategic goals include revitalizing public information and knowledge to upgrade government strategic thinking, policy coordination and reorganization to enhance government integration, promoting transparency, and advancing results-oriented performance management for accountability.

To encourage public participation, the RDEC has conducted large scale national polls since 1978 to monitor public response to government policy. In 1988, in response to the rapidly changing policy environment, face-to-face surveys were replaced by computer-assisted telephone interviews (CATI) to collect real-time public feedback on major social issues and policies. The RDEC also established the Public Opinion Survey Center in October 2000 to track public opinion on current issues quickly and regularly. The results of these surveys assist in policy decision-making, and the survey reports are also posted on the RDEC official website for the media and public. The RDEC supervises all governmental departments in conducting public opinion surveys and organizes annual public survey workshops.

For the goal of structural reform, streamlining seeks to reevaluate the functions of the 37 ministries and councils as well as other agencies under the Executive Yuan, and adjust or merge some of these offices. Specific measures include trimming the number of ministries and councils from 37 to 29, reevaluating government functions, allocating human resources, imposing limits on staff numbers, and assessing the necessity of illegitimate offices in accordance with legal regulations.

To diversify organizational structures, specific measures include relaxing the laws of central government agencies to allow flexibility in the structural design of administrative departments, redefining relations between public and private organizations to provide convenient citizen services, and promoting incorporation of administrative agencies to allow the government more freedom in personnel and budget management.

Finally, initiatives for efficiency include reinforcing the ability of the Executive Yuan, the ministries, and councils to conduct general planning, enhancing cross-ministry-council coordination and governance, and introducing corporate management to root out inefficient practices in government.

The Government Program Framework includes a performance management system that combines medium-term plans with performance assessments. The plans are aimed at turning concepts into policies and to ensure adherence to the tenure of the president. These plans are reviewed for improvement once every four years. When formulating medium-term programs, agencies set performance objectives and indices for evaluating programs, personnel, and expenses using the balanced scorecard (BSC) method. For administrative accountability and customer satisfaction, performances are also evaluated from result-oriented perspectives. The Policy Program Management Information System (Government Program Network, GPMnet) is a web-based common service platform for integrating various management information systems so that agencies can plan and evaluate their medium-term programs based on integrated information.

### **Thailand**

The Office of the Public Sector Development Commission (OPDC) is a department under the Office of the Prime Minister tasked with functions related to public-sector development and other government duties. The OPDC's work covers the study, research, monitoring, and evaluation of ministry and department operations, dissemination of data and knowledge, organization of training programs, reporting of data and results, as well as recommending strategic plans and other actions [22]. Strategic areas include the provision of better services, reshaping of the public sector, increasing performance efficiency, enabling democratic governance, and enhancing organizational capacity of government agencies.

Specific public-sector reform initiatives currently in progress at the OPDC include the following:

- i. **Better Service Quality:** Raising the quality of public administration through work process reduction and improvement of service quality, deregulation, e-services, operation of Call Center 111, and service linkage through integrated customs solutions
- ii. **Rightsizing:** Restructuring of government agencies, specialization of agency functions, comprehensive review, contestability through competition, and activity-based costing and capital charges
- iii. **High Performance:** Implementation of change management, change in leadership, knowledge management, e-learning, paradigm shifts in governance, performance audits, and e-initiatives
- iv. **Open Bureaucracy:** Public participation, people's audit, lay board/citizen advisory boards, and networking

### **Indonesia**

The Ministry of Administrative Reform and Bureaucratic Reform (PAN Kemeneg) is the government ministry in charge of overlooking state organizations and bureaucratic reform. The minister assists the president in formulating policies, coordinating the implementation of those policies, management of state property and assets, supervision of programs, poverty eradication, advisory work, and other duties related to the PAN and Bureaucratic Reform. The overall mission of the ministry includes improving the effectiveness and efficiency of government agencies and operations, quality of public services, performance accountability apparatus, coordinated supervision, the effectiveness and efficiency of public management, and enhancing the professionalism of personnel.



Specific functions include: the formulation, implementation, and coordination of national policies in the operation of state organizations, including central and local agencies, personnel, governance, public service, oversight, and accountability agencies; the management of properties and assets under its jurisdictions; the supervision of the implementation of overall duties; and the submission of evaluation reports, programs, and initiatives related to the policies and its functions to the president [23].

### **Malaysia**

The Malaysian Administrative Modernization and Management Planning Unit (MAMPU), under the Office of the Prime Minister, is the highest government agency in Malaysia responsible for “modernizing and reforming” by setting standards and policies in the areas of public-sector administrative reforms. MAMPU is divided into the following six divisions: Task System Division, Productivity Enhancement Division, Finance Management Division, Information Technology Division, Task Force and Administrative Division, and Management Policy Analysis and Organization Research Division [24].

The main objectives and functions of MAMPU include conducting research in public administration and human resource, the formulation of policy for modernizing the public sector, and submitting reports to the cabinet and/or parliament. Other related objectives and functions consist of strengthening the administrative structure and human resource planning at the federal, state, and local government levels; upgrading and modernizing the administrative system and its operations; introducing new and innovative techniques in the government administrative sectors and improving the efficiency material management system, resources, and programs at all governmental levels; introducing an efficient system in human resource planning and development for the purpose of increasing accuracy in the prediction of current and future demands and needs of human resource for economic development; and the management and coordination of

purchases and usage of equipment of various government agencies.

### **The Philippines**

The National Competitiveness Council (NCC) is a public-private task force created in October 2006 through the Presidential Executive Order No. 571, amended to Executive Order No. 44 for the purpose of developing and overseeing the implementation of the Action Agenda for Competitiveness, building a culture of excellence, and promoting public-private sector partnerships as a means to achieve these goals [25]. Currently, the council is chaired by the Department of Trade and Industry Secretary Gregory L. Domingo and cochaired by Guillermo M. Luz of the private sector.

The NCC focuses on improving the country's competitiveness in the following 11 areas: Education and Human Resources Development, Performance Governance System, Streamlined Business Permits and Licensing System, the Philippine Business Registry, the Bureau of Customs' National Single Window, Infrastructure, Power and Energy, Transparency in Budget Delivery, Anti-Corruption, ICT Governance Framework, and Judicial Reform. Relevant working groups consisting of members from both the public and private sectors handle each of these areas. Members of the working groups are primarily from those agencies and offices, and are already involved in several projects; other members include foreign and local chambers of commerce and various industry associations. The NCC also works closely with the Anti-Red Tape Task Force and the Philippines Development Forum in the implementation of short- and long-term goals. Through these initiatives, the NCC seeks by 2016 to be included in the top 1/3 ranking in major global competitiveness reports, creation of new investments of 3%–4% of the GDP per year, doubling of exports, reduction of poverty, and increase in middle-class population.

## India

The Department of Administrative Reforms and Public Grievances, under the Ministry of Personnel, Public Grievances and Pensions, is the agency responsible for public-sector administrative reforms and redress of public grievances related to the states as well as those that pertain to central government agencies. The department provides information through publications and documentation on relevant activities of the government that concerns administrative reforms, best practices and public grievance redress. The department also undertakes activities in the field of international exchange and cooperation to promote public-service reforms [26].

The overall mission of the department includes acting as a facilitator in consultation with other government ministries and agencies as well as civil society representatives to improve government functioning through process reengineering, systemic changes, introduction of organization and methodology, efficient grievance handling, promoting modernization, citizens' charters, award schemes, e-governance, and best practices in government.

The following are some of the specific areas in which the department seeks to address public-sector reform initiatives: open information, efficient allocation of human capital, crisis management, ethics in governance, public order and justice, local governance, capacity building for conflict resolution, effective use of social capital, refurbishing personnel administration, promoting e-governance, citizen-centric administration, organizational reform, strengthening of financial management systems, and efficient state and district administration.

## **APO'S EFFORTS TO IMPROVE PUBLIC-SECTOR PRODUCTIVITY**

The APO's engagement in public-sector productivity is relatively new compared to other fields. In 2009, the APO extended its

efforts to encompass the public sector by organizing a study meeting on Public Sector Productivity from 19–22 May in Seoul, ROK. For the meeting, a survey of regional view on public sector reform was conducted to build common understanding on the sector's productivity. Experiences from the Korean public reform and the Canadian New Public Management (NPM) model were discussed with 16 participants from 10 member countries.

Since the public sector includes many areas, there is a need to devise a systematic and realistic plan to proceed to further action. For that purpose, a strategic meeting was held from 15–17 February 2010 in Tokyo, Japan. Representatives from targeted national productivity organizations (NPO) such as the Philippines, Malaysia, and Thailand participated to identify major challenges and opportunities for the enhancement of public-sector productivity.

In 2010, another study meeting on Innovation in Public-sector Service Delivery was held from 1–5 November 2010 in Jakarta, Indonesia. Recognizing the importance of providing services to the general public, improvement in public-service delivery was identified as one of the key areas the APO should emphasize, along with lean management and knowledge management.

To follow up on the Jakarta meeting, a study meeting on the Lean Management System in the Public Sector was held from 16–19 August 2011 in Bangkok, Thailand. Canadian and Korean models of lean management were presented for discussion along with the country papers from participants. Currently, a guidebook for knowledge management in the public sector is being developed to serve as a benchmark for member countries.

Although the APO's effort to improve public-sector productivity is in the initial stage, it is getting focused, which can benefit its member countries more effectively. The reviewed countries above have accomplished much in

the area of government modernization and reform, and this is linked to progress in social and economic development as examined in government effectiveness and doing business as well as overall national competitiveness.

## **CONCLUSION**

Improving public-sector productivity is a mandate regardless of the stages of development. In developed countries, it has been a norm for more than three decades. Although there are some differences among APO member countries on the intensity of public reform, they are all engaged in a number of programs and activities.

Today, demands from citizens for quality services are increasing while resources for public sector keep decreasing. The only way to deal with this situation is to fundamentally transform the way government works. Several valuable lessons can be obtained from the experiences of more advanced APO countries. First, input or process-based government operations should be changed to output or outcome-based management. In order to secure the improvement of government operations, public officials must have discretionary power for managing public programs and be accountable for the results, not the procedures.

Introducing market mechanism to government operation is another key element to improving public-sector productivity. Depending on the maturity of individual countries' economies, the role of government is different. In advanced countries, the size of public sector has been expanded due to the ever-increasing demand of social welfare. In the mean time, government is actively involved in producing and providing goods and services in developing countries due to the limited capacities of the private sector. In such circumstances, diverse market-based mechanisms such as outsourcing and vouchers should be utilized to improve the productivity of the public sector.

Regulation is one of the most important factors to influence the overall productivity of national economy. Overregulation is a major problem in most of the member countries due to high burden on the private sector. By streamlining regulatory system, not only public productivity but also private productivity can be enhanced substantially. Significant regulatory reforms along with procedural reforms such as simplification should be carried out simultaneously.

ICT-based government operations are prevalent in advanced countries. Using state-of-the-art technology, the speed and quality of public services have been revolutionized in many areas. E-government not only improves the productivity of public services, it also contributes to the transparent operations of public policies.

Finally, citizen-centered service delivery has become the ultimate goal of the public sector in many member countries. By enhancing the quality of public services through a variety of venues, citizen satisfaction can be improved. After all, the purpose of improving public-sector productivity is to provide more quality services with less resources.

## **RECOMMENDATIONS**

One: Conduct baseline study on public-sector innovation to identify the status quo of member countries

Two: Provide customized services to member countries according to their needs

Three: Target countries based on their development stages to stimulate the innovation initiatives of individual countries

Four: Target areas such as service delivery, regulatory reform, and performance management, which could increase outcomes with less input

Five: Utilize the existing know-how and resources of APO tools in areas such as knowledge management, quality management, and other technical expertise

Six: Create a database on public-sector productivity to accumulate the knowledge and experiences of member countries and to facilitate benchmarking among members

Seven: Develop guidelines and manuals for each specific program and area

Eight: Build capacities of the APO and NPOs to provide appropriate services to member countries

## REFERENCES

- [1] Haque M.S. Governance and Bureaucracy in Singapore: Contemporary Reforms and Implications. *International Political Science Review* 2004; 25 (2): 227-240.
- [2] Chung M. Rolling Back the Korean State: How Much Has Changed? Paper presented at the meeting of the IPSA Section of Structure of Governance. University of Oklahoma, Stillwater, OK, USA, 30–31 March 2001.
- [3] World Bank. *Worldwide Governance Indicators 2010; 2012*. <http://info.worldbank.org/governance/wgi/index.asp>, accessed on 7 October 2013.
- [4] Kaufmann D., Kraay A., Mastruzzi M. *The Worldwide Governance Indicators: Methodology and Analytical Issues*. World Bank Policy Research Working Paper No. 5430. Washington, D.C.; 2010.
- [5] World Bank. *Doing Business 2012; 2012*.
- [6] World Economic Forum. *The Global Competitiveness Report 2011–2012; 2011*.
- [7] Asian Productivity Organization. *Innovation Framework and Strategies: An APO Perspective; 2008*.
- [8] Kamarck E.C., *Government Innovation Around the World*. KSG Working Paper No. RWP04-010. Ash Institute for Democratic Governance and Innovation, John F. Kennedy School of Government: Cambridge, MA; 2004.
- [9] Public Service Division Singapore. *Mission & Philosophy*. <http://www.psd.gov.sg>, accessed on 7 October 2013.
- [10] Singapore Public Service. *National Goals Global Perspectives; 2008*.
- [11] Infocomm Development Authority of Singapore. *eGov Masterplans*. <http://www.egov.gov.sg/egov-masterplans/egov-2015/vision-strategic-thrusts>, accessed on 7 October 2013.
- [12] Hong Kong Efficiency Unit. *Overview of Reform*. Public Sector Reform. [http://www.eu.gov.hk/english/reform/reform\\_over/reform\\_over.html](http://www.eu.gov.hk/english/reform/reform_over/reform_over.html), accessed on 7 October 2013.
- [13] Administrative Management Bureau. Ministry of Internal Affairs and Communication. <http://www.soumu.go.jp/english/amb/index.html>, accessed on 7 October 2013.
- [14] Japan's e-Government Initiatives. <http://www.e-gov.go.jp/doc/e-government.html>, accessed on 7 October 2013.
- [15] Ministry of Public Administration and Security. *Happy People Safe Society*, Ministry of Internal Affairs and Communication. eGov; 2010. <http://www.e-gov.go.jp/doc/e-government.html>, accessed on 7 October 2013.
- [16] Public Information Sharing Committee. <http://www.pisc.go.kr>, accessed on 7 October 2013.
- [17] Korea Public Information Disclosure System. <http://www.open.go.kr>, accessed on 7 October 2013.
- [18] Anti-corruption and Civil Rights Commission. <http://www.epeople.go.kr>, accessed on 7 October 2013.
- [19] Ministry of Government Administration and Home Affairs. *On-Nara BPS; 2008*.
- [20] Ministry of Public Administration and Security. *National Computing & Information Agency Development; 2010*.
- [21] Research, Development and Evaluation Commission. *The Facilitator for Good Governance*. <http://www.rdec.gov.tw/ct.asp?xItem=4095699&CtNode=14522&mp=110>, accessed on 7 October 2013.

- [22] Office of the Public Sector Development Commission. Activities. <http://www.opdc.go.th/english/main>, accessed on 7 October 2013.
- [23] Ministry of Administrative Reform and Bureaucratic Reform. Function & Mission. <http://www.indonesia.go.id/en/ministries/ministers/state-minister-for-the-empowerment-of-state-apparatus/1645-profile/269-kementrian-negara-pendayagunaan-aparatur-negara-dan-reformasi-birokrasi>, accessed on 7 October 2013.
- [24] Malaysian Administrative Modernization and Management Planning Unit. Corporate Information. [http://www.mampu.gov.my/web/bi\\_mampu](http://www.mampu.gov.my/web/bi_mampu), accessed on 7 October 2013.
- [25] National Competitiveness Council. About NCC. <http://www.competitive.org.ph/about-us/about-ncc>, accessed on 7 October 2013.
- [26] Department of Administrative Reforms and Public Grievances. Vision & Mission Statement. <http://darpg.nic.in>, accessed on 7 October 2013.

---

# AGRICULTURE PRODUCTIVITY AND SUSTAINABILITY

KUNIO TSUBOTA

**Professor**

Faculty of Agriculture  
Meiji University

---

## INTRODUCTION

When the Asian Productivity Organization (APO) “founders” conceived the idea of a productivity-oriented organization in Asia, they paid little attention to agriculture. There were good reasons. The initiative that was started by the Japan Productivity Center had nothing to do with agriculture. It was obvious that the innovation of industrial sectors, not agricultural, was the main engine of high economic growth. Productivity concepts and tools developed for industry sectors were not tailored for farmers and rural communities. Agriculture was too vulnerable with many natural and social impediments to boost its productivity.

The situation changed quickly after the APO was established in 1961 as an intergovernmental organization. Developing member countries requested that the APO embrace agriculture because it was a main sector in their economies. While conceding the leading role of industrial sectors in economic development, they were also eager to raise agricultural productivity in order to address basic problems such as food shortage, rural poverty, and the widening income disparity.

The APO set up its Agricultural Department in 1966 and launched the Agricultural Program, which highlighted that governments, not farmers, were the main promoters of productivity growth in the sector. Therefore, the targets were not leaders of private sectors but government staff. Knowledge sharing on policy measures rather than

technology/skill transfer was the main activity. Financial support often came from the ministries of agriculture.

Throughout the 1970s and 1980s, various workshops, seminars, and observation missions were organized. They covered mainly production-oriented topics such as farm management, horticulture, irrigation, mechanization, rural credit, cereal processing, and cooperatives. In the late 1980s and 1990s, issues on food processing, marketing, and rural employment gained momentum as national economies and consumer income grew in many member countries. The late 1990s and early 2000s saw the emergence of two new trends in the APO Agricultural Program. One was a “green” trend in production and marketing, which mirrored the people’s rising concern regarding the environment and health in the region. The other was the trend of acknowledging “community forces” as a means of enhancing agricultural productivity and reducing mass poverty. In more recent years, food safety became a central issue for the entire agro-food chain in the APO region.

The transformation of the Agricultural Program has advanced in tandem with the evolution of productivity concept in the APO. In the early stage, productivity simply meant the volume of output per input. The Agricultural Program focused on how to produce more food with less input, for instance, rice yield per hectare. Then, productivity concept gradually shifted toward the efficiency of “value” addition in the 1980s. The APO paid increasing attention to value elements such as quality, safety, and convenience, among others. And so

did the Agricultural Program. The measures to promote value addition in agriculture and post-harvest activities were highlighted in the 1990s. Lately, the concept of productivity has extended further into the area of sustainability, as symbolized by Green Productivity. Topics such as low-input agriculture, food safety, and resource management are now at the core of the Agricultural Program.

### **Agricultural and Economic Development**

Agriculture is essentially a resource-based industry. Its productivity hinges primarily on natural endowments that include cultivable land, soil fertility, and available water. As productive land areas are limited, the law of “diminishing returns” works more rigorously in agriculture, which may endeavor as a dire impediment for the nation’s economic development. The mechanism can be noted as follows. Industrialization ignites population growth and higher demand for food, but food supply cannot catch up with the rising demand because of the “diminishing returns” in agriculture. The result is higher food prices and wages that would reduce the profits of industrial sectors, make capital formation more difficult, and eventually halt the growth of national economy. The notion of “Ricardian trap” suggests that economic development cannot last unless agricultural productivity is sufficiently raised. Food import may be an alternative for a small, rich country such as Singapore, but it is not applicable in large developing countries, where agriculture is often the mainstay for the large majority of the population.

Asia is not endowed with sufficient agricultural resources to sustain its huge population. Half a century ago, arable land per person in Asia was around 0.3 ha, and just a half of that size in sub-Saharan Africa. In developing Asia, only 20% of its arable land was irrigated, while the average fertilizer used was one-twentieth of that in developed nations. Rural infrastructures, including roads, power, and transportation facilities, were very underdeveloped, if not devastated by the war. The cereal yield per

hectare ranged 1–2 tons except for Japan. Serious food shortages were foreseen as population grew at 2.3% per year in the 1960s. An “Asian drama” appeared imminent [1].

It is now known that many APO member countries have successfully averted the Ricardian trap and passed, or are passing through, the “take-off” stage of economic development. They entered a high growth period one after another in a manner like flying geese: Japan in the 1960s; Republic of Korea (ROK), Republic of China (ROC), and Malaysia in the 1970s–80s; PR China, Thailand, and Indonesia in the 1980s–90s; and Vietnam and India in the 2000s. Indeed, this unprecedented chain reaction of heterogeneous countries in one region may resemble a miracle of sorts in the history of economic development [2].

A lot of factors must have worked in favor of economic growth in this region, and the powerful growth of the food and agricultural sector must have featured prominently as one of them. Agricultural production and productivity in APO member countries rose much higher than the population growth and reduced the wage pressure in other sectors. A key element was the “Green Revolution” that visited Asia in the late 1960s and the 1970s. Cereal production per capita steadily increased because yields per hectare rose every year owing to the expansion of high yield varieties (HYVs), use of fertilizer, and irrigated areas. The achievement of food self-sufficiency and price stability in the 1980s and 1990s assured many countries of food security and social stability on the one hand, and reduced foreign currency requirement on the other. Industrial sectors enjoyed low food prices and wages, and a continual supply of cheap labor from rural areas. Therefore, it is sensible that the APO included the agricultural sector in the productivity circle, whose ultimate goal is economic development.

### **Agriculture in the National Economy**

Although the agricultural sector has greatly contributed to the socioeconomic

development of these countries, its relative share in the national economy has gradually declined. Three basic factors can be attributed to this. The first is the nature of food demand. The growth of food consumption per capita slowed as income per capita rose. The second factor lies within the process of agricultural development. As the agricultural sector developed, higher portions of its final outputs were handled by the industry and service sectors. In later stages of development,

Table 1 shows that the share of agriculture in both GDP and total employment dropped during the last three decades in all the selected APO member countries. Agriculture now accounts for less than 20% of GDP in these countries except for Nepal and Pakistan. For Japan, ROK, and ROC, it only makes up 1%–2% of GDP. In terms of employment, however, agriculture is still a major economic sector for many developing countries. Agriculture makes up 55% of total employment in India and 40%–

Table 1. Share of Agriculture in the National Economy (%) and Changes in Relative Productivity to Other Sectors

Country	GDP (%)		Employment (%)		Changes in Relative Productivity
	1980	2010	1980	2009	
Bangladesh	31.6	18.6	NA	48.1*	-
India	35.7	19.0	NA	55.8*	-
Indonesia	24.0	15.3	56.4	40.3	0.90
Islamic Republic of Iran (IR Iran)	16.5	10.0	NA	21.2	-
Japan	3.6	1.4	10.4	4.2	0.95
ROK	16.2	2.6	34.0	7.2	0.75
Malaysia	22.6	10.6	37.2	14.0	1.25
Nepal	61.8	36.1	NA	NA	-
Pakistan	29.5	21.2	52.7	44.7	0.85
Philippines	25.1	12.3	51.8	35.3	0.72
ROC	7.5	1.6	19.5	5.1	0.80
Sri Lanka	27.6	12.8	0.0	32.6	-
Thailand	23.2	12.4	70.8	42.5	0.89
PR China (ref.)	30.2	10.1	68.7	39.6	0.58

Source: World Bank Databank, March 2012; and the Annual Year Book 2010, Council of Agriculture (COA), ROC.

\* 2005 figures.

most of the food-related value addition and new employment accrued outside the agricultural sector. The third factor was the intense competition among small farmers. The productivity gains of small farmers quickly transferred to consumers in the form of lower market prices. However, this did not mean that the productivity increase in agriculture was less important. On the contrary, it was a prerequisite for the nation's economic development.

45% in Thailand and Indonesia in 2008, although the share has been falling.

It should be noted that in most cases, the share of agriculture in the GDP has declined faster than the share in employment. This indicates that the relative productivity of agriculture to other sectors has fallen and the productivity gap with other sectors has widened in these countries. In other words, these countries have



been encountering the “structural adjustment” problem, which arises when a shift in resources from a traditional sector (i.e., agriculture) to modern sectors (i.e., industry and service) is not fast enough. This begs the question: Was something wrong with the agricultural sector in the APO countries? As highlighted in the next section, it was not the fault of the agricultural sector because it performed fairly well in the APO countries, despite the encounter with many difficulties.

## PERFORMANCE OF AGRICULTURAL SECTOR

### Measurement of Agricultural Productivity

The economic performance of a sector is best measured by its productivity. Ideally, the productivity of a sector should be measured in terms of total factor productivity (TFP) because productivity is affected by multiple economic factors and technologies. The TFP, if correctly estimated, can explain the difference in overall productivity among countries, contribution of major factors, and the nature of technological changes. Two different methods have been used to estimate the TFP in agriculture: the production function and the Malmquist Index. A number of studies have applied these methods to Asian countries. However, most of them still remain academic exercises because the TFP measurement is highly dependent on the assumptions, models, and data used. Indeed, it is extremely difficult to find appropriate statistical data for agricultural “capital” or “agricultural labor” that correctly represents the magnitude of real input in terms of both quantity and quality.

Therefore, the most frequently used productivity indicators for agriculture are “partial” indicators such as production per hectare (land productivity) or per farmer (labor productivity). They are measured for each product or at the aggregated level, e.g., rice yield per hectare or total value of agricultural production per farmer. These indicators provide a rough idea on the magnitude of resource-use efficiency and directions of technological changes. The following sections review and discuss the

performance of the agricultural sector mainly through these partial indicators.

### Agricultural Performance in APO Member Countries

The first indicator to assess the performance of agriculture in Asia should be the index of food production per person because providing rising population with enough food has long been the prime policy target in Asia. Table 2 illustrates the changes in Food and Agriculture Organization (FAO) of the United Nations per capita food production indexes computed for APO member countries. Except for Fiji, Mongolia, and Japan, all other countries saw a considerable improvement in food supply per person despite the increased population. As a result, the proportion of undernourished persons to the total population fell throughout in the APO region; APO member countries are winning the fight against hunger.

This improvement in food production per capita has been largely attributed to increased land productivity, i.e., crop yields, because economically cultivable land areas have been limited in most countries. As shown in Table 3, cereal yield increased quickly in all three sub-regions in Asia.

A more direct productivity indicator to review the sector's performance is the gross value added per agricultural worker (GVAW). GVAW represents the gross labor productivity in monetary terms. Table 4 shows the GVAWs of APO member countries in 2008 and their average annual percentage changes from 1983<sup>1</sup>. The GVAW increased in Malaysia, Japan, ROK, and ROC (the first group of countries) faster than in other countries (the second group) over the last 25 years. Several factors contributed to this trend.

The primary factor is the decline in agricultural labor force that occurred in the first group as a consequence of high economic growth. The reduced number of rural workers combined with higher agricultural production resulted in higher GVAW in this group. In other countries,

Table 2. Changes in Per Capita Gross Food Production Index (2004-6=100)

Member Economies	1963	2008	Change from 1963 (%)
Bangladesh	100	114	14
Cambodia	95	126	33
Fiji	121	89	▲ 26
India	79	109	37
Indonesia	49	110	126
IR Iran	45	102	129
Japan	101	99	▲ 2
ROK	47	102	115
Lao PDR	51	113	122
Malaysia	27	106	289
Mongolia	236	112	▲ 53
Nepal	78	101	29
Pakistan	72	105	45
Philippines	83	104	24
ROC	61	102	67
Sri Lanka	85	109	28
Thailand	64	109	70
Vietnam	46	108	134
PR China (ref.)	31	108	247

Source: FAOSTAT, March 2012; COA, op. cit.

the number of agricultural workers also increased, resulting in a slower growth of labor productivity. Secondly, agricultural production in the first group shifted to higher

value commodities that included livestock and horticulture products. This is a reflection of consumers' growing demand for these products and the capacity of their farm sector

Table 3. Changes in Cereal Yield Per Hectare in Asia

Region	1963 (ton)	1963 (ton)	2003 (ton)	2008 (ton)
East Asia	1.67	3.68	5.00	5.42
South Asia	1.01	1.54	2.43	2.67
Southeast Asia	1.53	2.48	3.58	3.93

Source: FAOSTAT, op. cit.

- Note: i. Figures are five-year averages  
 ii. East Asia includes Japan and PR China  
 iii. South Asia includes IR Iran  
 iv. Southeast Asia excludes Fiji

to respond. Thirdly, the first group invested heavily in agricultural capitals (Table 5) such as farm machinery, greenhouses, and irrigation facilities. Their irrigated land areas expanded as early as the 1970s–80s and mechanization in agriculture advanced in the 1970s–90s.

In short, the agricultural sector in APO countries has shown a fairly good performance over the last several decades. Food production expanded faster than population, and labor productivity in agriculture improved in all countries.

### From Physical Productivity to Sustainable Development

Raising physical productivity and production

is only the first step for many farmers in Asia. Competition should result in price reductions, especially the traditional foods, once consumer basic needs are met. Farmers have to shift to more profitable productions if they wish to raise their incomes, i.e., labor productivity in terms of value.

The first action that farmers should take is to increase the production of livestock products for which demand is growing. The share of livestock products in the total value of agricultural production has increased in many APO countries in the last 30 years (Table 6). On the other hand, the share of cereals has declined, except in a few countries where the income per capita is relatively low.

Table 4. Gross Value-added Per Worker in Agriculture

Member Economies	Value in 2008 (3-year Average)	Average Growth Rate 1983–2008
	Constant 2000 (USD)	Annual (%)
Bangladesh	419	2.2
Cambodia	388	-
Fiji	1,994	0.1
India	472	1.5
Indonesia	705	1.6
IR Iran	3,061	2.8
Japan	48,227	4.8
ROK	17,658	6.5
Lao PDR	512	1.4
Malaysia	6,328	3.0
Mongolia	1,754	1.5
Nepal	241	0.5
Pakistan	901	1.8
Philippines	1,122	1.0
ROC	9,230	2.9
Sri Lanka	892	1.2
Thailand	703	2.2
Vietnam	351	1.9
PR China (ref.)	502	3.4

Source: World Bank Databank, op. cit.

Note: Average 2007–09

Table 5. Changes in Net Capital Stock Per Worker: Machinery and Equipment

Member Economies	Value in 2007*	Increment since 1980	Ratio 2007/1980
Bangladesh	3	0	1.0
Cambodia	5	1	1.2
Fiji	46	4	1.1
India	22	16	3.8
Indonesia	19	15	4.5
IR Iran	146	86	2.4
Japan	10,762	8,251	4.3
ROK	449	445	98.8
Lao PDR	4	0	1.0
Malaysia	30	23	4.4
Mongolia	31	-30	0.5
Nepal	4	0	1.0
Pakistan	13	5	1.6
Philippines	6	-1	0.9
Sri Lanka	4	-1	0.9
Thailand	9	5	2.0
Vietnam	38	32	6.6
PR China (ref.)	17	8	1.8

Source: FAOSTAT, op. cit. Data for ROC not available

Note: \* Constant 2005 USD ('000)

Although no comparable official data exists throughout the region, we know that the production of higher quality and safer food has been a common trend in many APO countries. It has taken various forms: more fresh and cleaner products, supply during off-seasons, low input/organic production, and/or higher degree of processing. Higher consumer income, urbanization, better infrastructure, and ICT development have been the driving forces. The "supermarket revolution" (Reardon) that visited Asian countries in three stages in the last two decades has also had a significant impact on the attitudes of both consumers and producers.

This shift to higher value products is evidenced by statistics. Table 7 shows that in all countries but the Philippines, the relative size of the food

manufacturing sector to the agricultural sector has been expanding in recent years. In ROK, Indonesia, and Thailand, the value produced by the food manufacturing sector exceeded half of the value produced by the agricultural sector in 2007.

More importantly, the upward trend in value addition has accelerated and spread to other sectors in many APO countries. Consumer demand and shopping attitudes are quickly changing as their incomes and lifestyles change. A number of large and small supermarkets open every year in big cities. Traditional grocery stores are being modernized or replaced by supermarkets in urban areas. In Japan, ROK, and ROC, many new food business models proliferate - organic food shops, farmers' markets in urban centers,

Table 6. Share of Cereals and Livestock in Selected Countries

Country	Sector	1970–79 (%)	2000–09 (%)
India	Cereals	34.2	28.9
	Livestock	19.3	25.5
Indonesia	Cereals	43.6	36.1
	Livestock	9.3	11.3
ROK	Cereals	44.1	18.7
	Livestock	15.2	41.1
Malaysia	Cereals	13.8	5.3
	Livestock	10.8	18.5
Pakistan	Cereals	22.8	18.0
	Livestock	40.5	49.0
Philippines	Cereals	25.4	26.1
	Livestock	16.1	24.6
Thailand	Cereals	40.0	32.6
	Livestock	21.4	18.5
Vietnam	Cereals	54.6	44.7
	Livestock	15.2	21.0
PR China (ref.)	Cereals	44.8	19.5
	Livestock	17.3	34.4

Note: Computed from FAOSTAT data on gross production value

and “roadside station” shops (Michi-no-eki) alongside trunk roads. Even large supermarkets often set up a corner for organic products or fresh vegetables produced by nearby farmers. Lured by the offer of higher and stable prices, farmers are increasingly selling their products to these places. In the food supply chain, quality and safety management are critical elements for productivity and profitability.

Further, both producers and consumers in Asia have become aware of the link between agricultural production and the environment. The UN Conference on Environment and Development in 1992 emphasized sustainable agriculture and rural development. It implied that agricultural production cannot and should not expand at the expense of the environment and natural resources anymore. Neither can agricultural productivity. Agriculture is a

resource-dependent industry, which requires vast land areas, fresh water, and other natural resources. In populous Asia, which is afflicted by monsoons, the agricultural and food sectors need more environment-friendly technologies and more efficient use of resources for further development.

Another point that the APO Agricultural Program should bear in mind is the implications of globalization trend. Globalization brings about both risks and opportunities for the national agricultural sector. Farmers have to be innovative at all times if they wish to stay in the market locally and globally. In this regard, they have to pay much more attention to modern research, risk management, supply chain control, and updated information on the standards and regulations of importing countries.

Table 7. Relative Size of the Food Manufacturing Sector (Agriculture =1.0)

Country	1990	2006 or 2007
India	0.06	0.09
Indonesia	0.31	0.52
IR Iran	0.09	0.13
Japan	0.92	1.64
ROK	0.38	0.53
Malaysia	0.20	0.36
Pakistan	0.14	0.18
Philippines	0.65	0.39
Sri Lanka	0.38	0.42
Thailand	0.49	0.70
PR China (ref.)	0.14	0.42

Source: Computed from the World Bank data, op. cit. and after.

Note: Ratio of value-added in food, beverage, and tobacco sectors and that in the agricultural sector

The APO Agricultural Program responded quickly to these requirements. In the latter half of the 1980s, several seminars on agro-food industry management were conducted. And in the 1990s, the program implemented 2–4 projects each year, targeting food processing and marketing. In 1990–95, seven environment-related projects were organized before the onset of the Green Productivity program in 1996. These trends continued in the 2000s and accelerated after the Bovine Spongiform Encephalopathy, commonly known as mad cow disease, outbreak and several food poisonings that occurred in some member countries in the first half of the 2000s.

It is clear now that the industry's productivity has to be evaluated from a much broader perspective, including environment and social impacts. The APO Agricultural Program incorporated these concerns into the following subcategories: agricultural marketing and processing, sustainable development in agriculture, and integrated community development. In addition, a special subprogram targeting least developed member countries complements these three subcategories in recent years.

These programs are proven to be pertinent because the above-mentioned were major concerns for the APO member countries at the time and they have corresponded to the broadened productivity concept. However, we know that many new challenges lie ahead, i.e., global warming, oil shortage and biofuels, borderless competition, loss of biodiversity, and transboundary pests and diseases, to name a few. There are many issues that the Agricultural Program has to tackle.

#### **CASE STUDIES: GREEN REVOLUTION IN ASIA IN HINDSIGHT**

If agricultural economists in Asia are requested to name only one event that has had the most significant impact on the region's agriculture in the recent past, a majority would point to the Green Revolution. It represents the phenomenal upsurge in rice and wheat production that occurred in Asia from the mid-1960s to the 1980s. The driving force was the technical innovation generated by the combination of HYVs, increased fertilizer input, and expansion in irrigated areas. Cereal production in South and Southeast Asia almost doubled in the 20-year period beginning mid-1960s. During this time,

cereal yields rose by 70% and cropping intensity increased by 20%. HYV rice was often called "miracle rice", which turned many food-deficit countries into food self-sufficient countries. Indeed, "the speed and scale with which it solved the food problem was unprecedented and it contributed to the reduction in poverty and the launching of broader economic growth in many Asian countries" [3].

Despite this obvious success, the Green Revolution later became a target of criticism, mostly among the Western community. Critics blamed it for the intensive use of chemicals, resultant monoculture, neglect of small holders, and lopsided benefits [4]. Most of them are worth a careful listen. There must be some negative side-effect that its advocates have overlooked. Nevertheless, its remarkable achievement should not be undermined for "not having transformed the world into a Utopia" [5]. For many Asians who experienced hunger and poverty in the mid-20th century, getting out of hunger was their primary goal, and without a doubt, the Green Revolution has helped them achieve this goal. It may be useful to review it from slightly different angles, although a lot of good arguments and responses have already been made by many researchers.

First is the impact of Green Revolution Technologies (GRTs). These technologies, especially for rice production, were by nature, labor-intensive and land-saving types that fitted well into the socioeconomic conditions of monsoon Asia. They were "induced" technological changes that responded to the specific conditions of monsoon Asia at that time - high population, limited land areas, and lowering fertilizer prices [6]. The direction of technological changes was economically sensible considering the region's relative factor endowments and changes in relative prices. Most notable is that it did not significantly aggravate the already oversaturated labor market in the region's rural areas. The GRTs required more labor per land for seed preparation, transplanting, fertilizer

application, and water management in order to get higher crop yields.

In comparing GRTs with capital-intensive and labor-saving technologies that were introduced to the agricultural sector in Latin America and the industrial sector in other developing countries, capital-intensive technology often worsened employment and debt problems. It also undermined the social stability and economic growth, while the GRTs did not. It was perhaps a major factor that helped put APO countries on the trajectory of sustainable economic growth in the 1980s and thereafter.

The second factor relates to the question why GRTs are able to spread quickly and widely. The HYV-rice planted areas that were nil in 1965 jumped to nearly 10 million ha in five years and to 20 million ha in 1975. The use of HYVs spread to nine countries in 10 years. It is an incredible achievement for those who are aware of the difficulties in mass technology transfer. The tipping point was the role that the public sector and local communities played. The original GRTs were developed by international research centers such as the International Rice Research Institute (IRRI) and the International Maize and Wheat Improvement Center, but national research centers and extension workers localized them to fit their conditions. Governments also worked hard to maximize the full capacity of HYVs in terms of irrigation and drainage, provision of fertilizers, and access to credit.

A more important player was the rural community. In many parts of monsoon Asia, collective paddy farming encouraged the spirit of mutual cooperation among villagers. They accumulated "social capital" and strength within their community, which can exert enormous collective power and allow them to work together as "development agents". GRTs were largely well received by rural communities because they were less costly, could benefit all members of the community, and did not collide with their egalitarian disciplines. Government input subsidies and investment in irrigation

Table 8. Changes in Price Index for Rice (1967–69=100, Deflated by Consumer Price Index (CPI))

Country	1976–79	1987–89	1997–99
India*	62.4	56.3	64.9
Indonesia	65.6	72.6	115.3
Japan	114.8	107.5	202.3
ROK	161.1	205.3	NA
Malaysia	95.8	71.1	NA
Nepal	77.3	67.2	59.4
Pakistan	88.1	83.4	86.4
Philippines	84.7	74.9	86.1
Sri Lanka	99.1	82.7	66.5
Thailand	107.4	84.8	98.7

Source: Retail price (IRRI); CPI (World Bank)

Note: \* Producer price

were conducive for smaller communities. Without the effort of government agencies and cooperation of communities, HYVs would not have been adopted by local farmers so quickly.

Thirdly, we have to be aware that the benefits of investing in agriculture did not stay long with the farmers who had worked hard for it. It was the consumers and the national economy that eventually reaped the harvest in the form of low food prices. For instance, the real-term consumer prices of rice fell by 15%–45% in the 20 years after the Green Revolution started (Table 8). International rice prices also fell in real term, as both exporters and importers were mostly Asian countries. These price falls have been misinterpreted by investors and policy makers, who felt that investing in agriculture had been good enough in the 1980s. The post-evaluation of agricultural projects often reported very low economic returns because actual prices of food were much lower than the projected ones. Accordingly, the number and amount of investments in agricultural projects fell sharply in the 1990s and after.

With the benefit of hindsight, it needs to be said that these decisions were too short-sighted. Investment in agriculture should not

be evaluated only by the producers' own gain because much larger benefits could accrue outside the agricultural sector. If the ultimate purpose of their investment is the socioeconomic development of the nation, they should have continued investments in agriculture.

The fourth point is the fact that the Green Revolution is not a one-time event of the past. The upward trend of cereal yields in Asia is still continuing. This is partly because research institutes and extension workers have been trying to localize HYVs by developing their own and disseminating them. However, this is only a part of their efforts. Currently, they are mobilizing more resources to meet changing consumer demands and social conditions toward quality, safety, and better-tasting food, as well as environmentally-sound production processes. Higher yields alone can no longer guarantee farmers higher incomes. Tasty rice, non-cereal crops, food processing, and the environment play a part as well.

In addition, the recent turmoil in international commodity markets and global warming are posing new challenges and opportunities – making food production more resilient against fuel price hikes and heat stress, and being



prepared for new opportunities such as biofuel use. The Green Revolution has to, and is, moving toward the direction of producing higher value, environmentally sound, stress-resilient, and/or ready-for-fuel-use commodities. The APO can help make the Green Revolution greener and wealthier.

## CONCLUSION

As a nation's economy develops, its share of agriculture declines. The APO countries are no exception. Over the past 50 years, the share of agriculture has dropped both in terms of value-added and employment in all countries. Since the share of agriculture in GDP has declined faster than the drop in total employment, the productivity gap between agriculture and other sectors has widened.

However, this did not mean that the performance of agricultural sector was poor, but in fact it exhibited remarkable performance in productivity. Food production per capita increased in most member countries, and labor productivity measured at value-added per agriculture worker showed considerable improvement in all countries.

The speed of growth in labor productivity varies by country. More advanced countries have achieved higher growth rates, supported by capital input, shift to profitable products, and reduced agriculture workers. On the other hand, the increase in labor productivity has been modest in less advanced countries, mainly because the number of agricultural workers has increased as well.

The impact of the Green Revolution on the development of the region's socioeconomy should not be underestimated. It has helped many APO member countries not only solve their food problems, but also put their economy on the path of sustainable development.

The Green Revolution technologies fit the socioeconomic conditions of monsoon Asia, i.e., high population density, scarce

land resources, and well-organized local communities. One notable advantage of the Green Revolution was that it did not aggravate local employment problem.

The benefits of productivity growth, however, did not remain long with the farmers. It eventually went to consumers and the national economy in the form of low food prices. Investment in agriculture, however, should not be reduced for the reason that the return rate is low. Much larger benefits have accrued outside the agricultural sector.

The APO has made an apt judgment on the role and importance of agriculture in the economic development of member countries. Its Agricultural Program has responded well to the real needs of member countries. It is pertinent now for the program to focus on critical issues such as food marketing and processing, sustainable agriculture, and integrated rural development.

## RECOMMENDATIONS

As proven, the growth of agricultural productivity is the prerequisite for the development of national economy. The APO should focus more attention on the Agricultural Program, concentrating on areas that governments of member countries have little capacity to address or little knowledge to share. These may include food safety, agrotourism, biotechnology, resource management, consumer-producer linkage, and global warming.

Agricultural projects should not be confined to a narrow bar of agriculture. Rather, the topics that overlap other sectors should be selected more frequently.

For the food and agricultural industry, visiting the "genba" or field has special importance. In this regard, the Agricultural Program should have more observation missions, or incorporate more field visits in agricultural projects.

## ENDNOTES

- 1 Agriculture includes hunting, forestry, and fishing sectors. In most cases, the term 'agriculture worker' is synonymous to 'economically active population in agriculture'.

## REFERENCES

- [1] The Food and Agriculture Organization of the United Nations. The State of Food and Agriculture 2000. Rome: FAO; 2000. e-Book.
- [2] World Bank. The East Asian Miracle: Economic Growth and Public Policy. New York: Oxford University Press; 2003.
- [3] Hazel P.B.R. The Asian green revolution. IFPRI discussion paper 00911, November 2009.
- [4] International Food Policy Research Institute. Green Revolution: Cures or Blessing? Washington D.C.: IFPRI; 2002.
- [5] AgBio World. Four Iowans Who Fed The World—Norman Borlaug: Geneticist. Quoted from The Herbert Hoover Presidential Library-Museum, October 26 2002. Available at <http://www.agbioworld.org/biotech-info/topics/borlaug/iowans.html>.
- [6] Hayami Y., Ruttan V. Agricultural Development: An International Perspective. Baltimore: Johns Hopkins University Press; 1985.



---

# **PART 3:**

# **PRODUCTIVITY IN FOCUS**

## **GREEN PRODUCTIVITY AND ECONOMIC DEVELOPMENT**

---



---

# SUMMARY - PRODUCTIVITY IN THE FUTURE

DR. ALFRED LI-PING  
CHENG

Professor  
National Chiao Tung University

---

## INTRODUCTION

Productivity in the Future encompasses the seven key influencers of productivity and core drivers of a sustainable society that will emerge over the next two decades.

These seven are:

- Climate change and food security
- Biotechnology and bioengineering in agriculture and related industries
- Green energy and green technology
- The development and applications of ICT
- Entrepreneurship and productivity
- Health care for the aging society
- Social enterprises for rural innovation

The authors outlined the past and future impacts of the particular theme on the Asia-Pacific region, and then briefly ran through the anticipated challenges and potential achievements that lie ahead. Most of the papers refer to case studies of different APO member countries to further drive home their messages. In some papers, these case studies contain the main body of the research, while in others, they are briefly referenced to further illustrate specific points.

The authors concluded their research with a summary of the key findings and recommendations for the APO to achieve its vision of a sustainable regional and global society.

### Climate Change and Food Supply in the Asia-Pacific Region

Dr. Venkatachalam Anbumozhi and Dr. Vangimalla Reddy began their paper with a warning that Earth's rising temperature will cause extreme weather patterns that will

threaten biological systems and regional food security. At the same time, a 50% increase in food production has to take place by 2050 to feed a population that would have doubled by then. Thus, the threat of climate change to food security may be one of the biggest challenges of this century.

New technologies must be mainstreamed to mitigate food production systems for climate risk if the current equilibrium between the demand and supply of food is to be preserved. These new technologies consist of modeling, developing new crop varieties, maximizing water use efficiency, and formulating new standards for the infrastructure design of modified crops.

The success of these technological innovations hinges on a simple but powerful factor – a nation's acceptance of them. Genetically modified (GM) crops, for example, haven't found favor with many nations despite their proven record of revolutionizing productivity and environmental safety.

Having said that, several regional and subregional initiatives are already underway to ensure the security of food supply and enhance agricultural resilience to climate change in Asia. One such initiative is the National Adaptation Programmes of Action (NAPA), which has been well received by a majority of Asian nations. To guarantee food supplies and food safety, policy instruments at the national and regional levels must play the triple role of guiding, speeding up, and enhancing local actions. A further combination of these policies and actions are then needed to ensure food security in Asia Pacific.

### **Scope and Opportunities for Biotechnology and Bioengineering in Agriculture and Related Industries**

The speed at which Asia's economy is growing has given rise to a host of formidable challenges in the areas of agricultural production and productivity. Urgent solutions are needed for these challenges and can be found in bioengineering and biotechnology. Biotechnology is any technology using biosciences and any technique that contains the use of living organisms or substances derived from these organisms. Bioenterprises are business enterprises that use biological knowledge to create products such as hybrid plants and seed varieties.

When biotechnology is applied through bioenterprises, the potential to generate products and processes of value to society is tremendous. Today, hybridization has increased yield per unit by more than 500 times and is responsible for boosting the yields of rice, maize, and vegetables in Asia, particularly China. Biotechnology crops, also known as genetically modified (GM) crops, are currently the most widespread and high-valued of all modern biotechnology applications in agriculture.

Aside from an increase in demand for food, urbanization and rising income in Asia has led to a shift in food consumption patterns that include more resource-intensive food products and a stronger demand for raw agricultural commodities. Unfortunately, as noted by the paper's author, Professor Paul Teng, the agriculture resources have shrunk in Southeast Asia and this trend is unlikely to be reversed anytime soon. A more worrying trend is the slowdown in annual productivity growth over the years. Further adding to that conundrum is the degradation of many agro-systems that act as food production systems.

In short, more production of food, feed, and fiber will have to be produced with less water and farm labor, and under bad weather conditions during cropping season.

A more holistic approach is, therefore, needed to address agricultural production and productivity. The paper recommends more comprehensive policies on investment, regulations, and education, more attention paid to Asia by national governments, the inclusion of cities in the agenda of food and agriculture policy makers and planners, and the integration of food security and agriculture in the agenda of urban planners and authorities.

### **Scope and Opportunities for Green Energy and Green Technology**

Green energy (GE) technology, a crucial part of the APO's green productivity (GP) activities, is a new energy system for better environment and sustainability. GE technology exists in the form of renewable energy sources such as hydraulic, solar, wind, geothermal, and biomass.

Dr. Osamu Kitani's concern, however, is the pressure that a growing population, higher living standards, and steeper demand for energy are putting on the local and global environment. In his paper, he cautions that the future need for renewable sources will cause considerable challenges in the energy sector of the APO member economies.

Currently, global renewable energy comprises 16% of the world's energy consumption and is expected to increase in response to the climbing fossil energy prices, subsequently reducing GHG emission. GE sustainability depends on the application of technology, and in view of this, the paper advocates implementing green energy policies in the APO member economies that are currently testing green technology. Among the types of technology that are being rolled out include solar water heating in ROC, small hydraulic power in Nepal, biodiesel from palm oil in Malaysia and Indonesia, and biogas fuel in India.

Special note is made of the APO's Green Productivity and Integrated Community Development project in Vietnam, where improvements to the cooking system

successfully resolved a common problem in the country. The APO has a strong part to play by means of promoting R&D as well as the exchange of knowledge and training, both regionally and globally. The dissemination of knowledge is of top priority here. With most of the available renewable energy resources still underutilized, APO member economies face an urgent need to develop local green energy if they are serious about stimulating their respective economies and eradicating poverty.

The possibilities that renewable energy offers are endless, but much needs to be done in terms of R&D, capacity building, and program supports if its growth is to be accelerated. The cornerstone of its success lies in enhanced regional collaboration and long-term policies with steady support.

### **The Development and Applications of ICT in Selected APO Member Economies**

Dr. Chuan-Neng Lin based his paper mainly on APO members' ICT and economic growths, which he categorized into three stages - primitive, developing, and advanced. A nation's categorization is determined by the maturity of its infrastructure development, development of ICT policies, and its contribution to its overall economic growth and productivity levels.

The paper zeroes in on Republic of China (ROC) as a best practice model in ICT development. As a leader in the global ICT industry, ROC is a major sourcing center for worldwide ICT vendors and sits among the top-ranked countries in "innovation" competitiveness.

Knowledge has since replaced capital, technology, and labor as the main driver of ROC's productivity and economic growth. The e-Taiwan Program has revolutionized the communications network infrastructure and is steadily moving toward promoting health, culture, and network development in its society. The paper then refers to the opinion of a prominent professor of finance at the University

of Chicago that the lack of organizational structure to effectively distribute physical assets will be a key challenge for developing countries. The paper further urges the APO to take this view into consideration when assisting other members to boost production capacity in the future.

In conclusion, the ideal way to elevate productivity while simultaneously reducing cost would be to connect ICT with other applications in the areas of health care, biotechnology, and energy.

### **Entrepreneurship and Productivity**

According to this paper, the APO has numerous opportunities to contribute to productivity growth in its member economies through the entrepreneurship route. Its author, Dr. Poh Kam Wong, lists the various means through which entrepreneurship can drive productivity.

One is by disseminating knowledge through new entrepreneurial firms, while another is by reallocating resources to higher value-adding activities. A third is by creating new industries, a fourth is when incumbent firms improve productivity to defend their market share, and a fifth is through the survival of necessity entrepreneurs. The paper, however, acknowledges the impracticality of making broad generalizations on the above, as every region has its own economic variants. Nevertheless, it emphasizes the need for public policy makers in all Asian economies to pay closer attention to the positive relationship between entrepreneurship and productivity growth.

This is where it sees the APO playing a role in collating best policy practices from its member economies where entrepreneurship developments have had a positive impact on productivity. The APO is also asked to close the gap in scholarly empirical research on this relationship between entrepreneurship and productivity by funding scholars from selected Asian economies and then sharing the findings with other member countries.

### **Health Care for the Aging Society**

The expected spike in the aging population of the Asia-Pacific region from 419 million to more than 1.2 billion by 2050 will undoubtedly have deep social, economic, and political implications. Notable trends include chronic illnesses, an overburdening of the pension system, and the changing family structure that leaves the aged with fewer options for care. Both the fiscal and social insurance systems will have to evolve to accommodate these trends. On the bright side, many of the elderly are still able to contribute to the economy and society as long as the health care system is equipped to serve their own needs, which it currently isn't.

According to the World Health Organization (WHO), the above problem lies in three main areas. The first involves patient interaction, the second pertains to the link between health organizations and the community, and the third surrounds poorly designed policies. The flip side, however, is that the elderly still have opportunities to contribute to society as long as the good systems and technology can serve their increasing needs. A new paradigm of studying the aging is therefore necessary, one that needs innovative approaches and an organized system of care.

New models of health care must depend on geographically dispersed expertise and the use of ICT in driving efficiency, quality, and access to care. Health care organizations in most countries have already begun implementing productivity tools to cope with rising demand.

Thailand, with the APO's support, implemented the Demonstration Project for Lean Application in Health Care Industry between 2008 and 2009, which revealed that its system needed to be more patient focused.

The author, Dr. Anuwat Supachutikul, concluded his paper by suggesting that the APO economies take a collaborative stance toward promoting health care systems for the aged and use the national diversities to drive innovations.

### **Social Enterprises for Rural Innovations**

One of the biggest benefactors of social enterprises is the rural community, through the creation of employment and entrepreneurial ventures in local areas. As the 21st technology and economic development have failed to eradicate global poverty, that role has now fallen to social enterprises, especially those in Asia. In his paper, Dr. Harish Hande emphasized that social enterprises were not monolithic structures and had different challenges that required customized solutions. However, he said, quality of impact and effectiveness were usually compromised when the priority was speed and ease.

Social enterprises face a multitude of challenges. Its toughest is convincing a society to trust an idea aimed at serving the basic needs of the poor through a sustainable business model. The other major challenge is attracting the right people at the right price with a passion for the sector. Governments should adopt policies that can adequately address the concerns of social enterprises. With no separate legal and financial frameworks or regulatory structures, social enterprises are forced to register as for-profit and pay taxes accordingly.

The interrelation of social issues calls for a holistic approach toward the resolution of its challenges. The APO is able to facilitate this approach through various means such as bridging the skill gap, supporting ground level research projects by social enterprises, and influencing countries to focus on bottom-up approach within policy advocacy. Social enterprises are crucial in creating a sustainable business model for the world's four billion poor that identify them as equal partners and not just as consumers. To this end, any long-term solution must link technology, finance, and the market linkages to the community's demand.

### **CONCLUSION**

The papers identify several challenges in the Asia-Pacific economies in the seven areas



covered in this section. The authors have also recognized the key role of the APO in working with organizations to effect significant changes in the current situation. They call for more such collaborations as well as public-private partnerships to move toward a more sustainable future.

---

# CLIMATE CHANGE AND FOOD SECURITY IN THE ASIA-PACIFIC REGION

DR. VENKATACHALAM  
ANBUMOZHI

**Capacity Building Specialist**  
Asian Development Bank Institute

DR. VANGIMALLA R.  
REDDY

**Research Leader**  
USDA-ARS, Crop Systems and Global Change Laboratory  
Agricultural Research Service (ARS),  
United States Department of Agriculture (USDA)

---

## INTRODUCTION

The Earth's climate has been changing rapidly in the past 150 years. The average temperature of Earth has increased close to 1°C since the beginning of the industrial era [1]. Projections indicate that there will be more hot days, fewer cold days, and a reduced diurnal temperature range with higher night temperatures. As the world becomes warmer, the hydrological cycle will also become more intense, resulting in a more uneven and intense precipitation. Widespread melting of snow and ice, rising sea levels, and frequent heat waves have been observed. Global precipitation has increased, and the regional heavy rainfall and floods are becoming more common. At the same time, many other regions have seen more frequent and intense droughts. The intensity and frequency of extreme weather events are expected to increase in the future due to amplifying effects of climate change [1]. Larger and more abrupt changes in climate will cause adverse effects on biological systems, thus affecting regional food security. Developing countries such as those in the Asia-Pacific region are more vulnerable to the adversity of climate change due to limited natural resources and lesser economic development [2].

This change in climate is mostly attributed to the fast increase in post-industrial concentration of atmospheric greenhouse gases (GHG) such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), chlorofluorocarbons (CFCs),

hydrofluorocarbons (HFCs), perfluorinated compounds (PFCs), troposphere ozone (O<sub>3</sub>), and atmospheric water vapor (H<sub>2</sub>O) caused by human activities such as burning of fossil fuels, industrial processes, agriculture, and land use changes. These GHGs play a direct or indirect role in global warming, and most of them are moving at an accelerating rate [3]. Since the last decade (1995–2005), atmospheric concentration of CO<sub>2</sub> has increased with the highest ever recorded average growth rate of 1.9 μmol mol<sup>-1</sup> yr<sup>-1</sup> within the past 200 years [4].

Changes in regional and global climate, particularly the climatic variability, affect global food, fiber, and forest production [5]. Developing countries, mainly in Asia, will be affected more compared to the rest of the world (Table 1). While crop productivity may benefit from rising CO<sub>2</sub>, the increased potential for abiotic stresses such as droughts, floods, heat waves, and UV-B radiation will pose challenges to farmers and endanger food security. Therefore, the overall impact of climate change on agriculture will depend on the balance between these factors. Recent studies suggest that due to climate change, southern Africa could lose approximately 30% of its maize production by 2030, and in South Asia the loss of many regional staples such as rice, millet, and maize could go up to 10% [6].

As illustrated in Figure 1, food security requires reaching an equilibrium between food demand and supply, and it refers to a situation where production of adequate food

Table 1. Changes in Global CO<sub>2</sub> Emissions, Temperature, and Food Production in the Next Two Decades

Factor	2012	2030
Carbon dioxide emissions (ppm)	392 [7]	350–700 [8]
Temperature rise (°C)	-	2–7 [8]
Population in Asia	4.2 billion [9]	4.9 billion [9]
Population growth in Asia (% per annum)	1.1 [9]	0.8 [9]
Growth in demand for agricultural products (% per annum)	2.2 [10]	1.7 [10]
Growth in agricultural production (% per annum)	2.0 [10]	1.7 [10]
Calorie consumption (kcal/capita/day)	2,850 [10]	2,980 [10]
Number of people undernourished	568 million [11]	220 million [10]

supplies can fulfill food requirements on a continuous and stable basis. At present, there is enough capacity to guarantee the security of food production and meet food demand. Nevertheless, food is poorly distributed. One billion people suffer from hunger and nearly 560 million of those are in Asian countries, mainly in Bangladesh, PR China, India, Indonesia, and Pakistan. Despite a decreasing trend in recent years, this number represents 16% of the total population in developing countries [12].

As a result of population growth, economic development in emerging economies, and

changes in consumption patterns, world food consumption is forecasted to increase steadily. With regard to food production, despite expansions of agricultural lands and increasing yields during the green revolution, crop yields have either stabilized or declined. A study released by the World Bank [13] projects a need for a 50% increase in food production by 2050 to meet demand. This will be an enormous challenge given the increasing pressures of urban expansion, land degradation, cropland loss, and climate change.

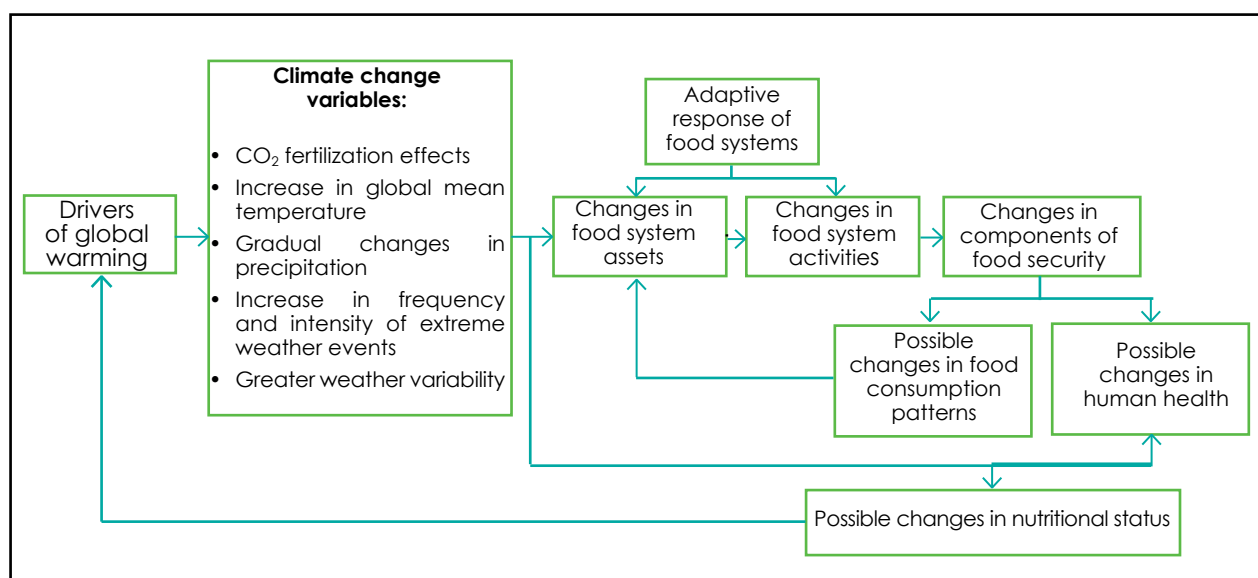


Figure 1. Climate Change Variables and Impact on Food Security

Source: Food and Agriculture Organization of the United Nations [14]

## IMPACT OF CLIMATE CHANGE ON AGRICULTURE

The Asia-Pacific region consists of many developing countries that are diverse economically, politically, socially, and culturally. Many of these countries face similar development and production challenges related to poverty alleviation, greater rural-urban migration, and frequent natural disasters. Changing climate poses additional challenges for food security. As for extreme climatic events, evidence suggests that increase in temperatures, altered precipitation patterns (including flooding and drought), glacial melting, and rising sea-levels in many parts of the Asia-Pacific region are expected to increase the severity of damage to crops, transportation systems, and overall infrastructure [15].

These changes will affect the water supply and its quality, and impact agricultural systems by: i) altering cropping and grazing areas and seasons, ii) the spread of pests and diseases, iii) irrigation requirements, and iv) the need for heat-, drought-, flood-, and saline-resistant crops. In the last century, changes in sea levels have been noted. Sea levels are expected to rise by 1 m by 2100, though this projection is disputed. The thermal expansion of oceans has contributed to sea rise of 1–3 mm per year compared to the rise of global average sea levels over the last decade in the coastal areas of Asia. A rise in sea level would result in agricultural land loss, in particular along coastal areas in Southeast Asia. Erosion, submergence of shorelines, and salinization of water tables due to increased sea levels could deleteriously affect agriculture through inundation of low-lying lands.

Projections indicate that variations in climate patterns in Asia will be heterogeneous. While some regions will experience more intense precipitation and flood risks, in other areas, heat waves and prolonged droughts will be more frequent. Though a few areas might actually benefit from climate change, the overall estimated net impact of climate

change in the agricultural sector in Asia is negative. Further, assessments conducted by the Intergovernmental Panel on Climate Change (IPCC) [16] show that the most vulnerable countries are those that are less likely to cope with natural disasters and where agriculture accounts for a large share of GDP and employment.

The agriculture in many countries of the Asia-Pacific region is highly sensitive compared to developed countries due to farmers' lack of adequate resources, smaller land holdings, and lack of financial support from government or private sectors. There are four ways in which climate would have a direct effect on crop production and thus on food security. First, changes in temperature and precipitation will alter the distribution of agro-ecological zones. Irrigation availability and demand will also be affected by changes in temperature and precipitation. Second, CO<sub>2</sub> effects are expected to have a positive impact due to greater water use efficiency and higher rate of photosynthesis. Third, water availability is a critical factor in determining the impact of climate change in many places. A number of studies suggest that precipitation and length of growing season are critical in determining whether climate change affects crop production positively or negatively. Fourth, agricultural losses can result from climatic variability and increased frequency of extreme events such as droughts and floods, or changes in precipitation and temperature variance.

Recent studies have reported substantial decreases in cereal production potential in Asia. However, the climate change-related regional differences are difficult to forecast and might range from positive to negative. For instance, the IPCC report on impact, adaptation, and vulnerability of climate change revealed that crop yields could increase by up to 20% in East and Southeast Asia, whereas it could decline by 30% in Central and South Asia [17]. Accordingly, if no adaptation practices or technical improvements are implemented, rice yields are expected to fall by about 50%

by 2100, relative to the 1990 level on average. The rice yield decline would range from 34% in Indonesia to 75% in the Philippines, and is projected to begin in 2020 for most countries [18]. However, stabilization efforts could prevent this decline.

### **Impact of Rising Temperature**

In general, crop simulation modeling studies reveal that crop yields might increase with a small rise in temperature, but decline with large increases in temperature. Several studies [19, 20] report 10%–40% loss in crop production in India with projected increase in temperature by 2080–2100. A recent study points out that rice yields in Bangladesh might drop by 8% by 2050 [21]. On the other hand, wheat yields are predicted to decline between 6% and 9% in sub-humid, semiarid, and arid areas with a 1°C increase in temperature [21]. Similarly, with a 2°C increase in temperature, the rice yield decreases by about 0.75 ton/ha in India and rain-fed rice yield in China by 5%–12% [22]. Higher temperatures can alter the crop growing season and duration to maturity, increase water stress, and affect water resources and crop productivity.

### **Impact of Precipitation and Hydrological Cycle Variability**

The negative effects of altered water availability are more likely to be felt in semiarid and arid countries in the Asia-Pacific region, where rainfall is concentrated over monsoon months. In these areas, agricultural irrigation demand is estimated to increase by about 10% if temperature rises by 1°C. In northern China, surface and groundwater sources will meet only 70% of the water requirement for agricultural production [17]. The climate change-related melting of glaciers may cause an initial increase in river runoff but will eventually decrease as a result of loss of glacial ice resources, which will affect agriculture, livestock, and millions of people in China, the Himalaya-Hindu-Kush region, and most of the other countries of South Asia [20]. Furthermore, decreasing groundwater levels in coastal areas were observed as a result of

change in precipitation patterns, drought, and excessive use of groundwater. Groundwater resources have been overexploited due to increasing demand for agriculture and livestock. India, PR China, and Bangladesh are especially susceptible to increasing salinity of their groundwater as well as surface water resources, especially along the coast, due to increases in sea levels [23].

### **Impact of Increase in Atmospheric CO<sub>2</sub> Concentration**

In general, plants respond positively to elevated CO<sub>2</sub> concentration. Crops with C<sub>3</sub> types of photosynthetic mechanism (i.e., cotton, soybean, wheat, rice) will benefit more compared to crops with C<sub>4</sub> types of photosynthetic mechanism (i.e., maize, sugarcane, millet, sorghum, switch grass). While crop productivity may benefit from rising CO<sub>2</sub>, the increased potential for abiotic stresses such as drought, flood, heat wave, and UV-B radiation will pose major challenges for farmers. Therefore, the overall impact of climate change on agriculture will depend on the balance between these factors [6, 24–26]. As a GHG, CO<sub>2</sub> is directly associated with the increase in Earth's air temperature, thus, participating in the climate change phenomenon by introducing global warming. Also, increased atmospheric CO<sub>2</sub> leads to increased uptake of CO<sub>2</sub> by the oceans, causing acidification.

### **Impact of Increase in the Frequency and Intensity of Extreme Weather Events**

The intensity and frequency of extreme weather events are expected to increase in the future due to amplifying effects of climate change. It is projected that heat waves will be more intense, more frequent, and longer lasting in future warmer climates [27]. Daily minimum temperatures are projected to increase faster (night time) than daily maximum temperatures (day time), leading to a decrease in diurnal temperature trend. For example, in summer 2003, Europe experienced an extreme climatic anomaly that raised July temperatures up by 6°C above the long-term mean, resulting

in about 30% reduction in terrestrial gross productivity [24]. Changes in climate will also bring precipitation extremes and droughts on a regional scale, causing flooding and dry spells [28]. Decrease in precipitation is predicted by most of the model simulations by the end of the 21st century in the subtropical regions [16]. Increase in precipitation extremes is very likely in major agricultural production areas in southern and eastern Asia, East Australia, and northern Europe [29].

## **CLIMATE CHANGE AND FOOD PRODUCTION SYSTEM**

Food production is mainly governed by climatic conditions over regional and global scales. Forestry and agriculture, livestock production, and fisheries are highly climate sensitive. In addition, the benefits humans derive from natural ecosystems are being threatened by fast-growing human population in many developing countries in the Asia-Pacific region through habitat destruction and air and water pollution. Threatened benefits include:

- i. Marketable products and goods (timber, fish, pharmaceuticals, etc.)
- ii. Recreational opportunities (camping, boating, hunting, hiking, sports fishing, etc.)
- iii. Maintaining biodiversity
- iv. Aesthetic experiences
- v. Other services (erosion control, water purification, carbon sequestration, oxygen production, etc.)

Increasing threat to world food security due to the impact of climate change may be one of the biggest challenges faced this century. An estimated 1.02 billion people in the world today suffer from hunger. Of those, more than 60% live in developing countries of the Asia-Pacific—countries expected to be most affected by climate change. Projected population and socioeconomic growth will

double current food demand by 2050. To meet this challenge in developing countries, cereal yields need to increase by 40%, net irrigation water requirements by 40%–50%, and 100–200 million ha of additional land may be needed [16]. Since the expansion of arable land is limited, these demands have to be met by enhancing food productivity in sustainable ways by utilizing available resources, modern technologies, and newer approaches.

It is evident that natural ecosystems are being affected by regional climate change, particularly a rise in temperature and unpredictable precipitation. In terrestrial ecosystems, earlier timing of spring events and poleward, and upward shifts in crop plants and animal ranges are linked to recent warming. A warming-related northward movement of agricultural zones in Mongolia and China is projected [17]. A similar movement of tropical plants and a consequent shrinking of subtropical plant zones may be seen in Southeast Asian countries such as Vietnam [15]. In some marine and freshwater systems, shifts in ranges and changes in algal, plankton, and fish abundance are associated with rising water temperatures as well as related changes in ice cover, salinity, oxygen levels, and circulation.

All these changes are already affecting agriculture and food security in many parts of the world. South Asia - Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka - faces key developmental challenges such as population growth, high incidence of poverty, urbanization, and degradation of the environment. Climate change could restrict development and prosperity of these countries via a reduction in agricultural yields, increased water stress due to changes in precipitation patterns and glacier melting, decline in fishery products, degradation of natural grasslands, and impact on forest products. The climatic conditions, combined with socioeconomic situations, make South Asia one of the most vulnerable regions in the world with regard to climate change [13]. The climate in this region

is characterized by extremes and natural hazards that include cyclones, wind storms, droughts and heat waves, floods, glacial lake outburst floods, landslides, and pest and disease outbreaks. Climate change will significantly increase the risk to food production and rural vulnerability, particularly in regions that already suffer from poverty and hunger [30].

The impact of climate change will be particularly severe on small farmers in developing countries, with inadequate resources and limited capabilities to cope with climate risks. The long-term damage caused by projected changes in climate, and extreme and frequent weather-related events could limit national development by taking away the resources for maintenance, rehabilitation, and settlements that could have been used for other developments.

#### **DEVELOPMENT OF TECHNOLOGIES FOCUSING ON CAPACITY PRESERVATION AND ECONOMIC SUSTAINABILITY: ADAPTATION AND MITIGATION PRACTICES**

Given the uncertainty in food production and supply chains, along with increasing food demand, a shift in agricultural practices is needed. The challenge is to enhance supply through increasing productivity and optimizing the efficiency of production chains under more volatile conditions. Thus, in the future, farmers have to be less vulnerable to climate risks by maximizing crop yields while minimizing the loss of energy and resources in the food life cycle, from harvest and processing to consumption. While increasing productivity, keeping in mind the resilience and sustainability principles would ensure food security and reduce damage to the environment. To this end, innovative and low-carbon agricultural technologies will play a central role in enabling producers to meet these core challenges.

The core challenges faced for mitigation and adaptation in response to climate change emphasize innovation and utilization of new technologies, enhancing food productivity in agriculture, forestry, fisheries, and animal

husbandry by maintaining sustainability [31]. These recognized priorities are to produce more food and to produce efficiently under harsher climate by minimizing GHG emissions. Strategies that ensure high productivity environment without interrupting long-term income growth will be important to attain food security. Carbon emission policies may simultaneously encourage or force producers to recognize GHG emissions as an important and costly "input" in production processes and open new opportunities and incentives for on-farm GHG mitigation. Agricultural technologies will play a central role in enabling producers to meet these core challenges.

#### **Development of Tolerant Crop Varieties**

Crop yield is determined by genotypic potential and environmental effects, and their interactions. In the natural habitat, crop plants are subjected to a combination of abiotic conditions that may include one or more stresses such as heat, drought, and nutrition. The interactions among these factors elicit a variety of responses in crop plants, often resulting in loss of crop productivity. One of the important strategies to cope with the adverse effects of various stress factors is to develop new, long-duration cultivars, with tolerance to heat, drought, salinity, and resistance to pests and diseases. The selection of tolerant cultivars and genetic traits in a crop species is crucial to develop new cultivar by breeding and/or genetic engineering that can adapt to a wide range of environmental conditions with increased productivity.

#### **Advanced Water Management and Irrigation**

In irrigated areas, it is important to increase the efficiency of existing systems and extending infrastructure, whereas in non-irrigated areas, water conservation, water harvesting, and improved water storage techniques will play a major role in improving water management.

#### **Production Management and Soil Management Practices**

In general, aside from practices to conserve soil and water resources such as traditional agricultural practices (Table 2) that restore soil

Table 2. Comparison Between Traditional Food Production to Innovative Climate-resilient Food Production

	Traditional agricultural technologies	Innovative and low-carbon agricultural technologies
<b>Farm Level</b>		
Irrigation	Conventional and high-cost irrigation systems	Small-scale water harvesting and storage infrastructure. Water supply meets multiple needs
Farming input (fertilizers, pesticides, etc.)	Reliance on NPK fertilizers and chemical pesticides	Limited agrochemical input, application of organic fertilizers, and sustainable manure management
Resilience/risk	Highly vulnerable to climate risks	Resilient to climate change
Type of culture	Monoculture	Diversified mosaics of cultures (agro-forest, feature perennials in crop rotations)
Livelihood conditions	Subsistence and vulnerable farming systems	Diversified small-farming systems (enhanced capacity, equity, and sustainability)
<b>Sectoral Level</b>		
Institutions	Top-down action	Local community-based practices
Resource policies	Disaggregated policies that fail to cope with adaptation and mitigation strategies	Integrated sectoral policies to enhance climate resilience of small-farming systems
<b>National Level</b>		
Public capital	Low investment in agriculture	Sponsorship
Public and private partnerships	Private investment is limited	Investment by the private sector; participation in climate insurance schemes

degradation, agro-forestry also plays a role in enhancing ecosystem functions, providing resilience against droughts, pests, and other climatic threats. For example, improving fertilizer use efficiency by ensuring the right amount of fertilizers and the timing of application will reduce the risk of runoff and eutrophication while saving the environment, money and labor cost. Using such best management

practices not only enhances crop productivity, but also confers minimal GHG emissions in the agricultural sector. Some of the farm practices that are key to enhanced food production and agricultural sustainability include:

- i. Applying low-carbon fertilizers
- ii. Reassessing fertilizer application



- iii. Reduced tillage
- iv. Altering the timing or location of cropping activities
- v. Modifying grazing times
- vi. Altering forage and animal species/breeds
- vii. Altering the integration of mixed livestock/crop systems
- viii. Use of adapted forage crops

There are many potential ways to alter the management practices to deal with the projected effects of climate change. These practices include, but are not limited to, altering the timing or location of cropping activities based on environmental niche; diversifying income by integrating other farming activities such as raising livestock and fisheries; improving the effectiveness of pest, disease, and weed management practices through wider use of integrated pest and pathogen management; maintaining or improving quarantine capabilities and sentinel monitoring programs; and using seasonal climate forecasting from the local and regional weather centers to reduce crop production risk by integrating into crop simulation models.

Developing infrastructure, enacting policies to minimize GHG emissions, R&D, and technology transfer programs are some of the long-term planning tools that can play important roles in the mitigation and adaptation processes. Government support will be needed for climate change-related transitions, where there are major land use changes, industry location changes, and migration to create alternative livelihood options. These programs may include reducing dependence on agriculture, supporting community partnerships in developing food and forage banks, enhancing capacity to develop social capital and share information, providing food aid and employment to the more vulnerable, and developing contingency plans [5]. Effective planning and management of such transitions

may result in less habitat loss, less risk of carbon loss, and lower environmental costs such as soil degradation, siltation, and reduced biodiversity.

### **MAIN CHALLENGES AND DEVELOPMENT OF NEW TECHNOLOGY AND OPPORTUNITIES FOR THE ASIA-PACIFIC REGION**

Adaptation at the farmer level implies three levels of action: i) farmers need to be aware of weather fluctuations and its potential impacts, ii) the cost-benefits of adopting adaptation measures need to be quantified, and iii) farmers need to decide how to respond. When the farmers opt to adopt alternative practices, they must have the capacity to undertake changes. However, these procedures are yet to be widely mainstreamed to assist farmers in developing countries to enhance their resilience to climate vulnerability. Despite the urgent need for innovative and low-carbon technologies in agricultural practices, implementation is lagging due to the poor capacity of farmers and weak information channels.

The acceptance of new technologies and/or products by nations is crucial to the success of adaptation and mitigation processes. There could be many reasons, including social, religious or cultural, economic status, and unawareness (lack of education) that can hinder progress. Genetically modified (GM) crops, for example, have revolutionized crop productivity and environmental safety. However, in many countries, these have not been widely accepted. Similarly, poverty can also impede technology transfer between developing countries. Lybbert and Sumner [31] summarized some of the major impediments to the adaptation and diffusion of innovative and low-carbon agricultural technologies in developing countries as follows:

- i. Declining public investment in agricultural R&D
- ii. Discontinued local R&D capacity-building programs

- iii. Lack of investment in location-specific technologies
- iv. Intellectual property rights covering advanced technologies
- v. Lack of biosafety regulations
- vi. Limited private-sector investment and involvement in the seed sector
- vii. Weak local institutions that support farmers' access to and use of new technologies
- viii. Limited acceptance of GM crops
- ix. Social, cultural, and climatic limitations
- x. Lack of financial mechanisms to support climate insurance initiatives (e.g., microinsurance, catastrophe bonds, and reduced insurance premiums)

#### **BENCHMARKING INITIATIVES AND WELL-KNOWN BEST PRACTICES**

To reduce GHG emissions, management tools are available often without costly capital investments or increased operating costs. The use of these tools in day-to-day practices has shown to be beneficial. The emission of CFCs, for example, has been reduced to zero due to the implementation of the Montreal Protocol. The private sector such as industries and companies play a crucial role in the mitigation of GHG emissions. Therefore, joint efforts by citizens, governments, and the private sector are important to address climate change.

Several regional and subregional initiatives have been taken to ensure the security of food supply, meet growing demands, and enhance climate resilience of the agricultural sector in Asia. Table 3 illustrates the benchmark practices as observed in several countries of the Asia-Pacific region and policy interventions that could augment the uptake of such activities. Since the 7th Conference of the Parties, the international community has focused its attention on the special needs of developing

countries in dealing with problems associated with adaptation to climate change and has established a framework with the National Adaptation Programmes of Action (NAPA). Under this scheme, national actions have been conducted by central and local governments with financial and technical assistance from international development organizations. The majority of developing countries in Asia have submitted their NAPA, recognizing that agriculture is vulnerable to climate change and places priority on enhancing adaptation projects to improve resilience and ensure food security. For instance, in Bangladesh, projects have been undertaken to promote research on drought-, flood-, and salt-tolerant species. Actions to support the promotion of household integrated farming and community-based soil conservation are ongoing in Cambodia and Bangladesh. Additionally, international organizations are supporting country-driven disaster risk reduction, helping to build the climate resilience of the agricultural sector, including preparation of climate-resilient sector road maps.

#### **POLICY INITIATIVES AND PUBLIC-PRIVATE PARTNERSHIPS FOR BETTER MANAGEMENT OF NATURAL RESOURCES AND TO GUARANTEE FOOD SUPPLIES AND FOOD SAFETY**

To promote the integration of low-carbon innovative agricultural practices and overcome barriers, policy instruments at the national and regional levels are needed to guide, speed up, and enhance local actions. In the first stage, governments need to draw their attention to measures that simultaneously bring environmental, developmental, and social benefits, whereas in the long-term, actions should include broader spectrum approaches. Developing countries should focus on creating a favorable environment by changing the incentive structure as part of a dedicated policy that strengthens research, extension education and services, as well as physical and institutional infrastructure [12, 30, w31, 33]. Main policy measures may include, but not be limited to:

Table 3. Benchmarking Examples of Climate Change Adaptation Measures and Policy Options

Adaptation Measure	Policy Option
<b>Near-term Actions (5–10 years)</b>	
Crop insurance for risk coverage	Improved access to information, risk management, revised pricing incentives
Crop/livestock diversification to increase productivity and protect against diseases	Availability of extension services, financial support, etc.
Adjust timing of farm operations to reduce risk of crop damage	Extension services, pricing policies, etc.
Changes in cropping pattern, tillage practices	Extension services to support activities, policy adjustments
Modernization of irrigation structures	Promote water-saving technologies
Efficient water use	Water-pricing reforms, clearly defined property rights
Risk diversification to withstand climate shocks	Employment opportunities in nonform sectors
Food buffers for temporary relief	Food policy reforms
Redefining land use and tenure rights for investments	Legal reforms and enforcements
<b>Medium-term Targets (2030)</b>	
Development of crop and livestock technology adapted to climate stress: drought, heat tolerance, etc.	Agricultural research (cultivar and livestock trait development)
Develop market efficiency	Invest in rural infrastructure, remove market barriers, property rights, etc.
Irrigation and water resources consolidation	Investment by public and private sector
Promoting regional trade in stable commodities	Pricing and exchange rate policies
Improving early warning/forecasting mechanisms	Information and policy coordination across sectors
Capacity building and institutional strengthening	Targeted reforms on existing institutions on agriculture and skills development

Source: Asian Development Bank Institute [32]

Short-term measures:

- i. Support farmers and local communities in developing diversified and resilient community-based agricultural systems that provide adequate food to meet local

and consumer needs while guaranteeing critical ecosystem services

- ii. Invest in better information and weather forecasts to predict extreme weather events accurately

- iii. Develop new channels of information exchange and skill transfer between farmers and research communities to promote weather forecasting and mainstreaming sustainable agricultural production methods
- iv. Invest in transport and storage systems. Emphasis should be placed on developing locally shared infrastructure and improving value-added activities for farmers
- v. Achieve policy coherence and effective coordination of different governmental activities
- vi. Enhance public investment in R&D programs on high-yield crop varieties that are tolerant to drought and nutrient stress, and also encourage private-sector participation in agricultural system infrastructure
- vi. Raise awareness of impacts of increasing world population and changes in consumption patterns
- vii. Reformulate trade-related policies to strengthen food security. On the export side, increase market access in developed countries for products exported by developing countries to raise farmers' income and reinforce food security. This could be conducted by introducing insurance and financial rebate programs on products from developing countries

### SUMMARY AND CONCLUSION

Food security is an important issue for the Asia-Pacific region over the next 20 years. This paper explored key issues related to food production and food supply from the perspective of climate change, and changes in consumption patterns.

Long-term measures:

- i. Implement a scheme for payments to finance sustainable agricultural development framework
- ii. Implement regulations in the financial sector that facilitate the international flow of funds for adapting local communities and reducing barriers to pay farmers for environmental benefits
- iii. Expand agricultural Official Development Assistance to enhance agricultural innovation and extension systems, environment farming methods, and supportive infrastructure
- iv. Reform international trade policies aimed at improving market access for developing country producers and supporting the agricultural sector
- v. Implement best management practices for greening the agricultural supply chain
- Food production and consumption (crop, fisheries, and animal husbandry) are affected by changing climatic conditions since both are linked through a web of feedback connections
- Mainstreaming new technologies (modeling, developing new crop varieties, maximizing water use efficiency and formulating new standards for infrastructure design of modified crops) stimulates food production to counter climate risk
- A combination of policies and actions are necessary to bring needed food security to the Asia-Pacific region. These include: i) integrating green technologies in food supply/distribution, ii) exploring co-benefit approaches (use of bio/renewable energy systems), and iii) crop insurance schemes with private sector participation. Research and effective policy formulation are at a nascent stage in the Asia-Pacific region and are constrained by knowledge, institutional structures, and financial gaps. Improbability and uncertainty are often cited as reasons for inaction and could be interpreted as a case for limited knowledge on cost-effective best practices

- Climate change and food security strategies are also largely being analyzed in isolation. In order to attain food security by 2030, agricultural, technological/industrial, environmental, and developmental policies should be integrated at the sectoral and local levels

A combined perspective to ensure that the formulation and implementation of integrated approaches and processes is required, as it recognizes how climate risks and food supply needs exacerbate the adverse consequences on productivity and poverty. Climate change will alter the set of appropriate agricultural investments and policies over time, both in type and location. Effective adaptation measures, therefore, require judicious selection of cost-effective measures within the food security policy context and a strategic development framework.

## REFERENCES

- [1] Allison I., Bindoff N.L., Bindschadler R.A., et al. *The Copenhagen Diagnosis, 2009: Updating the World on the Latest Climate Science*. Sydney: The University of New South Wales Climate Change Research Centre; 2009.
- [2] Asian Development Bank. *Building Climate Resilience in the Agriculture Sector of Asia and the Pacific*. Manila: Asian Development Bank; 2009.
- [3] Runeckles V. C., Krupa S.V. The impact of UV-B radiation and ozone on terrestrial vegetation. *Environmental Pollution* 1994; 83: 191–213.
- [4] Raupach M.R., Marland G., Ciais P., et al. Global and regional drivers of accelerating CO<sub>2</sub> emissions. *Proceedings of the National Academy of Science of the United States of America* 2007; 104: 10,288–10,293.
- [5] Easterling W.E., Aggarwal P.K., Batima P., et al. *Climate Change 2007: Impacts, Adaptation and Vulnerability*. In: Parry M.L., Canziani O.F., Palutikof J.P., van der Linden P.J., Hanson C.E., eds. *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press; 2007, pp. 273–313.
- [6] Lobell D.B., Burke M.B., Tebaldi C., et al. Prioritizing climate change adaptation needs for food security in 2030. *Science* 2008. 319: 607–610.
- [7] CO2Now.org. Atmospheric CO<sub>2</sub> for December 2011. <http://co2now.org>, accessed January 2012.
- [8] Intergovernmental Panel on Climate Change. *Climate change 2007: The physical science basis*. [http://www.ipcc.ch/publications\\_and\\_data/publications\\_ipcc\\_fourth\\_assessment\\_report\\_wg1\\_report\\_the\\_physical\\_science\\_basis.htm](http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm).
- [9] United Nations, Department of Economic and Social Affairs. *World population prospects: The 2012 revision*, <http://esa.un.org/unpd/wpp/index.htm>, accessed February 2012.
- [10] Food and Agriculture Organization of the United Nations. *World agriculture: towards 2015/2030 summary report*. <http://www.fao.org/docrep/004/y3557e/y3557e00.htm>.
- [11] Food and Agriculture Organization of the United Nations. *The state of food insecurity in the world 2011 – annex 2*. <http://www.fao.org/docrep/014/i2330e/i2330e00.htm>.
- [12] Hoffmann U. *Assuring food security in developing countries under the challenges of climate change: Key trade and development issues of a fundamental transformation of agriculture*. Discussion paper no. 201. United Nations; 2011. [http://unctad.org/en/docs/osgdp20111\\_en.pdf](http://unctad.org/en/docs/osgdp20111_en.pdf), accessed on 19 June 2013.
- [13] World Bank. *Rising food and fuel prices: addressing the risks to future generations*. <http://siteresources.worldbank.org/DEVCOMEXT/Resources/Food-Fuel.pdf>, accessed on 19 June 2013.
- [14] Food and Agriculture Organization of the United Nations. *Climate change: Implications for food safety*. <http://www.fao.org/docrep/010/i0195e/i0195e00.htm>.
- [15] United States Agency for International Development. *Asia-Pacific regional climate change adaptation assessment – final*

- report: findings and recommendations. [http://pdf.usaid.gov/pdf\\_docs/PNADS197.pdf](http://pdf.usaid.gov/pdf_docs/PNADS197.pdf), accessed on 19 June 2013.
- [16] Intergovernmental Panel on Climate Change. *Climate Change 2007: The Physical Science Basis*. In: Solomon S., Qin D., Manning M., Chen Z., Marquis M., Averyt K.B., Tignor M., Miller H.L., eds. *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press; 2007, p. 999.
- [17] Cruz R.V., Harasawa H., Lal M., et al. *Climate change 2007: impacts, adaptation and vulnerability*. In: Parry M.L., Canziani O.F., Palutikof J.P., van der Linden P.J., Hanson C.E., eds. *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press; 2007, pp. 469–506.
- [18] Asian Development Bank. *The Economics of Climate Change in Southeast Asia: A Regional Review*. Manila: Asian Development Bank; 2009.
- [19] Parry M.L., Rosenzweig C., Iglesias A., et al. Effects of climate change on global food production under SRES emissions and socio-economic scenarios. *Global Environ. Change A* 2004; 14: 53–67.
- [20] Stern N. *The Economics of Climate Change*. Cambridge: Cambridge University Press; 2007.
- [21] Sivakumar M.V.K., Stefanski R. *Climate change in south Asia*. In: Sivakumar M.V.K., Faiz S.M.A., Mustafizur Rahman A.H.M., Islam K.R., eds. *Climate Change and Food Security in South Asia*. Dordrecht Heidelberg: Springer; 2011, pp. 13–30.
- [22] Lin E., Wei X., Hui J., Yinlong X., Yue L., Liping B., Liyong X. *Climate Change Impacts on Crop Yield and Quality with CO<sub>2</sub> fertilization in China*. *Philosophical Transactions of the Royal Society B* 2005. 360: 2149–2154.
- [23] Han M., Zhao M.H., Li D.G., Cao X.Y. Relationship between ancient channel and seawater intrusion in the south coastal plain of the Laizhou Bay. *Journal of Natural Disasters* 1998; 8: 73–80.
- [24] Ciais P., Reichstein M., Viovy N., et al. Europe-wide reduction in primary productivity caused by the heat and drought in 2003. *Nature* 2005. 437: 529–533.
- [25] Lobell D.B., Asner G.P. *Climate and management contributions to recent trends in U.S. agricultural yields*. *Science* 2003; 299: 1032.
- [26] Teramura A.H. Effects of ultraviolet-B radiation on the growth and yield of crop plants. *Physiologia Plantarum* 1983; 58: 415–427.
- [27] Meehl T.G.A., Tebaldi C. More intense, more frequent, and longer lasting heat waves in the 21st century. *Science* 2004; 305: 994–997.
- [28] Giorgi R., Meehl G.A., Kattneberg A., et al. Simulation of regional climate change with global coupled climate models and regional modeling techniques. In: Watson R.T., Zinyowera M.C., Moss R.H., eds. *The Regional Impacts of Climate Change: An Assessment of Vulnerability*. New York: Cambridge University Press; 1998, pp. 427–437.
- [29] Christensen, J.H., Hewitson B., Busuioc A., et al. *Regional climate projections*. In: Solomon S., Qin D., Manning M., eds. *Climate Change 2007: Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press; 2007, pp. 847–940.
- [30] Lal R., Sivakumar M.V.K., Faiz S.M.A., Mustafizur Rahman A.H.M., Islam R.K. *Climate Change and Food Security in South Asia*. Dordrecht Heidelberg: Springer; 2010.
- [31] Lybbert T., Sumner D. *Agricultural Technologies for Climate Change Mitigation and Adaptation in Developing Countries: Policy Options for Innovation and Technology Diffusion*. Issue Brief No.6 Geneva, Switzerland; International Centre for Trade and Sustainable Development; 2010.
- [32] Asian Development Bank Institute. *Climate Change in the Asia Pacific: How Countries Can Adapt?* New Delhi: Sage Publications; 2012.

[33] Food and Agriculture Organization of the United Nations. Trade Reforms and Food Security. Conceptualizing the Linkage. Rome: Food and Agriculture Organization of the United Nations; 2003.

---

# SCOPE AND OPPORTUNITIES OF BIOENGINEERING AND BIOTECHNOLOGY IN AGRICULTURE AND RELATED INDUSTRIES

PROF. PAUL P. S. TENG

**Dean**

Office of Graduate Studies &  
Professional Learning  
National Institute of Education

---

## INTRODUCTION

With Asia having some of the fastest-growing economies with over 60% of the world's population, 34% of the world's arable land, and 36% of the world's water resources, the region's need to overcome formidable challenges and improve its total agricultural production and agricultural productivity are urgent. The region is currently home to six of the world's top 10 most populous countries and to half of the world's urban population [1]. It is no wonder that the Asian region plays a dominant role in the demand for global food, feed, fiber, and fuel. Despite remarkable success in reducing poverty over the years and strong economic growth pushing some Asian countries to middle income status, Asia still suffers from high levels of food insecurity and malnutrition. According to the Food and Agriculture Organization of the United Nations (FAO) [2] over 60% of all the undernourished in the world, 578 million out of 925 million, live in this region with an overwhelming share (86%) belonging to middle-income countries [3].

The future is no less daunting. Emerging trends occurring globally and regionally are changing the food security landscape in Asia, and threatening further is its ability to feed itself. In order to maximize the potential of Asia's agricultural sector, governments must embark on a multifaceted and integrated strategy, one that is broader in scope, adapted to these dynamic challenges, and make best use of new developments in science and technology such as biotechnology.

This paper will provide an overview of the scope of modern biotechnology and bioengineering in relation to the challenges and needs in agriculture. It will then provide a discussion of biotechnology opportunities meeting the challenges of increasing total production and productivity.

## SCOPE OF BIOENGINEERING AND BIOTECHNOLOGY

The published literature has many uses of the terms "bioengineering" and "biotechnology". In this paper, the Merriam-Webster Dictionary definition of "bioengineering" as applied to agriculture and its related industries is used - "the application of biological techniques (such as genetic recombination) to create modified versions of organisms (such as crops)". In this definition, biotechnology is logically included as a set of technologies that have applications to increase productivity, and implicitly, production. However, both bioengineering and biotechnology are dependent on the exponential new knowledge in modern biosciences, especially at the molecular and gene levels [4].

Traditionally, biotechnology was considered any technology based on biology. In its modern, contemporary sense, biotechnology is taken to mean the new recombinant DNA technologies that utilize some aspect of genetic engineering. A hybrid of the two interpretations is used in this paper, in which biotechnology will include any technology arising from the biosciences, including modern biotechnology. At a practical, application



level, biotechnology includes any technique that uses living organisms or substances derived from these organisms to make or modify a product, improve plants or animals, or develop microorganisms for specific uses [4]. It is possible to discern a gradient of sophistication and complexity in biotechnology, ranging from microbial fermentation to genetic engineering (Figure 1). These are strongly influenced by the new knowledge in biology (especially molecular biology and DNA) and engineering (bioinformatics and automation). A sampling of these technologies is shown with some of the associated products such as food items and biotechnology crops (also known as genetically engineered crops).

enterprises that utilize biological knowledge to create products. Bioenterprises have successfully impacted Asia in areas such as hybrid plants and seed varieties, cloned plant material (tissue culture), biofermentation products, biofertilizers, biopesticides, and mushroom culture. Biofuels, bioremediation plants and microbes, biodetection kits, and biotechnology crops are also examples of bioenterprises.

The pioneering use of biology knowledge from Applied Genetics and Breeding have resulted in bioenterprise producing hybrid seeds and improved varieties, initially using conventional techniques and recently using

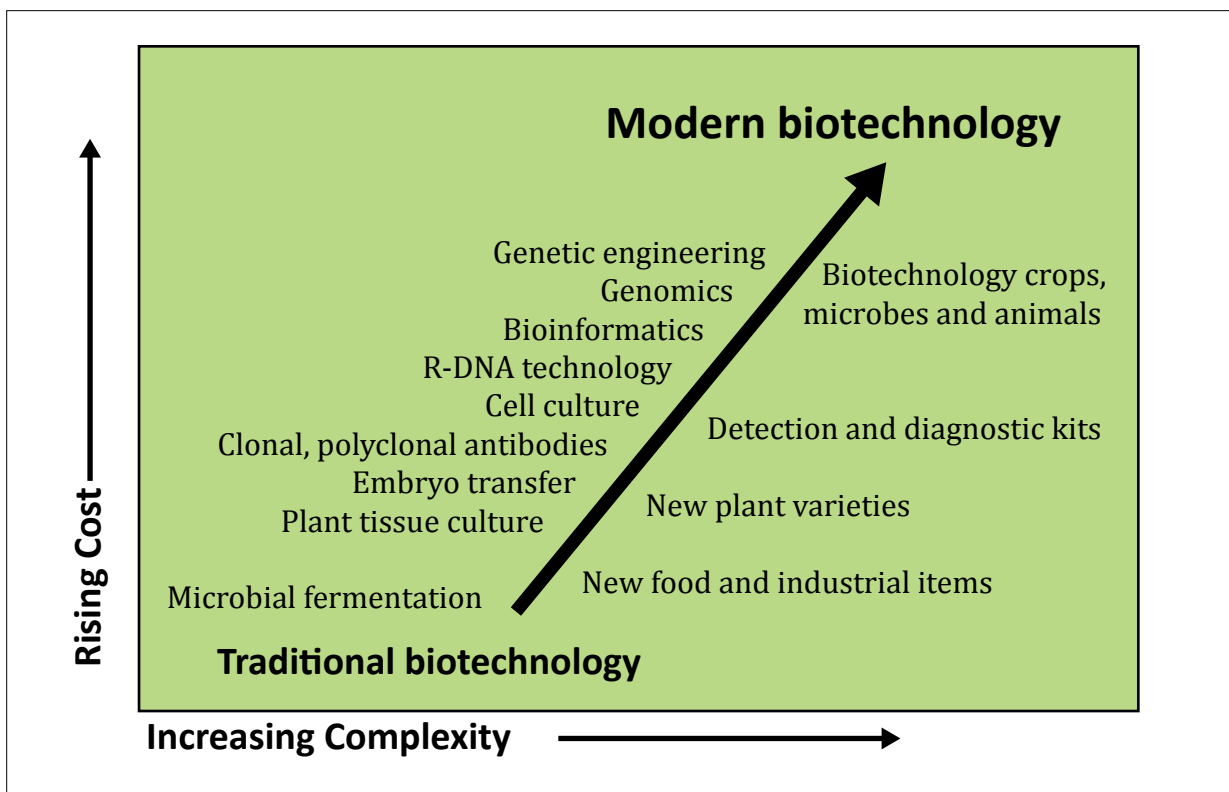


Figure 1. Technology Gradient in Biotechnology and its Relationship to Selected Bioenterprise Products

Note: Modified from Doyle J.J. and Persley C.J. 1996. Enabling the safe use of biotechnology : Principles and Practice ESDS & Monograph Series No. 10. Washington D.C.: World Bank

There is increased recognition that knowledge or technology on its own has no intrinsic value, but applications through "bioenterprises" have the potential to generate products and processes of value to human society. Bioenterprises are business

modern biotechnology to improve one of the parents used in hybridization. In the USA up till about 1930, open-pollinated maize varieties dominated. When hybrids were introduced, their uptake by farmers was spectacular, and today there is almost 100% hybrid use, which

has been responsible for yield per unit increase by more than 500 times. Hybridization has also played a major role in increasing yields of rice, maize, and vegetables in Asia as well as in other regions. In PR China, hybrid rice is acknowledged to be a key factor in increasing total rice production.

Bioenterprises can also be based on tissue culture, which cover trait-specific clones and somaclonal variants. Tissue culture is defined as the process or technique of making animal or plant tissue grow in a culture medium outside the organism. Tissue cultures have long been used successfully in many Asian countries - with notable examples such as Republic of China - with many novel applications of this biotechnology to confer new, desirable traits to plants. But for such enterprises to sustain themselves, there has to be a market for the product and a need for value creation. The latter has enabled these technologies to maintain themselves and improve as new knowledge from the molecular sciences become available. Both the public and private sectors are key in sustaining the flow of goods from tissue culture.

Applied microbiology is another avenue for bioenterprises. This includes biofermentation, biofertilizers, biopesticides, and mushroom culture. Biofermentation products include crude antibiotics, amino acids, vitamins, organic acids, and enzymes, while biofertilizer products include mycorrhizal and other fungi, and bacterial mixtures. An often ignored application of biotechnology is in the biological control of plant diseases, exemplified by commercialized cultures of *Trichoderma* spp.

Biodetection is also another example of a bioenterprise. Diagnostic kits have been extensively used in the West but have been underutilized in Asia. Diagnostic kits for plant viruses or diseases, for instance, can improve farm interventions and prevent significant crop or yield losses. Such kits are also routinely used in the USA and Europe to provide early detection of virus diseases in vegetatively propagated

plant material such as potato and cut flowers, so that infected plantlets are rogued and discarded.

The most complex set of biotechnologies revolve around bioinformatics, genomics, and genetic engineering (Figure 1). These lead to bioenterprise-based alteration of genetic material by interventions that include the insertion of transgenes to confer desirable traits such as insect resistance. Well-known examples are biotechnology (genetically modified or GM) plants and microbes. Biotechnology crops require heavy investments in infrastructure, equipment, and human resource, and in Asia, the bioenterprises are predominantly multinational in nature, with their scope limited to a few important crops such as cotton and corn.

The scope of biotechnology in Asia is broad and has a high potential to address the challenges facing Asia. These challenges will be discussed in the next section, as they provide both the rationale and *raison d'état* for accelerating the use of biotechnology and bioengineering to produce more food, feed, fibre, and fuel.

## **CHALLENGES THAT REQUIRE IMPROVED AGRICULTURAL PRODUCTIVITY**

The FAO has estimated that food production will have to increase by about 70% to keep pace with demand by 2050. Biotechnology is one set of technologies with the potential to significantly increase production by optimizing yield potential and reducing losses, and concurrently, ameliorating the effects of climate change on food availability, physical access, and its utilization. Biotechnology applications in agriculture help increase the supply of crop-based foodstuffs and feedstuffs. These applications include i) improving conventional breeding using marker-aided selection, ii) diagnostic and early detection tools for reducing losses caused by pests and diseases, iii) increasing the knowledge of genetics and ecology for managing yield and losses (biodiversity management), and

iv) genetic engineering for improved yield and pest-resistant traits using transgenes (GM crops). New traits to address changes in the biotic (insect, disease, weeds) and physical (soil, water, nutrients) environment have proven successful in countering extreme weather events arising from climate change. Many of these new traits such as drought and submergence tolerance and insect and disease resistance have been derived through biotech tools such as genetic engineering or marker-aided selection. But what are the challenges that these new traits address?

Foremost among these challenges are population growth and urbanization, the declining performance of agriculture, natural resource constraints, climate change, high and volatile food and oil prices, and the rapid transformation of supply chains [5].

Between now and 2050, the world's population is expected to increase by 2.4 billion, from the current 6.9 billion to 9.3 billion with Asia capturing the lion's share. At the same time, the population living in urban areas is projected to grow by 2.9 billion, increasing from 3.4 billion in 2009 to 6.3 billion 2050 with most growth concentrated in cities and towns of less developed regions (UN, 2009). Asia, in particular, is projected to see its urban population increase by 1.7 billion. One predictable outcome of this massive population shift is urban poverty. Already, Asia accounts for over half of the world's slum population. Today, Asia has 11 megacities (cities with over 10 million inhabitants). By 2025, when the number of megacities is expected to reach 29, Asia would have contributed another five to the current 11. Underpinning this rapid urbanization in many parts of Asia is strong economic growth, and looking to the future, this is not likely to change. Thus, population growth is just one factor. Urbanization in combination with rising income will increase food demand and accelerate the diversification of diets. As income rises, diets will come to include more resource-intensive food products such as meat, dairy, eggs, fruits, and vegetables, thus unleashing a rapid increase in demand for raw agriculture commodities [6].

Agriculture's performance in the region presents another major challenge as it has declined over the last few decades, with its share of GDP falling from 43% to 18% between 1961 and 2009 in South Asia [3]. The number of people working in agriculture has also steadily declined from 70% to 55% between 1980 and 2010, and is projected to further fall to 49% in 2020 [7]. In terms of farm size, while smallholder agriculture continues to dominate Asian farming systems with 87% of the world's 500 million small farms (less than 2 ha), farm sizes in the region are getting smaller as a result of population growth and inheritance-based fragmentation [8].

A more worrying trend is the fact that annual growth in productivity, measured in terms of average aggregate yield, has been slowing over the years [9]. Global aggregate yield growth of grains and oilseeds averaged 2% per year between 1970 and 1990, but declined to 1.1% between 1990 and 2007. Yield growth is projected to continue declining over the next 10 years to less than 1% per year. Asia's agricultural sector is also facing a new challenge in the fact that farmers are also growing older. Lastly, concomitant with the changes in the age profile of farmers is the gender-relatedness of the farming community in countries like PR China, which has seen massive rural-to-urban migrations. A study conducted in three southwestern PR China provinces showed that the average age of active farmers was around 50 and women comprised 78% of the total agricultural labor force [10].

Another challenge facing agriculture is that many of the agro-ecosystems being used as food production systems are already showing worrying signs of degradation. According to the Millennium Ecosystem Assessment, 60% or 15 out of 24 ecosystem services examined are already degraded or used unsustainably. The use of two of these systems, capture fisheries and fresh water, are now well beyond levels that can be sustained even at current demands, much less future ones. Climate change will put

additional pressure on natural resources and food security through higher and more variable temperatures, changes in precipitation patterns, and increased occurrences of extreme weather events [11]. According to recent projections by the International Food and Policy Research Institute (IFPRI), Asia's production of irrigated wheat and rice will be 14% and 11% lower respectively in 2050 than in 2000 due to climate change.

The above challenges confirm the fact that agriculture will need to produce more food, feed, and fiber on less land, with less water and reduced farm labor, and under the increasing influence of unexpected severe weather during cropping seasons. It is fortunate that biotechnology is one technology that offers the potential to tackle these challenges in a cost-effective way.

Lastly, international prices of major food commodities have risen sharply in recent months, only a few years after the 2007–08 food crisis. Since June 2010, international maize prices have more than doubled, and wheat prices have almost doubled. Domestic food prices in many countries in Asia have also increased rapidly [12]. For example, between June 2010 and May 2011, domestic rice prices in Bangladesh, PR China, Indonesia, and Vietnam have risen in the range of 13% to 46%. One reason for the price increase can be traced to a temporary reduction in the supply of rice caused by policy change. But closely linked to the price increase is the rising cost of fuel, directly impacting the price of nitrogen fertilizers, of which natural gas is a key component. Less fertilizer use means lower yield, generally.

A biotechnology product such as biofertilizers offers some deferment of the costs of providing sufficient nutrition to plants for their growth. Further, higher oil prices also negatively impact the cost of transportation and shipping, which can affect the ability of developing countries to import food. Unfortunately, because of continued strong demand from emerging economies and possible supply issues, the price of crude oil will continue to fluctuate in

the coming decade. An increasingly worrying trend resulting from this is the expansion of biofuel production and its competition with food crops for available land. Biofuel production based on agricultural commodities increased more than three-fold from 2000 to 2008. Various policy measures driving the rush to biofuels as well as tax incentives and import restrictions in developed countries have been the main driver of this development. One way to determine that sudden increases in the price of food staples such as rice do not occur is to ensure that there is a reliable, sustained supply of these staples. This, in turn, requires that there be surpluses of production over consumption, which can be achieved only with increased productivity such as that provided through biotechnology.

## **OPPORTUNITIES TO APPLY BIOTECHNOLOGY**

Many of the challenges facing Asia discussed in the preceding section provide opportunities for bioenterprises using biotechnology to solve, or at least, ameliorate the negative effects from such challenges. The potential for biotechnology applications stretches across several aspects of agriculture and its related activities, as summarized in Figure 2. It is also obvious that some common opportunities exist to produce more food, feed, fiber, and fuel. While crops remain an important focus of R&D and commercialization activities using biotechnology, more attention is being paid to its applications in livestock and aquaculture improvement as well as in natural product utilization.

Agriculture, however, remains an important area for biotechnology due to the importance of assuring food security. Modern biotechnology applications in agriculture may be divided into several broad categories [13] such as:

- i. Diagnostic and early detection tools
- ii. Input such as biofertilizers and biopesticides
- iii. Crop varieties derived from marker-aided selection

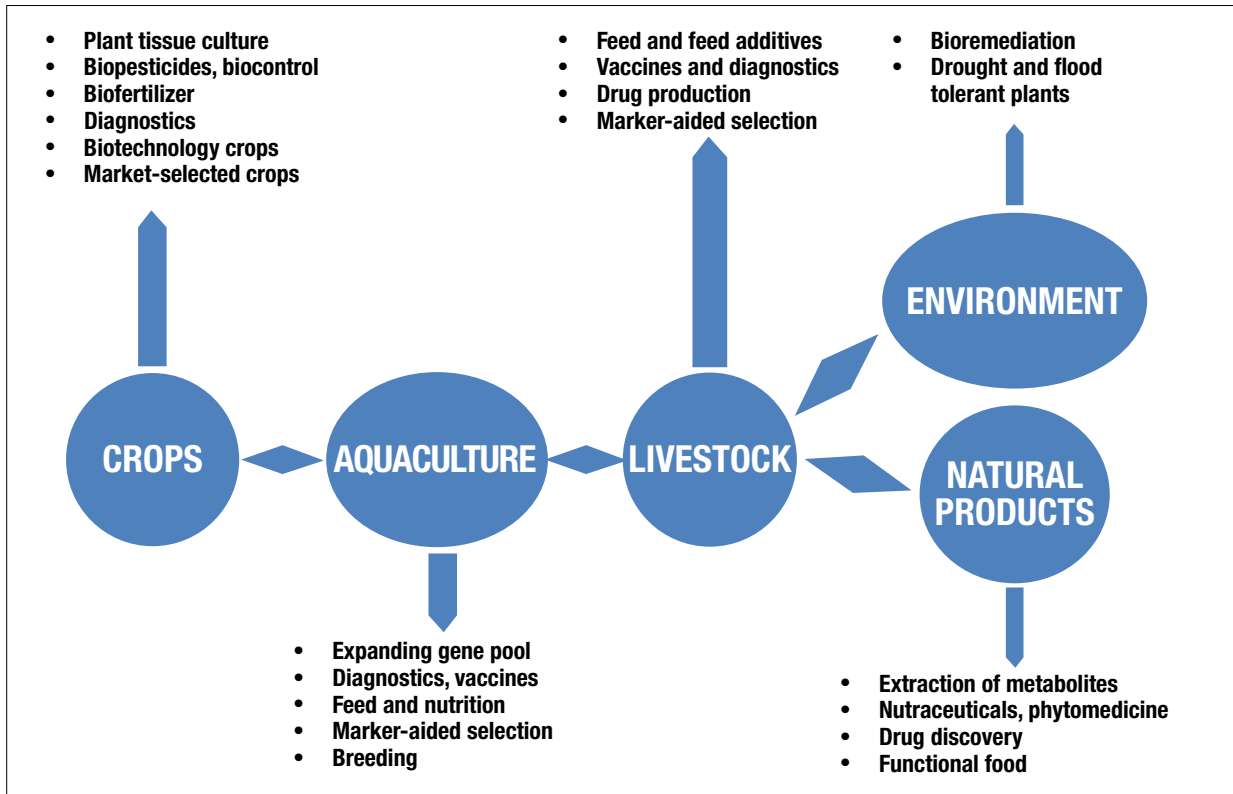


Figure 2. Opportunities to Apply Biotechnology in Agriculture and Related Activities. Adapted from Frost & Sullivan, 2009 [14]

- iv. Crop varieties derived from tissue culture
- v. Crop varieties derived from genetic engineering

Diagnostic kits produced from biotechnology include those for confirming specific animal and plant diseases; many are based on immunology, e.g., the kit for detecting the fungus-causing rice blast disease *Magnaporthe grisea*. With increasing trade in biotechnology products, the detection of the low-level presence of such products has also spawned an industry to help countries meet international reporting requirements.

The biopesticide and biofertilizer industry has grown in recent years due to two factors: the demand by the organic food sector for substitutes to synthetic chemical fertilizers and pesticides, and the demand for reduced dependency on petroleum-based fertilizer and pesticide. This has also been supported by scientific breakthroughs in isolating microbes

and engineering them for increased efficiency as fertilizers and pesticides. Marker-aided selection makes use of information from genetic markers, which indicate the presence of specific major genes in a crop parent used in plant breeding; this makes breeding less of a process based on phenotypes and more based on genotypes. Crop varieties derived from tissue culture are also grown widely, especially through the planting of clones derived from the same genetic background such as the large areas of rubber and oil palm in Southeast Asia. The adoption and use of diagnostics, biofertilizers/biopesticides, marker-aided selection, and tissue culture techniques are widespread across the Asia-Pacific region, and in some countries have even generated multi-million dollar businesses.

Estimates of the monetary value of biotechnology applications concerned with diagnostics, biopesticides, and biofertilizers are difficult to obtain and verify, with some global estimates of the diagnostics market at USD3.8

billion by 2017, biopesticides at USD3 billion by 2015, and biofertilizers at USD3 billion by 2015 [4].

Biotechnology crops, also known as genetically engineered crop varieties, or GM plants, are the most widespread and high-valued of all modern biotechnology applications in agriculture. These biotech crops have shown some impressive double-digit growth rates in planted areas each year since they were first commercialized in 1996, making them the fastest-adopted crop technology in the recent history of agriculture [15]. The latest data shows that worldwide, 170 million ha of biotechnology (GM) crops were grown by an estimated 17.3 million farmers in 28 countries [15]. The growth in the value of biotechnology crop seeds has increased greatly in the first year of introduction. W.C. James [15] estimated the following value (in USD million) of biotech seeds - 1996 (93), 2000 (2,429), 2005 (5,714), 2006 (6,670), 2007 (7,773), 2008 (9,045), 2009 (10,607), 2010 (11,780), 2011 (13,251), and 2012 (14,840), showing in less than two decades, the value multiplied by over 15,000%!

The use of GM plants, however, has not been as far-reaching as the needs demand. So far, only six countries in the Asian region have GM crops under commercial cultivation: India, PR China, the Philippines, Australia, and most recently Pakistan and Myanmar. India has seen record-high adoption rates since 2002 when Bt cotton was first commercialized. The area planted with Bt cotton increased from 50,000 ha in 2002 to 10.8 million ha in 2012 (equivalent to an adoption rate of over 90%) [15]. Approximately 7.2 million small and marginal resource-poor farmers in India planted and benefited from Bt cotton in 2012. Interestingly, 2009 also saw the commercialization of an indigenous public sector-bred Bt cotton variety and a hybrid, thus redressing the balance between the role of private and public sectors in biotech crops in India. The deployment of Bt cotton over the last eight years has resulted in India becoming the number one exporter of cotton globally as well as the second largest cotton

producer in the world - important testaments to the increase in production and productivity that biotechnology can provide. Though Bt cotton is the only biotech crop available to farmers in India, this could soon change with the commercial release of Bt brinjal (eggplant/aubergine), which is pending and subject to final clearance by the government of India. Bt brinjal is expected to be the first biotechnology food crop to be commercialized in India [15].

PR China has successfully planted Bt cotton since 1997 and is currently the largest producer of cotton in the world with 65% of its 5.4 million ha planted with Bt cotton in 2010. Approximately 6.5 million resource-poor farmers planted Bt cotton in 2010. In Guangdong, the principal province for papaya, approximately 90% of the fruit is biotech papaya, which is resistant to the Papaya Ringspot Virus. In addition to cotton and papaya, Bt poplar continued to be grown on approximately 450 ha. More recently, PR China's Ministry of Agriculture approved the safety of Bt rice and biotech phytase maize, with full commercialization expected in about 2–3 years pending completion of the standard registration field trials, which applies to all new conventional and biotech crops [15]. This could have momentous implications for PR China, Asia, and the world, since rice is the most important food crop and maize the most important feed crop in the world. Bt rice stands to benefit the 110 million rice households in PR China and potentially 250 million rice households across Asia.

The adoption of biotech maize in the Philippines has increased consistently every year since it was first introduced in 2003. In 2010, the Philippines planted close to 500,000 ha of biotech maize. An estimated 250,000 farmers planted on average 2 ha of biotech maize. Notably, the area occupied in 2010 by maize with stacked Bt and herbicide tolerance (HT) traits was 411,000 ha compared to only 200,000 ha in 2008, reflecting the preference of farmers for stacked traits and the benefits they offer over single traits.

In Australia, biotech crops recovered after a multiyear drought with the largest proportional year-on-year increase of 184% in 2010. Following a multiyear drought, which was the worst in the history of the country, the total area of biotech crops in 2010 increased significantly to over 650,000 ha from approximately 250,000 ha in 2009 (184% increase). Increases were recorded for both biotech cotton and canola. Australia is one of the first countries to grow biotech crops, having commercialized Bt cotton in 1996, the first year of global commercialization of biotech crops.

The above developments confirm that there exists still significant opportunities to increase the use of biotechnology in agriculture for food, feed, and fiber. This is supported by analysts' reports on the extensive pipeline of biotechnology crops that exists globally [16]. The number of biotechnology companies in the Asia-Pacific region has been estimated at 6,615 [14] and anticipated to double in the next five years. A previous Asian Productivity Organization (APO) publication [17] surveyed the business potential for agricultural biotechnology products and highlighted how such products can create value and livelihoods for many in the Asian region. Indeed, more mature economies such as those of Japan and the Republic of Korea already show applications of biotechnology and bioengineering for food, health, and industrial products, while ROC has been a pioneer in plant tissue culture applications.

## CONCLUSION

Feeding and nourishing a larger, more urban, and increasingly affluent Asian population sustainably and equitably will be an unprecedented challenge in the coming years. It will require a more holistic approach to address agricultural production and productivity more effectively. Increasing production of food, feed, and fiber through the use of modern biosciences and biotechnology is only one among many strategies needed to meet this challenge. Access to modern science

and technology will need to be supported by more comprehensive policies on investment, regulations, and education. In addition, while rural areas currently hold most of the world's poor and hungry, and will continue to do so for many years to come, the urban areas of Asia will require more attention and distinct focus from national governments.

As it is, the world is witnessing the shifting of poverty and food insecurity to cities. Factors of production, technologies, employment, and indeed policies that have been aimed at rural populations must adapt to address urban situations. This in itself will offer new opportunities to apply biotechnology for urban agriculture, and it is satisfying to evidence movement in this direction by national and international entities. Cities, with their unique features, must be included in the agenda of food and agriculture policy makers, planners, and institutions, and conversely, food security and agriculture must be integrated into the agenda of city planners and local urban authorities.

Increasing productivity is a development imperative, whether urban or rural, if more agricultural production is to be achieved with reduced arable land, labor, and water in Asia. And therein lies the huge potential for biotechnology as a "green" technology.

## REFERENCES

- [1] United Nations. World urbanisation prospects: the 2009 revision. United Nations Department of Economic and Social Affairs, Population Division website. Available at [http://esa.un.org/unpd/wup/doc\\_highlights.htm](http://esa.un.org/unpd/wup/doc_highlights.htm).
- [2] Food and Agricultural Organization. The State of Food Insecurity in the World. Food and Agriculture Organizations of the United Nations website. Available at <http://www.fao.org/publications/sofi/en/>, 2010.
- [3] World Bank. World Development Indicators database. World Bank website. <http://data.worldbank.org/data-catalog/world->

- development-indicators, accessed on 3 July 2011.
- [4] Teng P.S. *BioScience Entrepreneurship in Asia: Creating Value with Biology*. Singapore: World Scientific Publishing Co.; 2008.
- [5] Teng P.S., Escaler M., Caballero-Anthony M. Urban food security: feeding tomorrow's cities. *Significance Magazine* 2011; 8 (2): 57–66.
- [6] Teng P.S., Margarita E. Food Security in Asia: the changing landscape. In: *CSCAP Regional Security Outlook, Chapter 5, Council for Security Cooperation in the Asia Pacific*. Canada: University of British Columbia; 2011, pp. 40–45.
- [7] Food and Agricultural Organization. FAOSTAT database 2011. Food and Agriculture Organizations of the United Nations website. <http://faostat.fao.org/>, accessed on 5 July 2011.
- [8] Thapa G., Gaiha R. Smallholder farming in Asia and the Pacific: Challenges and opportunities. Paper presented at the IFAD Conference on New Directions for Smallholder Agriculture, Rome, 2011.
- [9] Trostle R. Global agricultural supply and demand: Factors contributing to the recent increase in food commodity prices. Economic Research Service, USDA website. Available at <http://www.ers.usda.gov/Publications/WRS0801/WRS0801.pdf>
- [10] Song Y., Zhang L., Sun D., Sun Q., Jiggins J. Feminization of agriculture in rapid changing rural China: policy implication and alternatives for an equitable growth and sustainable development. Paper presented at the FAO-IFAD-ILO Workshop on Gaps, trends and current research in gender dimensions of agricultural and rural employment: differentiated pathways out of poverty, Rome, 31 March–2 April 2009.
- [11] Nelson G., Rosegrant M., Palazzo A., Gray I., Ingersoll C., Robertson R., Tokgoz S., Zhu T., Sulser T. B., Ringler C., Msangi S., You L. *Food Security, Farming, and Climate Change to 2050: Scenarios, Results, Policy Options*. Washington DC: IFPRI; 2010.
- [12] Food and Agricultural Organization. Food Price Data and Analysis Tool. Food and Agriculture Organizations of the United Nations website. <http://www.fao.org/giews/pricetool2/>, accessed on 8 July 2011.
- [13] Teng P.S. Where does Asia stand in accepting agri-biotechnology crops? *Asia Pacific Biotech* 2006; 10: 838–845.
- [14] Frost and Sullivan. Overview: Malaysian Agricultural Biotechnology. The Malaysian Agricultural Biotechnology Sector (A Frost & Sullivan White Paper). Malaysian Biotech Corporation website. <http://www.biotechcorp.com.my/KenticoCMS/about-us/PDF/final-agricultural-cover-and-inside.aspx>, accessed on 1 January 2012.
- [15] James W.C. Global Biotech/GM Crop Planting Increase 100-fold from 1996. International Service for the Acquisition of Agri-biotech Applications website. Available at <http://www.isaaa.org/resources/publications/briefs/44/pressrelease/>.
- [16] Stein A.J., Rodriguez-Cerezo E. International trade and the global pipeline of new GM crops. *Nature Biotechnology* 2010; 28: 23–25.
- [17] Asian Productivity Organization. *Business Potential of Agricultural Biotechnology Products*. Tokyo: Asian Productivity Organization; 2007, pp. 197.



---

# SCOPE AND OPPORTUNITIES FOR GREEN ENERGY AND GREEN TECHNOLOGY

PROF. OSAMU KITANI

Professor Emeritus  
University of Tokyo

---

## INTRODUCTION

With the worldwide increase in population and the development of living standards, the demand for energy is sharply increasing, which places much stress on the local and global environment.

Depletion of fossil resources in the future and the rise of their prices will force the world to shift to renewable resources. The role of new energy technology to utilize renewable resources will be increasingly important in the future. It will also cause considerable challenges in the energy sector of the Asian Productivity Organization (APO) member economies.

Green technology, with its unique characteristics of energy, material, and information, is less burdening on the local and global environment, making it possible for creating sustainable societies in the future.

Green energy is a new energy system for better environment and sustainability, and it is an essential part of the APO's Green Productivity activities. Green Productivity has been successful in the APO as an important tool for higher productivity and economy. It contributes to raising the efficiencies of labor input, material, and energy, resulting in higher productivity with less environmental load and more sustainability. Particularly, Green Productivity activities for energy must be continued and further developed in the future.

### Renewable Energy and Energy Saving

Green energy technology consists of renewable energy resources such as hydraulic, solar, wind, geothermal, and biomass. They are friendlier to both global and regional environment

compared to fossil energy and nuclear power. Fossil energy-saving, as a part of green energy technology, is also very important because nonrenewable energy supplied about 84% of the world's energy consumption in 2009 [1].

### Policy and Technology for the Sustainable World

Renewable energy is ever available from nature. It is important that renewable resources such as solar, biomass, hydraulic, wind, ocean, and geothermal energies are further utilized in APO member economies, depending on their available resources. On the other hand, green energy sustainability depends on how the technology is applied. Therefore, green energy policies should be put in place in support of green technology.

### Green Technology for Regional Development

Renewable energy is characteristically more localized than fossil and nuclear energies. Solar, wind, hydro, and biomass energies have strong regional characteristics. While generating the knowledge of green technology, these regional differences must be carefully considered. As green technology basically utilizes local resources, local companies can undertake it and contribute to the promotion of local economy and put an end to poverty. Switching from fossil energy to renewable energy also contributes to the saving of fossil resources. The application of green energy in energy-saving initiatives has the measure to improve resource-saving efficiency.

## CURRENT STATUS

Green energy technology as a part of green technology is represented by the introduction of renewable energy. Among the various kinds of renewable energy sources, biofuels

and wastes comprised 10.2% of the world's energy supply in 2009. Hydraulic power is also prominently used globally, comprising 2.3% of energy supply. Solar, wind, tidal/wave, and geothermal are among the natural energies utilized, but the number is limited, totaling only 0.8% of the world's energy supply in 2009 [1]. Solar voltaic cells are now being tested for utilization in APO member economies. Solar heat to warm water is also used partly. Some examples from the APO member economies are presented here.

### **Solar Water Heating**

Solar water heating has come into wide use in the Republic of China (ROC), located in the subtropical region with an average irradiance of 716–1,027 kJ/m<sup>2</sup>. The government initiated subsidies since 2000 to cover about 15%–20% of the total cost of the solar water heating system. By the end of 2005, about 280,000 families had installed solar water heating and the installation rate reached 4.32% [2]. Solar water heating is one of the most cost-effective renewable energy systems. It can be successfully used in other APO member economies with enough annual sunshine.

### **Small Hydraulic Power**

Small hydraulic power systems have relatively low environmental impact compared to large ones because they usually have minimal reservoir and require less construction work. A small hydropower of 4 MW with a gross water head of 103 m was installed near Khudi River in Lamjung District, Nepal. The waterway up to the powerhouse with two power-generating units consisted of exposed steel pipe of about 2.5 km long and a diameter of 1.75 m. It generates an annual power output of 24,000,000 kWh, which is about 2% of the annual electricity consumption in Nepal [3].

### **Biodiesel from Palm Oil in Indonesia and Malaysia**

Indonesia and Malaysia produce about 85% of the world's palm oil. It is used as edible oil, feedstock for chemical products, and also as fuel for diesel engines. The EU is now trying to get more biodiesel from imported palm

oil. Biodiesel from waste oil or non-food crop such as *Jatropha* is an attractive alternative as it can be cultivated in marginal lands without conflicting with food agriculture. The promotion of domestic utilization of biodiesel fuel is further expected [4].

### **Biogas Fuel in India**

Methane capture and power generation with cogeneration in a distillery is performed in India. The power plant capacity is 0.96 kW with an annual power generation of 710,137 kWh. This is an off-grid system by a manufacturer in Nagpur, India [3].

### **Improvements in Cooking System**

Inefficient use of cooking fuel has been a common problem in villages of developing countries. As part of the APO's Green Productivity and Integrated Community Development project, improvements in cooking systems were promoted in Vietnam. The project was successful due to practical and visual demonstrations, thus facilitating the enhancement of the program [5]. This project is just a single example, but it's a remarkable step in solving a common problem in the developing regions of the world.

## **FUTURE INITIATIVES**

### **New Technologies for Energy**

There are so many new, viable green energy technologies for the future. Solar power systems across countries, wind power from the sea, tidal/wave power of the ocean, fuel cells using organic waste, and second generation bioethanol (avoiding conflict with food) are some examples. New technologies should be fine-tuned into practical systems and introduced to the society with proper market promotion and integrated into policy.

### **Biomass for Energy and Material**

Biomass is quite diversified. Plants of many species, including crops and trees, seaweed, and microalgae, and even animals are sources of biomass. The quality and yield of biomass are also diversified according to its area and

climate. Bioenergy takes the form of liquid, gas, and solid. Liquid biofuels such as bioethanol, biodiesel, and Biomass to Liquid (BtL) are used for transportation. Gas fuels from biomass are usually used for stationary purposes such as electricity-generation plants and city gas. Solid biomass fuels such as wood chips, bark pellets, fuel wood, and organic wastes are burned to get heat or electricity. Thanks to the unique characteristics of biomass as a renewable resource, it can be converted not only into energy, but also into raw materials.

### **Cascade Use of Biomass**

Bioenergy is seen as one of the natural energies, but its characteristics differ greatly from the others. Biomass is not always natural and is produced by hand in farms and forests. It is used for energy, food, feed, fiber, feedstock, construction material, and others. Cascade use of biomass is primarily used for materials, but it is also possible to be converted into energy [4]. Cascade use and recycling are characteristics of biomass utilization as material and are typical examples of green technology for preserving resources, reducing environmental load, and improving economic efficiency.

### **Energy-Saving Technologies**

Energy saving is important for all kinds of energy utilization. As fossil resources are being depleted and their prices are escalating, energy saving is crucial in making the present energy system sustainable. In order to reduce CO<sub>2</sub> emissions and achieve low-carbon societies, energy saving is a key technology. Various new energy-saving devices and systems such as light emitting diode (LED) and heat pump applications are introduced every year. Combining these with the current ones or replacing the old systems will increase energy efficiency and make the system more environmentally friendly.

### **Reduction of GHG Emission**

Greenhouse gas (GHG) emission is a crucial issue of the global environment. The global average surface temperature is likely to increase by 1.8°C to 4.0°C by the end of this century. CO<sub>2</sub> is the largest source of GHG, accounting for 77%

of total emissions. Sustainable levels of GHG emissions are estimated to be less than two tons CO<sub>2</sub> equivalent per capita per year [6].

Power plants without heat recovery account for over 70% of GHG emissions globally. Energy saving in other industries, offices, and homes, as well as transportation is really needed for the reduction of GHG.

The reduction of GHG emissions can be achieved by a number of emerging technologies such as renewable energy utilization, energy-efficiency improvement, scrubbing CO<sub>2</sub> at power stations, afforestation, etc. Another important sector in developing countries is solid waste and wastewater disposal. In most of these countries, solid waste and wastewater management systems are not adequate, resulting in GHG emissions in the form of methane gas [6].

Emissions due to land-use change such as deforestation associated with planting of oil palm is estimated to be bigger than the energy derived from oil in some cases [6]. Afforestation, or better use of land, is desperately required to decrease GHG emissions, reduce/avoid conflicts in local societies, and improve biodiversity.

## **SCOPE OF DEVELOPMENT AND OPPORTUNITIES**

Local power from on-site renewable resources could improve the quality of life and create new jobs using electricity.

### **Solar Cells and Heat for Localized System, and Smart Grid Electricity**

Matching demand and supply of electricity in large grids is not an easy task. New grid systems adjusting demand and supply control by means of ICT is called Smart Grid and is now being developed. Fluctuations in electric power from solar and wind sometimes make it difficult to supply electricity through an ordinary grid. New Smart Grid techniques may solve this problem and achieve higher efficiency in local power systems.

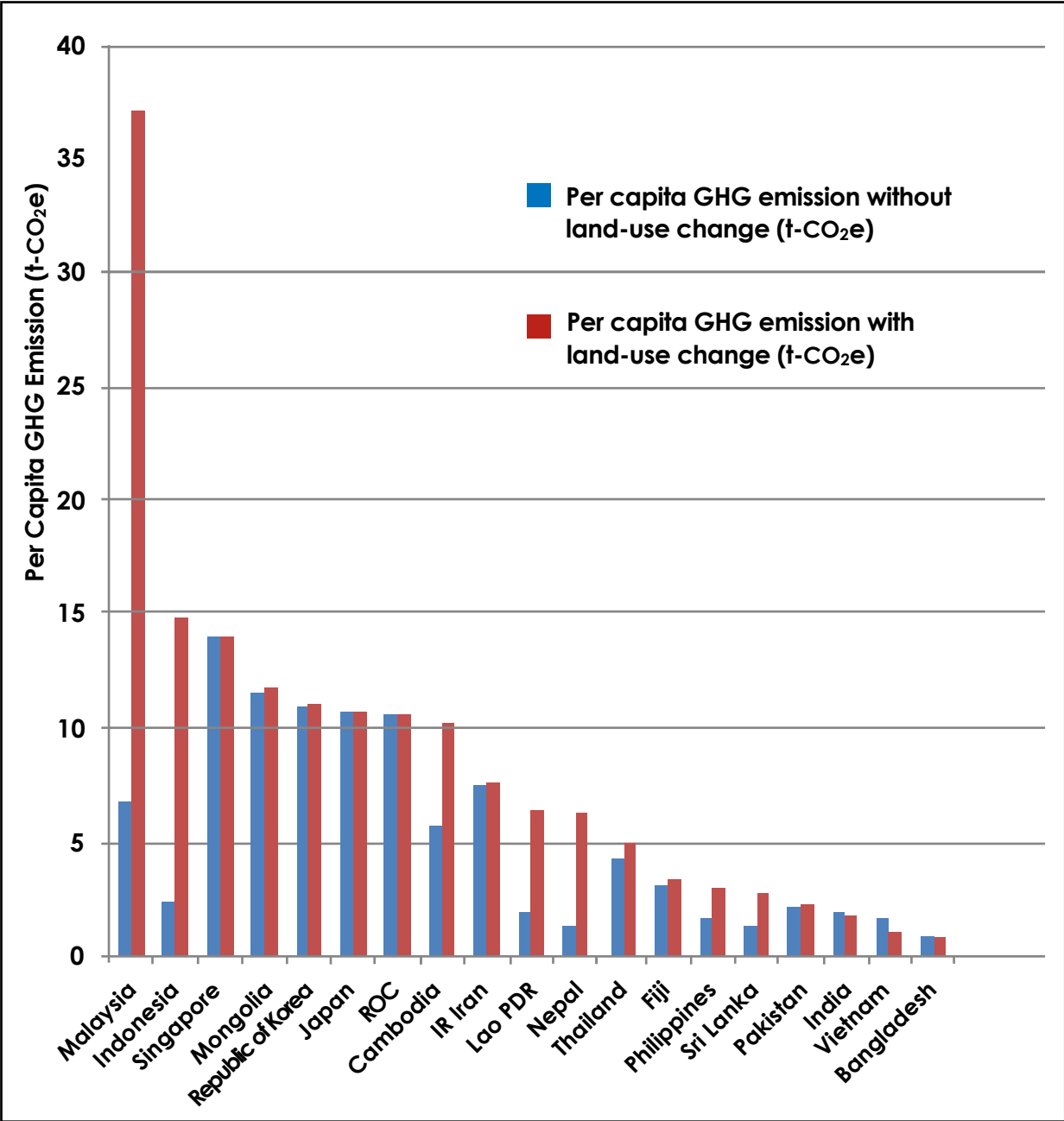


Figure 1. Per Capita GHG Emission of APO Member Economies With and Without Land-use Change  
 Source: APO [6]

**Small Hydraulic Power**

Small hydraulic power with an output of less than 1,000 kW can generate electricity with comparatively high efficiency without the construction of an expensive dam. It utilizes water flow energy of rivers or canals with simple turbines. However, seasonal fluctuations of water flow and sedimentation problems must be taken into account.

**Wind Power for Higher Efficiency**

Wind power is, at present, less expensive and has higher energy efficiency in comparison to solar power. However, suitable locations are limited because it requires higher than average wind velocity throughout the year. Wind on the sea is more stable and can yield more power. Windmills on the sea are also considered more environmentally friendly without noise pollution and bird-strike problems.

## **Geothermal Energy**

Geothermal energy is the inner energy of the earth. Volcanic magma is able to supply extremely hot vapor through excavated holes from 1,000 m to 3,000 m deep, enabling the generation of electricity. In order to maintain water resource and to avoid the deposit of dissolved minerals under the ground, an additional hole is dug to channel the cooled water into the ground. Geothermal power is very stable, and constant supply of electricity is possible.

## **Bioenergy**

Fuels for biomass power stations are diversified. Wastes from agriculture, forestry such as bagasse, straw, and wood chips are burned in biomass boilers or commercial power plants for cofiring. Biogas can be purified into highly concentrated methane and used as car fuel or substitute for city gas. Biogas for transportation is an atypical example of first generation biofuel for cars without conflicting with food. Biogas is usually used as fuel for a small power plant or for heat. In future, biogas could be fed to fuel cells because they have a much higher energy efficiency than traditional small power plants.

Bioethanol and biodiesel are used for transportation. Conflicts of raw materials for these fuels and food are a crucial problem. To avoid this, second generation biofuel is now being developed. Bioethanol from lingo-cellulosic materials such as wood and straw will be in the market in the near future. Biodiesel fuel from waste oil and fat can also be used. BtL is a liquid synthesized fuel from gasified biomass, and it can be used for automobiles, ships, and airplanes. BtL can also be made from non-food materials such as crop wastes and woods. Fast-growing trees such as willow and hybrid poplar have been planned to be cultivated in short rotation intensive culture and may be supplied as raw material for second generation biofuels. Microalgae with very high productivity can be cultivated on non-farm lands or in the water to yield bio-oil for biodiesel.

## **INITIATIVES BENEFITTING LOCAL COMMUNITIES AND MARKETS**

### **On-site Production and Consumption of Energy**

Renewable energy can be produced and consumed on site. It is generally bound by land and local geographical or meteorological conditions. Transportation of renewable energy to distant markets, especially across borders, is only possible where it is physically and economically feasible. On-site production and consumption of energy has a huge potential to improve and sustain local life and economy. The following are a few examples from the APO countries.

### **Tidal Power in Republic of Korea**

Sihwa Lake Tidal Power Plant is the world's largest tidal power generation plant. It uses an existing seawall for flood mitigation and agriculture. The tidal barrage provides environmental benefits and renewable energy generation using a mean tidal range of 5.6 m, generating 552.7 GWh/year of power. Annual reduction of GHG emission is an estimated 315,000 tons of CO<sub>2</sub>e. It is also anticipated that the tidal stream will improve the water quality inside the seawall [7].

### **Biogas in Thailand (Through a Clean Development Mechanism with Japan)**

It is still a common practice to discharge organic waste into streams or lagoons, emitting methane (CH<sub>4</sub>) gas, which has 21 times more GHG effect compared to CO<sub>2</sub>. A starch factory in Kalasin, Thailand, used to dispose of its liquid waste (ca.700t/day) from cassava into a nearby lagoon. On top of the GHG emission, the odor in the air and polluted water had been degrading the local environment. A Clean Development Mechanism between Thailand and Japan was used to initiate a project, in which an artificial pond was constructed to generate and utilize biogas in the factory. About 440,000t-C of carbon credit was expected to be produced by 2012. The local community now enjoys cleaner environment with new job opportunities for 26 workers to run the new biogas facility [8].

### **Policy and Support for Green Energy**

Renewable energy technology is still in the developing stages. Due to its strong local characteristics, local and international cooperation in R&D is required. Cost reduction is needed to compete with present energy systems. Training for experts is essential to make the green energy projects successful. The APO workshops, publications, country programs, and ICT content delivery will play important roles in capacity building.

Application of renewable energy needs steady policy and support because it is usually higher in price than conventional energy. Partial aid, while introducing new technologies, is effective to build up steady markets. However, it is more important to create a new system such as Feed-in Tariff to guarantee the minimal price of power from renewable resources in order to build a long-term utilization system.

### **SUMMARY**

#### **Future Role of the APO**

Green energy technology needs further efforts in R&D and its promotion. Exchange of knowledge and training in regional and international levels are required. The APO in the role of disseminating knowledge is especially needed.

#### **Full Use of On-site Green Energy**

Most of the available renewable energy resources are not utilized effectively at present. Development of local green energy is essential for the local societies in APO member economies. It will also stimulate local economy and contribute to eradicating poverty.

#### **Policy and Support**

Renewable energy has huge potential. As cost decreases and benefits are increasingly recognized, it will become a fast-growing energy source. Global activities such as continued R&D, capacity building, and various program supports for establishing stable markets and more investment will be required in order to accelerate renewable energy growth. Enhanced regional collaboration will

be a key to success. Long-term policies with steady support and international collaboration are essential for realizing green energy societies in the future.

### **REFERENCES**

- [1] International Energy Agency. Key World Energy Statistics 2011. <http://www.iea.org/textbase/nppdf/free/2011/>, accessed on 20 November 2011.
- [2] Chen F., Liu S.M., Chang Y.L. Renewable energy in Taiwan — It's developing status and strategy. *Energy* 2007; 32: 1634–1646.
- [3] Asian Productivity Organization. Compendium of Best Practices for Renewable Energy. Tokyo: Asian Productivity Organization; 2011.
- [4] The Japan Institute of Energy. Asian Biomass Handbook; 2008. e-Book.
- [5] Asian Productivity Organization. APO Demonstration Projects in Vietnam 1998–2003: Green Productivity and Integrated Community Development — The Vietnam Experience. Tokyo: Asian Productivity Organization; 2006.
- [6] Asian Productivity Organization. Greenhouse Gas Emissions: Estimation and Reduction. Tokyo: Asian Productivity Organization; 2009.
- [7] Daewoo E&C. Sihwa Tidal Power Plant Project. [http://pemsea.org/eascongress/international-conference/presentation\\_t4-1\\_kim.pdf](http://pemsea.org/eascongress/international-conference/presentation_t4-1_kim.pdf), accessed on 22 November 2011.
- [8] Kitani O. Baiomasu wa chikyuukankyō o sukueruka. (Can Biomass Save Global Environment?) (in Japanese). Tokyo: Iwanami Shoten; 2007.

---

# THE DEVELOPMENT AND APPLICATIONS OF ICT IN SELECTED APO MEMBER ECONOMIES

DR. CHUAN-NENG LIN

**Director General**

Department of Industrial Technology  
Ministry of Economic Affairs

---

## INTRODUCTION

The OECD's Working Party on Indicators for the Information Society (WPIIS) has categorized the ICT sector into two main segments: ICT manufacturing and ICT service. According to an ICT sector classification standard based on the guiding principles of OECD's WPIIS, ICT sector definitions are expressed in terms of the characteristics of its products such that goods and services must be intended to fulfill the function of information processing and communication by electronic means, including transmission and display. The objectives of these OECD guiding principles are to provide a framework to profile the ICT sector, support economic analysis, and attain sustainable development [1].

### Characteristics of ICT Development

The characteristics of ICT development can be categorized as follows:

- i. Higher R&D costs and shorter product life cycles

In the past, where labor and capital were two major production driving forces, ICT manufacturing firms tended to invest heavily in R&D in order to come up with new products or extend the life cycles for existing products. As the world enters the era of knowledge economy, where the technology and standard of development have become rapid and product life cycles have become significantly shorter, firms have to either set up industry standard to spearhead market development so as to uphold their industry leadership and revenues, or create patent pools to increase barriers to entry. With razor-thin profits gained

from manufacturing ICT products without an optimal level of sales volume, enterprises will encounter challenges, as they may not be able to generate enough profits to cover costs and obtain resources to help them stand at the forefront of the ICT sector.

- ii. Open and shared platforms

Through open platforms such as open source code and open Application Programming Interface, technology development in the ICT sector can be advanced by leveraging the wisdom of crowds. The amount of information derived from these open platforms is much larger than information from closed platforms. However, as more and more information can be easily obtained at no cost, the mechanism of valuable information has been jeopardized. Therefore, the problem of information asymmetry observed in the traditional economy is no longer seen in the knowledge economy. Nowadays, a social media-based economy focusing on the management of e-commerce and social networking has surfaced. Against such backdrop, enhancing consumer experience has become a key factor to help firms in the ICT sector establish consumer trust, brand loyalty, and real-time response mechanism while enhancing customer relationship management.

### Resource Reallocation and Flexible Marketing Strategies

With the trend of globalization and digitalization eliminating geographical boundaries, enterprises are now able to plan their organizational structure with more flexibility. For instance, they are able to set up call centers offshore in a country with lower labor costs

and/or set up R&D centers in regions that offer better investment environments. Since their resources are no longer regionally bound, ICT firms can implement global deployment with more flexibility and can further strengthen their global presence. Thus, unlike in the past when profit and return on investment relied heavily on technology upgrades and investments on production facilities, resource reallocation and flexible marketing strategies are two major growth factors for enterprises to increase their profit margins.

### **ICT AND ECONOMIC DEVELOPMENT OF ASIAN PRODUCTIVITY ORGANIZATION (APO) MEMBER ECONOMIES**

The ICT and Internet development have not only had a profound impact on the industries, but also on national economy, society, and government policies. ICT has been recognized as the key to restructure industries and increase national competitiveness.

Based on the industrial life cycle theory, the correlation between digitalization of the ICT sector and economic development built on the progress of ICT in advanced countries was evaluated. In addition, based on their major ICT products and the level of digitalization, APO member economies were classified into starting, middle, and advanced stages in an attempt to shed light on future growth opportunities for those member economies in different stages [2].

Member countries such as Bangladesh, Cambodia, Fiji, Lao PDR, Mongolia, Nepal, Pakistan, and Sri Lanka are in the starting stage. These countries are in the initial stage of building infrastructure, and therefore, they can only make a minimum level of contribution to the overall economic growth and generate a limited level of productivity in their home countries. Taking Cambodia as an example [3], the International Monetary Fund indicated that the nominal GDP of Cambodia in 2010 was USD11,629 million and has an annual growth rate of between 6% and 7%. ADB denoted that in 2010, Cambodia's nominal GDP per capita

was USD752. The industrial, agriculture, and service sectors accounted for 23%, 36%, and 41% of GDP, respectively [4]. It was found that the industrial sector still represented a small share of Cambodia's domestic economic growth (Table 1).

Member countries in the middle stage are emerging countries whose governments have been aggressively building up infrastructure, developing ICT policies, and establishing a solid industrial environment. Through technological improvements in ICT, these countries aim to improve domestic economic environment, productivity, and efficiency. India, Indonesia, Islamic Republic of Iran (IR Iran), Malaysia, the Philippines, Thailand, and Vietnam are in this stage. Taking Vietnam as an example [3], it was found that Vietnam's economy continued to grow steadily for the past decade with more than 8% annual growth during the period of 2005–07. In 2010, Vietnam's economy enjoyed an annual growth of over 6.8% with a nominal GDP per capita of USD1,174. The Vietnamese government expects that its industry and service sectors would become the driving force of its economic growth. In 2010, the industry sector accounted for 41.1% of GDP while the service sector accounted for 38.9%. As for the agriculture sector, it slipped to 20.6% (Table 1) [5].

For those advanced economies that have relatively mature ICT technologies and infrastructure, they have shifted their focus to: i) promote ICT applications and services with the aim of building an environment with smart living in mind, ii) develop innovative technology services, iii) provide quality living environment, and iv) accelerate the pace of industrial restructuring and upgrades. Hong Kong, Japan, Republic of Korea (ROK), Singapore, and Republic of China (ROC) are in this stage. For example, ROK's nominal GDP in 2010 reached USD9,200 billion with an annual growth rate of 6.3% and GDP per capita of USD20,759. The service sector accounted for 58.8% of GDP, followed by the industrial sector's 37.8% and the agriculture sector's 3.3%. The ICT sector contributed 10% of GDP (Table 1).



## BEST PRACTICES IN ICT DEVELOPMENT: ROC

ICT development is one of the major growth drivers for the future of society and economy. Observing the development roadmap of the Taiwanese industrial structure, the influence of the ICT sector on ROC's economic growth is especially evident.

10 ICT products that are ranked first in terms of global market share are manufactured by Taiwanese makers.

The Taiwanese government has begun implementing a series of information society policies starting from 2000 in an attempt to successfully enhance ROC's national

Table 1. Major ICT Indicators in APO Member Economies in 2011

Starting						Middle						Advanced					
Bangladesh	Cambodia	Mongolia	Nepal	Pakistan	Sri Lanka	India	Indonesia	IR Iran	Malaysia	Philippines	Thailand	Vietnam	Hong Kong	Japan	ROK	Singapore	ROC
<b>Broadband Internet subscriptions per 100 people</b>																	
0	0.3	2.3	0.4	0.3	1.0	0.9	0.8	0.7	7.3	1.8	3.9	4.1	30.2	26.9	36.6	24.7	22.7
<b>Fixed telephone lines per 100 people</b>																	
0.6	2.5	7.0	2.8	2.0	17.2	2.9	15.8	36.3	16.1	7.3	10.1	18.7	61.6	31.9	59.2	39.0	70.8
<b>Internet bandwidth per 10,000 people (Mb/s)</b>																	
0.1	0.4	6.2	0.1	0.4	0.4	0.4	0.3	0.4	6.4	2.7	2.3	1.5	474.3	12.4	9.9	122.2	21.2
<b>Internet users per 100 people</b>																	
3.7	1.3	10.2	6.8	16.8	12.0	7.5	9.1	13.0	55.3	25.0	21.2	27.6	69.4	80.0	83.7	70.0	71.5
<b>Mobile phone subscriptions per 100 people</b>																	
46.2	57.7	91.1	30.7	59.2	83.2	61.4	91.7	91.2	121.3	85.7	100.8	175.3	190.2	95.4	105.4	143.7	119.9

Source: World Economic Forum [6, 7]

With limited domestic market size and scarcity of natural resources, ROC has to rely heavily on exports to achieve large-scale production efficiency. In order to enhance its competitiveness in the global market, the Taiwanese government has been implementing a series of industrial policies. Seeing as the ICT sector is one of its major promotional industries, the Taiwanese government built science parks, strengthened industry clusters, and formed full-fledged supply chains, thereby promoting the ICT sector to become ROC's major high-tech industry. By doing so, ROC became the leader in the global ICT industry and served as a major sourcing center for worldwide ICT vendors. More than

competitiveness in IT. In 2011, ROC's household PC penetration rate reached 88%, the number of frequent Internet users exceeded 10 million, mobile phone penetration rate arrived at 120.2%, the share of Internet access through mobile devices at 70%, and digital TV penetration rate at 31.1%. ROC ranked sixth worldwide and second in the Asia-Pacific region in the Networked Readiness Index released by the World Economic Forum [6] in 2011. ROC is one of the top-ranked countries in other international indicators in "innovation" competitiveness.

Capital, technology, and labor are three major factors significantly leading to ROC's

economic growth, accounting for 60%, 29%, and 11%, respectively during 1996–2000. With capital taking up the largest share, it is obvious that during this period, firms poured a massive amount of investment in manufacturing facilities and machinery equipment coupled with sufficient labor. Today, knowledge has replaced traditional production factors such as land, labor, and capital, to become a key growth driver to increase productivity and economic growth.

The development roadmap of ROC's ICT sector and the corresponding policies are further elaborated as follows:

i. ROC's economy began to take off in the 1970s, and ICT policies and infrastructure construction projects both played important roles. Three principles, namely future outlook, technology development and market demand, and international competitiveness were taken into consideration when the Taiwanese government planned for the emerging high-tech industry in the 21st century.

ii. Founded in 1980, the Hsinchu Science Park was home to major high-tech vendors in ROC. The science park formed an important high-tech industry cluster that helped ROC gain a significant foothold in the global market. The advantages of system assembly and industrial cluster put ROC's ICT sector at an advantage when placing the Original Equipment Manufacturing (OEM) orders with international branded vendors.

iii. Starting from 1995, other than aggressively upgrading traditional industries, the Taiwanese government also began developing 10 emerging industries and eight key technologies. In addition, the government also helped the ICT sector develop product R&D and design capabilities. The ICT sector then developed a new business model called Original Design Manufacturing, which combines design with assembly operations.

iv. Since 2000, ROC has supplied more high-tech products to the global market than any

other nation. Its ICT sector has been well-known for its high manufacturing capability and integrated supply chain for personal computers. To stay ahead of others, the Taiwanese government has aggressively and continuously helped enterprises in industries such as Worldwide Interoperability for Microwave Access (WiMax) and broadband establish their presence in the ICT sector. There was one program launched to achieve TWD2 trillion production revenue in semiconductor and panel industries by 2006. In addition, the Taiwanese government set up programs to support R&D plans proposed by local enterprises. In 2008, the development of System on Chip (SoC) solutions and integration services opened up opportunities for the ICT sector. With help from the government, ROC's ICT sector will continue to play a key role in global innovation in the areas of personal computers and smartphones. Another business model, Original Innovative Management, was also established.

v. In recent years, the Taiwanese government has been focusing on six emerging industries, four intelligent areas, and 10 service sectors. Due to increasing demand for quality and affordable products from emerging markets, and mature markets shifting demand to applications of technologies, the Taiwanese government assisted enterprises to develop products with integrated capabilities. ROC's ICT sector has developed a new business model called Original Concept Manufacturing, which bundles culture, marketing, soft power with humanity, fashion, and new technologies.

In the post-2000 era, the Taiwanese government launched ICT-related programs that included the e-Taiwan Program (2000–07), the m-Taiwan Program (2005–09), and the i-Taiwan Program (2009–12). Leveraging the full-fledged ICT environment, the government aimed to improve overall social environment to further boost economic growth.

The e-Taiwan Program aimed to propel ROC with the use of ICT applications to become Asia's most digitized economy in providing

high-tech services. The program poured considerable resources in the establishment of communications network infrastructure. The goals of the program included bringing broadband services to six million households, enhancing the quality of living, e-commerce, e-government, and bridging the digital divide.

The m-Taiwan Program further strengthened the fiber-optic network deployment of the "Broadband to Home" project. Major goals of the program included the construction of fiber-optic broadband and the deployment of WiMAX applications through the promotion of mobile services, mobile living, and mobile learning.

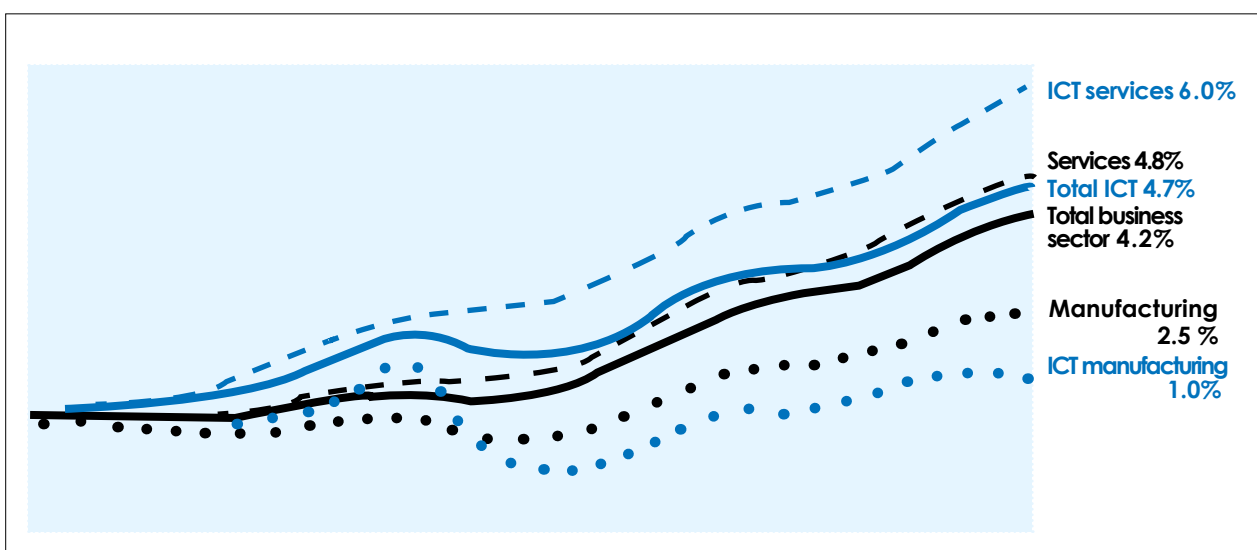
The i-Taiwan Program was the follow-up to the m-Taiwan Program. The i-Taiwan Program, the major program in ROC at the time, concentrated on ICT development. The vision of the program was to create a safe and convenient environment and to promote health, culture, and network development of the society. The program covered wireless broadband and digital convergence network construction, cultural and creative industries development, innovation-driven government service integration, smart environment establishment, and smart transportation service promotion.

## CHALLENGES AND OPPORTUNITIES OF THE ICT SECTOR

In the face of fast-changing global economy and increasing global market competition, the ICT sector's profit in ROC has been draining away and the total value-added of the pure manufacturing service and/or ICT manufacturing service is also reducing. According to the data compiled by the OECD using 1995 as the base year, growth of the ICT sector and total value-added was around 4.7% in 2008 while the growth of ICT manufacturing and total value-added was around 1.0%. However, by leveraging on the ICT technology competitiveness, the growth of ICT services, and the total value-added was around 6.0% (Figure 1).

Another challenge that economies in advanced stages are facing is the negative correlation between investment and return on investment of existing ICT projects. ROC, an expert in contract manufacturing, is experiencing reduced profit margins due to free trade policies. Strategic planning of the ICT sector in Japan and ROK is elaborated as follows:

Figure 1. Value Creation of ICT Manufacturing Versus ICT Services



Source: OECD Information Technology Outlook 2010, 2 [1]  
 Growth of ICT sector and total value-added in the OECD area, 1995–2008  
 Index 1995 = 100, compound annual growth rate in current exchange rates (%)

### i. Japan - i-Japan Strategy 2015

i-Japan Strategy 2015 was designed to create a citizen-driven, reassuring, and vibrant digital society toward digital inclusion and innovation. By 2015, the i-Japan Strategy seeks to achieve two goals: a) "digital inclusion," which can be achieved by establishing an economic society built through life enrichment and interpersonal bonding, and b) "digital innovation," which can be achieved by generating new vitality and value for individuals and society through digital technology. Priority projects include e-government and e-municipal government, medical and health, and education and human resource [8].

### ii. ROK-IT Korea (2009–13)

ROK's IT Korea plan began in 2009 with the aim of increasing economic growth by 0.5% by the time it ends in 2013. Its visions include the growth potential enhancement through IT technology convergence and upgrading, and technology innovation and job creation through ventures among small, medium, and large enterprises to boost its ICT competitiveness. Priority projects include the development of 10 leading IT converged industries, the software development as the core of industrial competitiveness, to make the goal of becoming a global supply base of key IT equipment a reality and to actualize the availability of convenient and advance broadcasting and communications services as well as the provision of faster and safer Internet environment [9].

Countries in the starting and middle stages also face their own set of challenges. Taking India as an example, in order to create more job opportunities, increase national competitiveness, and ensure economic growth momentum, it has been aggressively promoting its manufacturing industry, especially the ICT sector. Nevertheless, India's infrastructure improvement is relatively slow and its lack remains a hindrance to the economic growth and the manufacturing industry development in India.

In addition, due to the inadequacies of its fundamental educational system, India currently is still unable to meet the demand of the manufacturing industry for massive technical labor despite having an abundance of labor force. Therefore, during the transitional period from agriculture industry to manufacturing, the Indian government has been addressing on the ways to improve fundamental education for the general public and to foster labor quality capable of meeting the demands of the manufacturing industry. This is especially crucial for the ICT sector where the demand for skilled labor is higher than the general manufacturing industry. The lack of skilled labor is expected to be a key issue for the ICT sector in the starting and/or middle stages.

According to "Fault Lines", a book written by Raghuram G. Rajan [10], a professor of finance at the University of Chicago's Booth School of Business, the lack of organizational structure to effectively and massively distribute physical assets will be one of the key challenges for developing countries. Without a complete mechanism and/or organizational structure, the chance of a country's ICT sector in the starting and/or middle stages to achieve economies of scale will be rather slim, even when the most advanced ICT technologies and equipment as well as abundant funds are given. Observing the development of economy and the ICT sector of developed economies, it is found that they normally will have rather rigid organizational structures and industrial policies. This shall be a direction for the APO to consider when assisting other members to boost production capacity in the future.

## CONCLUSION

Looking at the ICT development plans currently implemented by developed economies such as ROC, Japan, and ROK, they are designed with an aim to build a healthy, energetic, and innovative information society. Leveraging mature ICTs, individual industries in these economies are able to develop

more innovative applications and produce efficiency gains through the said development plans. In addition, ROC government authorities have been aggressively initiating several ICT-focused industrial policies such as e-Taiwan and m-Taiwan, which have directly sharpened productivity and competitiveness of ROC's high-tech industry to help sustain the economy's national competitiveness in the ICT sector.

Based on the different course of development of the ICT sector in ROC and other advanced countries, there are corresponding industrial policies drafted for the starting, middle, and advanced stages. Observing APO member economies' development policies for ICT products and applications, they too can be categorized into three stages: the starting, middle, and advanced stages. Thus, the accumulated experiences and strengths of different ICT industries in ROC can serve as a reference for APO member economies in different stages.

In the starting stage, viewing the ICT sector as a major industrial project, the ROC government launched a series of industrial policies, set up science parks to strengthen the industrial clusters, and build a one-stop supply chain to help the ICT sector become the most dominant sector in the high-tech industry.

In the middle stage, with the emergence of ICT technologies and the Internet, the ROC government initiated several projects such as m-Taiwan, e-Taiwan, and i-Taiwan in the hope of improving the socioeconomic environment in ROC and helping to boost economic growth by taking advantage of the economy's solid strengths in the ICT sector.

In the advanced stage, the ROC government realized that the valued added generated from focusing mainly on the manufacturing and ICT manufacturing sectors was diminishing. Therefore, the government has been strategizing on ways to leverage on mature technologies in the ICT sector to help other industries upgrade and the general public

improve their living environment. In addition, the government has confirmed several development areas for the future, including four intelligent areas and 10 service sectors. It is anticipated that the incremental improvements in product diversification, brand awareness, and know-how acquisition will bring changes for ROC and strengthen national competitiveness.

Since ICT development plays a key role in affecting national economic growth, the presence of a full-fledged ICT infrastructure will be essential for a country to achieve sustainable economic growth and the vision of information society. Observing the national development in the ICT sector, focusing on one area will lead to diminished economic benefits. Therefore, connecting the ICT sector with other applications in the areas of health care, biotechnology, and energy will help elevate productivity and reduce costs. Upon the completion of ICT infrastructure construction, the government and industry sectors can jointly develop a cloud computing platform to consolidate more applications and services into the cloud computing environment and to ensure they can be widely used. As a result, production efficiency of all sectors can be increased significantly and synergies can be created in the era of knowledge economy.

## REFERENCES

- [1] OECD: Information Technology Outlook 2010, December; 2010.
- [2] Asian Productivity Organization. APO Productivity Databook 2010, March, Tokyo: Asian Productivity Organization 2010.
- [3] Hsu J. 2011 ICT Country Report: Vietnam, Market Intelligence and Consulting Institute, Institute for Information Industry. 3; 2012; pp. 22-24.
- [4] World Economic Forum. The Global Information Technology Report 2010–2011, the Networked Readiness Index 2010–2011; 2011; pp. 19.
- [5] Hsu J. Cambodia's Macroeconomic Development in 2011, 2011 ICT Country Report: Vietnam, Market Intelligence and

- Consulting Institute, Institute for Information Industry; 2011; pp. 194-200.
- [6] World Economic Forum. World Economic Forum Data Base 2011; 2011; pp. 419-420.
  - [7] World Economic Forum. World Economic Forum Data Base 2012; 2012; pp. 493-495.
  - [8] Chang C. Y. ICT Country Report: Japan. Taipei: Market Intelligence and Consulting Institute, Institute for Information Industry; 2010.
  - [9] Chen C. S., and S. J. Huang. ICT Country Report: South Korea. Taipei: Market Intelligence and Consulting Institute, Institute for Information Industry; 2010.
  - [10] Raghuram G. R. Fault Lines: How Hidden Fracture Still Threaten the World Economy; 2011; pp. 88-90.

---

# ENTREPRENEURSHIP AND PRODUCTIVITY

DR. WONG POH KAM

**Professor**

Department of Strategy & Policy  
National University of Singapore

---

## INTRODUCTION

While conventional studies on the sources of productivity growth focus primarily on existing firms and the role of management practices, recent research literature has witnessed a growing interest in the contribution of new firms and the role of entrepreneurs driving these new firms. This paper provides a theoretical overview of how entrepreneurial new firm entry impacts productivity growth in an economy and briefly reviews the available empirical evidence on entrepreneurship as a key determinant of productivity growth. It also briefly examines the sources of such entrepreneurial firms and the role of public policy in promoting entrepreneurship development before concluding with some observations on the Asian context and recommendations for the Asian Productivity Organization (APO).

## IMPACT OF ENTREPRENEURSHIP ON PRODUCTIVITY: THEORETICAL OVERVIEW

The relationship between entrepreneurship development and productivity is not a straightforward one because of the variety of entrepreneurial activities that range from:

- i. New firms seeking to bring innovation to market versus firms trying to replicate what others have done
- ii. Opportunity-seeking versus necessity-driven start-ups
- iii. "Growth-oriented" start-ups versus "lifestyle" entrepreneurs

While much of the research literature tends to focus on only certain types of entrepreneurial firms, especially those expected to generate

positive economic outcome, a comprehensive framework that incorporates the different varieties of entrepreneurial firms is a necessary first step in assessing the overall effect of entrepreneurship on economy-wide productivity growth.

Figure 1 provides an overall framework that summarizes the key impacts of entrepreneurship development on economy-wide productivity growth. While recognizing that entrepreneurship development could encompass various antecedent activities that precede the actual starting up of new businesses, the framework in Figure 1 focuses on the act of new firm entry in the market as a tangible measurement of entrepreneurship development. There are five major economic pathways through which entrepreneurial new firm entry can impact the overall productivity level and growth of an economy.

### Productivity Increases Through Commercialization and Diffusion of Knowledge

The successful commercialization of new knowledge and technologies in the marketplace leads to their widespread diffusion and adoption across many economic sectors, which in turn induces higher productivity in these industries. While such new product and process innovations can be introduced by both incumbent and new firms, prior literature has shown that many innovations, especially the more radical ones, are often commercialized through new entrepreneurial firms [1–4]. Indeed, there is substantial evidence that new firms are the vehicles for bringing to market not only technologies emerging from universities and public research institutes but also technologies that are first developed within large incumbent firms themselves [5]. By serving as a channel

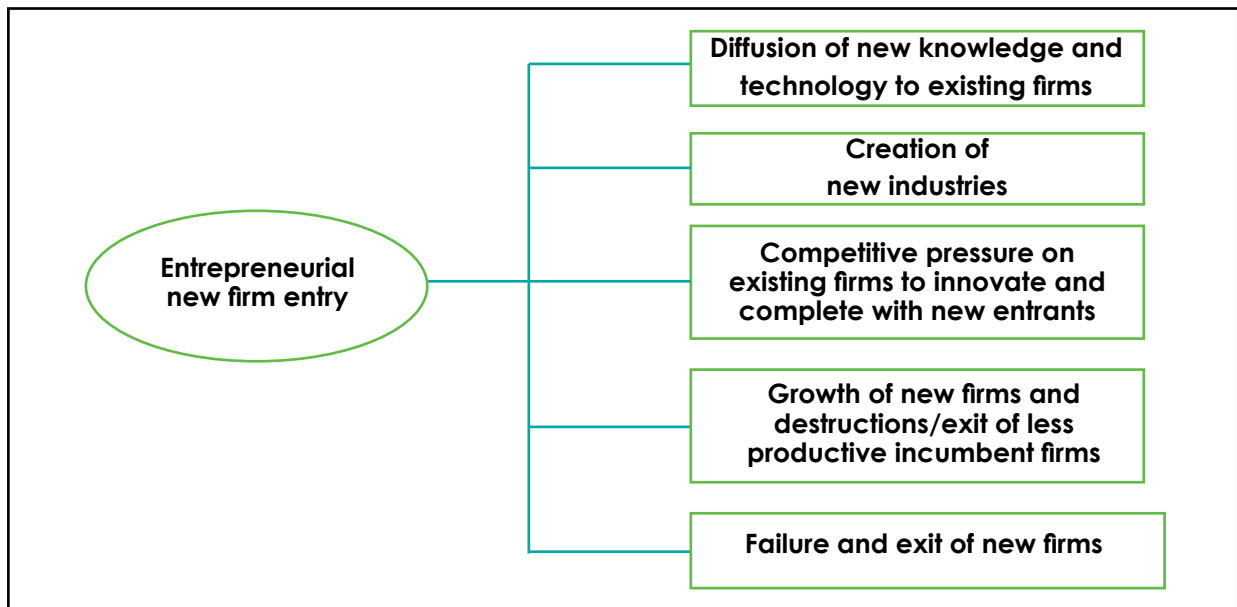


Figure 1. Effects of Entrepreneurial New Firm Entry on Productivity

for new knowledge and technology to be introduced into and diffused across markets, entrepreneurial new firms can directly influence the total factor productivity (TFP) of an economy [6].

Further, in the process of taking new knowledge and developing them into new products, these innovation-driven entrepreneurial firms can generate knowledge spillovers that are appropriated by other firms seeking to imitate or replicate their success, thereby accelerating the diffusion of the new products and processes. Thus, innovation-driven entrepreneurial firm entry can transform and revitalize existing industries [1, 7, 8].

### **Creative Destruction and Resource Reallocation**

Most of the literature on the impact of entrepreneurship on productivity builds on Schumpeter's work on the entrepreneur as the agent for creative destruction. Schumpeter claimed that entrepreneurs combine existing and new knowledge in innovative ways. As such, they are a central channel in converting knowledge to innovation, resulting in new products, services, inputs, novel ways of organizing production, and the identification of new markets. The entrepreneur is thus instrumental in "creative destruction", in which

new firms enter markets introducing new technologies and displacing older, less efficient firms [7–9].

The creative destruction process thus contributes to productivity growth through the reallocation of resources to higher value-adding activities. As new firms introduce new products and services that displace existing ones, resources are reallocated away from less productive incumbent firms to the new, more productive firms, causing aggregate productivity to rise in the long run [7–8, 10], even though the dynamics of this process of simultaneous value creation and destruction may result in productivity level to drop in the short run.

### **Creation of New Industries**

By bringing radically new products and services that did not exist before, entrepreneurial new firms are often credited with the creation of entirely new industries such as personal computer, web search, online games, social media, and biotechnology. While this new value creation role is sometimes subsumed under the Schumpeterian view, its effect is different in that it stimulates new categories of market demand and consumption activities rather than displacing existing products and



services. New entries (by new firms or existing firms from other industries) that try to replicate the success of pioneering firms are also attracted, thereby spawning a new industry in the process.

Obviously, such new industry-creating activities are highly risky and many such attempts are likely to fail, leading to the eventual exit of the firms concerned and the reduction of the average productivity level of the economy in the process.

### **Competitive Pressure on Incumbent Firms to Improve Productivity**

The threat of new firm entries can also spur incumbent firms to improve productivity in an attempt to defend their market share. Specifically, threat from entrants induces technologically advanced incumbents to innovate more, and this triggers productivity growth. In contrast, threat of entry discourages innovation in laggard incumbents, as it reduces the firms' expected payoff from investing in R&D, which in turn may cause these firms to decline and eventually exit the market through the creative destruction mechanism highlighted earlier. The dynamics of this process is likely to differ across industries [11, 12].

### **Failure or Exit of New Firms and Subsistent Survival of “Necessity” Entrepreneurs**

As alluded to earlier, not all new firm entries lead to value creation and positive productivity impact. Firms seeking to bring new, unproven technologies to market often fail, as they face technological, market, and firm execution risks. The failure and eventual exit of these unsuccessful firms will incur economic value destruction, and hence, will lower aggregate productivity level of the economy as a whole [10].

In addition, many new firm entries in poor developing economies (or advanced economies with high structural unemployment problems) may be the result of “necessity” entrepreneurship, whereby individuals who cannot find productive jobs resort to self-

employment to eke out a subsistent living [13]. Some of these “necessity” entrepreneurs are protected from exits through government subsidy and other protective measures, so they may continue to survive but at a subsistent, low-productivity level, thus dragging down overall productivity of the economy.

As can be seen from the above, the overall effect of entrepreneurial new firm entry on aggregate economy-wide productivity growth depends on the propensity and composition of entrepreneurial activities. For example, economies that have high propensity of innovation-driven entrepreneurship are expected to achieve higher productivity growth versus economies that have high “necessity” entrepreneurship rates. Similarly, economies that have a vibrant venture capital financing infrastructure to support entrepreneurs with high growth aspiration is likely to show higher entrepreneurial impact on productivity versus economies, where such entrepreneurial risk capital is lacking, and family ownership and control is the main form of entrepreneurship.

## **IMPACT OF ENTREPRENEURSHIP ON PRODUCTIVITY: EMPIRICAL EVIDENCE**

While there has been growing empirical literature on the impact of entrepreneurship on productivity, much of it is at an aggregate level and is not able to isolate the effects of the different pathways identified in Figure 1. Annex 1–5 summarize some of the most recent empirical studies on the contribution of entrepreneurship to productivity, based on a number of reviews [14–16] supplemented by additional independent literature search.

In general, the available empirical evidence can be divided into studies that examine the effect of various entrepreneurship on labor productivity or TFP, either in terms of their level or growth trend. Some studies have examined the effect of entrepreneurship on aggregate economic growth, and while these do not directly address the issue of productivity, they are included in Annex 5 for completeness. The

level of analysis also varies from the firm level to industry and regional/national economy-wide levels.

Overall, the empirical findings summarized in Annex 1–5 show that there is evidence of a positive relationship between entrepreneurship and productivity. While the studies covered in the review by van Praag and Versloot [14] is slightly more ambiguous, this may be partially due to the fact that many of the studies covered use relatively short time periods. Subsequent reviews incorporating studies with longer time periods (about 10 years) provide stronger evidence of entrepreneurship having a positive impact on productivity [15,16]. None of the studies were able to distinguish between the different types of entrepreneurial firms, the only exception being some of the studies that utilize the Global Entrepreneurship Monitor (GEM) database (Annex 5), where innovative and high growth aspiration entrepreneurial rates are found to have positive effects, while “necessity” entrepreneurial rates are found to have negative effects.

It should be noted that the empirical studies are almost exclusively on the advanced OECD economies, with little evidence available for developing economies in general and Asian economies in particular. The only exceptions are the studies on entrepreneurship on economic growth that utilize the GEM database and cover some Asian economies as well as developing economies in Latin America. Even then, the degree to which these studies are reflective of entrepreneurship in Asia is limited by uneven and irregular participation of Asian economies in the GEM survey, as reflected in Annex 6.

It should be further noted that the definitions of entrepreneurship used in the studies vary widely, and may not strictly capture new entrepreneurial firms, e.g., based on firm size or new entrants without discriminating between start-ups and new establishments set up by incumbents. On a more general basis, the broader industrial organization literature

has found the rate of firm entry and exit to be a major driver of productivity growth. For example, Carreira and Teixeira [10] have shown that a large percentage of industry productivity growth can be imputed to mobility of firms, with low-productivity firms losing market share (or shutting down) in favor of more productive incumbents and new entrants.

## **SOURCES OF ENTREPRENEURIAL NEW FIRMS**

As highlighted in Theoretical Overview above, it is important to take into account the type of entrepreneurial new firm activities in assessing their impact on productivity. The variety of entrepreneurial new firms in turn depends on the origins and background characteristics of the entrepreneurs who founded these new firms. In economies with high unemployment, many of the new entrant firms are, in fact, a form of self-employment, often started by individuals lacking the skills to find gainful employment, hence the term “necessity” entrepreneurs [13]. It is possible, though, that some of these self-employed individuals may have high skills, but could not find jobs due to structural problems in the economy (e.g., protective labor unions, dominance by state-owned enterprises that are inefficient and hence slow growing, or a mismatch between their training and market demand).

Founders of innovation-driven firms tend to come from knowledge-intensive sectors, especially organizations that have substantial R&D activities such as universities, public research institutes, and high-tech firms in the private sector. For example, in his study of fast-growing private firms, Bhidé [17] reports that the greatest number came from high-tech/high-growth industries, which on average were started by highly educated individuals, and tended to be based on ideas associated with their founder’s previous employment. Wadhwa et al. [18] similarly discovered from their survey of high-tech entrepreneurial firms founded in the USA between 1995–2005 that over 90% of their founders have at least a bachelor’s degree, with over 40% having masters, or

PhDs. The extent of such knowledge-based entrepreneurial firm founding depends not only on the size and importance of these sectors in the economy, but also the propensity of such individuals to leave their employment to take the plunge to start up their own firms [5]. Many factors have been found to influence their likelihood of becoming entrepreneurs, including:

- i. Security, compensation, and career prospects of their current employment (which constitute opportunity costs)
- ii. Availability of risk financing (venture capital, angel investors, government grants, and seed funding)
- iii. Intellectual property protection regime
- iv. The fit between their knowledge and innovation
- v. Window of market opportunities

Fittingly, Wong et al. [19] found that firms engaged in product innovation are more likely to spawn entrepreneurs than firms that emphasize process innovation.

The openness of an economy to foreign talents in general and entrepreneurs in particular may also have a significant impact on the sources of entrepreneurial new firm formation. For example, more than one third of Silicon Valley's high-tech start-ups in the 1990s were founded by immigrant Asian entrepreneurs due to its openness to foreign students in universities and foreign employees in high-tech firms [20]. A more recent study on technology entrepreneurs in the USA found more than a quarter of them to be foreign immigrants, and the number is more than half in the Silicon Valley [18]. Likewise, a significant proportion of high-tech entrepreneurs in Singapore are foreign immigrants [21]. In contrast, immigrants have been a negligible source of entrepreneurs in Japan's economy.

## **PUBLIC POLICIES TO PROMOTE ENTREPRENEURSHIP DEVELOPMENT**

In recent years, entrepreneurship development has become a buzz word among governments in many countries around the world. While it is beyond the scope of this paper to provide a comprehensive review of the best public policy practices to promote entrepreneurship development, a summary is presented in Table 1 with a list of key characteristics of an innovative, entrepreneurial economy that have been advocated in the extant innovation research literature.

Taking the stylized characteristics listed in Table 1 as an ideal benchmark, the strengths and weaknesses of each economy can be identified and public policy changes can be suggested to help induce improvement in areas of weaknesses as well as further entrench competitiveness in areas of strength. For example, the study by Ho and Wong [22] has found that the availability of risk financing capital and regulatory cost have significant effects on opportunity-driven entrepreneurial new firm formation rates across a sample of close to 40 economies.

In the case of risk financing, the USA has developed the most advanced and vibrant venture capital industry and angel investment market to fund early-stage, high-risk technology start-ups. Contrary to popular impression, this vibrant venture capital industry did not emerge through free market forces alone, but had also been influenced by a number of public policies, including the public funding of Small Business Investment Company and changes in regulation that enabled public pension funds to be invested in venture capital funds [23].

In addition, public funding programs such as the Small Business Innovation Research (SBIR) grant scheme further reduced the risk of commercialization of federal-funded R&D before they became spin-offs that are fundable by angel investors and venture capitalists [24]. Learning from the USA's experience,

the Republic of China (ROC), PR China, and Singapore have actively used public funding to stimulate the growth of venture capital industry in their respective economies, albeit with varying degrees of success [25]. Singapore has also adapted the SBIR scheme to fund prototyping and market test-bedding costs of high-tech start-ups, as well as provide one-to-one matching funds for angel investors to invest in early stage start-ups.

Besides public policy intervention in risk-financing, other areas where public policies have been found to have significant impact include the regulatory-compliance cost of starting a business, foreign talent immigration policy, protective regime on intellectual property, corporate taxation rate, and entrepreneurship education. Some factors are arguably harder to change and it takes longer for public policy to achieve impact, e.g., social cultural norms and entrepreneurship education.

**Table 1. Key Elements of An Innovative, Entrepreneurial Economy\***

- Entrepreneurial-minded people
- High skilled, adaptive, and innovative labor force
- Business-friendly regulatory environment
- High investment in learning and R&D
- A vibrant venture-financing market
- Protection of intellectual property (IP)
- Advanced venture professional services (e.g., IP management, law firms, and head-hunting firms specializing in supporting start-ups)
- Flexible labor market
- Openness to global competition and foreign talents, capital, and technology
- Conducive social-cultural norm (openness to change and creativity, tolerance of failure, acceptance of diversity, etc.)
- Low corporate taxation

\* Compiled by author

## CONCLUSION: THE ASIAN CONTEXT AND THE ROLE OF THE APO

Given the development contexts of Asian economies, it is difficult to make broad generalizations about the role of entrepreneurship development in productivity growth in such a diverse region. For example, the GEM study has highlighted significant variations across Asian economies in terms of the aggregate propensity of adult population to engage in entrepreneurial activities. In addition, wide variations are found among these economies in terms of the share of innovation opportunity-driven versus “necessity”-driven entrepreneurship, with the more advanced newly industrialized economies like ROC, Republic of Korea (ROK), and Singapore having significantly higher share of innovation-driven start-ups than others like Vietnam, Indonesia, and the Philippines. Clearly, the composition of economic pathways through which entrepreneurship development influences productivity growth varies significantly between these two groups of economies. For example, entrepreneurial development in the agricultural sector is likely to be of great importance among the latter countries, while policies toward promoting public research institute/university technology spin-offs and academic entrepreneurship are likely to be of priority concerns in the former.

The above caveat notwithstanding, it is clear that public policy makers in all Asian economies need to pay greater attention to the contribution of entrepreneurship to productivity growth in the future. In particular, there should be greater public policy focus on promoting innovation-based, opportunity-driven entrepreneurial new firm formation as a means to spur productivity improvement at both the industry- and economy-wide level. The diversity of entrepreneurial developments among the Asian economies provides scope and opportunity for the sharing of best policy practices, taking into account the need for adaptation according to the unique context of each economy. In this regard, the APO can play a useful role in bringing its

geographically diverse member countries to share their best policy practices with respect to entrepreneurship development that lead to positive productivity impact.

This brief review also highlights the need for more scholarly empirical research on the impact of entrepreneurship development on productivity growth among individual Asian economies. As highlighted earlier, there have been very few empirical studies on the link between entrepreneurship and productivity in specific Asian economies, whether at the industry- or economy-wide level. The APO can contribute toward bridging this gap by funding appropriate scholarly research and common data collection methodologies in this emerging field of study among indigenous scholars from selected Asian economies, and disseminating their comparative findings to other member economies. In particular, there is significant information gap in the level and characteristics of entrepreneurial activities among the less developed member economies of the APO as seen from their lack of participation in the GEM surveys. As such, the APO can contribute by commissioning surveys and data collection programs on entrepreneurial activities in these member economies.

## REFERENCES

- [1] Audretsch D.B., Bönte W., Keilbach M. Entrepreneurship capital and its impact on knowledge diffusion and economic performance. *Journal of Business Venturing* 2008; 23: 687–698.
- [2] Audretsch D.B., Keilbach M. Entrepreneurship capital and economic performance. *Regional Studies* 2004; 38 (8): 949–959.
- [3] Acs Z.J., Braunerhjelm P., Audretsch D.B., et al. The knowledge spillover theory of entrepreneurship. *Small Business Economics* 2009; 32: 15–30.
- [4] Acs Z.J., Varga A. Entrepreneurship, agglomeration and technological change. *Small Business Economics* 2005; 24: 323–334.
- [5] Gompers P., Lerner J., Scharfstein D. Entrepreneurial spawning: Public corporations and the genesis of new ventures, 1986–1999. *The Journal of Finance* 2005; 60 (2): 577–614.
- [6] Erken H., Donselaar P., Thurik R. Total factor productivity and the role of entrepreneurship. Tinbergen Institute Discussion Paper 2009; TI 2009-034/3.
- [7] Braunerhjelm P. Entrepreneurship, innovation and economic growth: Interdependencies, irregularities and regularities. In: Audretsch D.B., Falck O., Heblich S., eds. *Handbook of Research on Innovation and Entrepreneurship*. Cheltenham: Edward Elgar; 2011; pp. 161–213.
- [8] Andersson M., Braunerhjelm P., Thulin P. Creative destruction and productivity: Entrepreneurship by type, sector and sequence. Centre of Excellence for Science and Innovation Studies, Electronic Working Paper Series 2011; Paper no. 256.
- [9] Robinson C., O'Leary B., Rincon A. Business start-ups, closures and economic churn: A review of the literature (Final report prepared for the Small Business Service). National Institute of Economic and Social Research 2006; URN 06/2112.
- [10] Carreira C., Teixeira P. Entry and exit as a source of aggregate productivity growth in two alternative technological regimes. *Structural Change and Economic Dynamics* 2011; 22: 135–150.
- [11] Aghion P., Blundell R., Griffith R., Howitt P., Prantl S. Entry and productivity growth: Evidence from microlevel panel data. *Journal of the European Economic Association* 2004; 2 (2–3): 265–276.
- [12] Aghion P., Blundell R., Griffith R., et al. The effects of entry on incumbent innovation and productivity. *The Review of Economics and Statistics* 2009; 91 (1): 20–32.
- [13] Global Entrepreneurship Monitor: Global Report. London: Global Entrepreneurship Research Association, London Business School; 2000–2012.

- [14] van Praag C.M., Versloot P.H. What is the value of entrepreneurship? A review of recent research. *Small Business Economics* 2007; 29: 351–382.
- [15] Nyström K. Is entrepreneurship the salvation for enhanced economic growth? Centre of Excellence for Science and Innovation Studies, Electronic Working Paper Series 2008; Paper no. 143.
- [16] Bjørnskov C., Foss N.J. Do economic freedom and entrepreneurship impact total factor productivity? Center for Strategic Management and Globalization, Working Paper 2010; SMG WP 8/2010.
- [17] Bhidé A.V. *The Origin and Evolution of New Business*. Oxford: Oxford University Press; 2000.
- [18] Wadhwa V., Freeman R., Rissing B. *Education and Tech Entrepreneurship*. Kansas City: Ewing Marion Kauffman Foundation; 2008.
- [19] Wong P.K., Lee L., Foo M.D. Occupational choice: The influence of product vs. process innovation. *Small Business Economics* 2008; 30 (3): 267–281.
- [20] Saxenian A. *Silicon Valley's New Immigrant Entrepreneurs*. San Francisco: Public Policy Institute of California; 1999.
- [21] Wong P.K., Ho Y.P., Singh A. Profile and growth patterns of young high tech firms in Singapore (Research report commissioned by National Research Foundation). Singapore: NUS Entrepreneurship Centre; 2011.
- [22] Ho Y.P., Wong P.K. Financing, regulatory business costs and entrepreneurial propensity. *Small Business Economics* 2007; 28 (2/3): 187–204.
- [23] Gompers P. The rise and fall of venture capital. *Business and Economic History* 1994; 23 (2): 1–26.
- [24] Wessner C. W. *An Assessment of the SBIR Program*. Washington D.C.: The National Academies Press; 2008.
- [25] Lerner J. *Boulevard. Of Broken Dreams: Why Public Efforts to Boost Entrepreneurship and Venture Capital Have Failed - And What to do About it*. Princeton: Princeton University Press; 2009.
- [26] Brouwer P., De Kok J., Fris P. Can firm age account for productivity differences? Business and Policy Research, Scales Research Reports, 2005; EIM SCALES-paper N200421.
- [27] Disney R., Haskal J., Heden Y. Restructuring and productivity growth in UK manufacturing. *The Economic Journal* 2003; 113: 666–694.
- [28] Jensen J.B., McGuckin R.H., Stiroh K.J. The impact of vintage and survival on productivity: Evidence from cohorts of U.S. manufacturing plants. *The Review of Economics and Statistics* 2011; 83 (2): 323–332.
- [29] Foster L., Haltiwanger J., Krizan C.J. Market selection, reallocation, and restructuring in the U.S. retail trade sector in the 1990s. *The Review of Economics and Statistics* 2006; 88 (4): 748–758.
- [30] Bosma N. Entrepreneurship, urbanization economies and productivity of European regions. In: Fritsch M., ed. *Handbook of Research on Entrepreneurship and Regional Development: National and Regional Perspectives*. Cheltenham: Edward Elgar; 2011; pp. 107–132.
- [31] Baldwin J.R. Were small producers the engines of growth in the Canadian manufacturing sector in the 1980s? *Small Business Economics* 1998; 10 (4): 349–364.
- [32] Robbins D.K., Pantuosco L.J., Parker D.F., et al. An empirical assessment of the contribution of small business employment to U.S. state economic performance. *Small Business Economics* 2000; 15 (4): 293–302.
- [33] Holtz-Eakin D., Kao C. Entrepreneurship and economic growth: The proof is in the productivity. Center for Policy Research. 2003; Paper 111.
- [34] Carree M. A., Thurik A.R. The lag structure of the impact of business ownership on economic performance in OECD countries. *Small Business Economics* 2008; 30 (1): 101–110.
- [35] Nguyen S.V., Lee S.H. Returns to scale in small and large U.S. manufacturing establishments: Further evidence. *Small Business Economics* 2002; 19 (1): 41–50.

- [36] Castany L., López-Bazo E., Moreno R. Differences in total factor productivity across firm size. A distributional analysis. Paper presented at the Knowledge and Regional Economic Development Open Conference, Barcelona, Spain, 9–11 June 2005.
- [37] Sutter R. The Psychology of Entrepreneurship and the Technological Frontier – A Spatial Econometric Analysis of Regional Entrepreneurship in the United States. (PhD dissertation manuscript). Fairfax: George Mason University, 2010.
- [38] Callejon M., Segarra A. Business dynamics and efficiency in industries and regions: The case of Spain. *Small Business Economics* 1999; 13 (4): 253–271.
- [39] Bosma N., Stam E., Schutjens V. Creative destruction and regional productivity growth: Evidence from the Dutch manufacturing and services industries. *Small Business Economics* 2011; 369: 401–418.
- [40] Blanchflower D.G. Self-employment in OECD countries. *Labour Economics* 2000; 7: 471–505.
- [41] van Stel A., Carree M., Thurik R. The effect of entrepreneurial activity on national economic growth. *Small Business Economics* 2005; 24: 311–321.
- [42] Carree M.A., van Stel A., Thurik R., et al. The relationship between economic development and business ownership revisited. *Entrepreneurship & Regional Development* 2007; 19: 281–291.
- [43] Braunerhjelm P., Acs Z.J., Audretsch D.B., et al. The missing link: Knowledge diffusion and entrepreneurship in endogenous growth. *Small Business Economics* 2010; 34: 105–125.
- [44] Reynolds P.D., Bygrave W.D., Autio E. *Global Entrepreneurship Monitor: 2003 Executive Report 2003*. Babson Park: Babson College; 2003.
- [45] Wong P.K., Ho Y.P., Autio E. Entrepreneurship, innovation and economic growth: Evidence from GEM data. *Small Business Economics* 2005; 24: 311–321.
- [46] Salgado-Banda H. Entrepreneurship and economic growth: An empirical analysis. *Journal of Developmental Entrepreneurship* 2007; 12 (1): 3–29.

## ANNEX 1

### Recent Empirical Studies on the Contribution of Entrepreneurs to Levels of Labor Productivity

Study	Sample	Measure of Value	Entrepreneur Definition	Main Finding	Evidence <sup>1</sup>
Brouwer et al. [26]	4,566 Dutch manufacturing firms (1999)	Value-added/wage bill and Gross output/wage bill	Firm size (wage bill)	Size relates positively to labor productivity	-
Disney et al. [27]	142,722 UK manufacturing establishments (1980–92)	Output/person hour	Entrants: firms <1 year	Age relates negatively to labor productivity	+
Jensen et al. [28]	200,000 USA manufacturing plants (1963–92)	Value-added/hours worked	Plant age	Age relates positively to labor productivity (unless controlled for labor quality and capital intensity)	-/0
Foster et al. [29]	1.5 million USA retail establishments (1987–97)	Output/hours worked	Entrant: plants	Productivity similar for incumbents and entrants (chains)	-/0
Bosma [30]	127 Nuts 3 regions of 17 European countries (2006)	Value-added/employment	GEM - Early Stage Entrepreneurial Activity rate (EASA)	Low-growth EASA, medium EASA, high-growth EASA, and innovation EASA all positively affect labor productivity. Effect is strongest for the latter types of EASA	+

Source: van Praag and Versloot [14], supplemented with other more recent studies compiled by author

<sup>1</sup>Evidence is positive (+) if findings indicate that entrepreneurial firms' contributions are relatively large. It is negative (-) if the opposite is found and indeterminate (0) if the study does not show significant differences between the contribution of entrepreneurs and their counterparts



## ANNEX 2

### Recent Empirical Studies on the Contribution of Entrepreneurship to Growth of Labor Productivity

Study	Sample	Measure of Value	Entrepreneur Definition	Main Finding	Evidence <sup>1</sup>
Baldwin [31]	Canadian manufacturing plants (1973–92)	Shipment share/employment share	Firm size classes (employment)	Relative labor productivity has decreased for small plants	–/0
Robbins et al. [32]	48 USA states (1986–95)	Gross state product/employment	Employment share of (i) firms <20 employed and (ii) firms <500 employed	Labor productivity is related positively to small firm share if small is <20 employed	+
Brouwer et al. [26]	4,566 Dutch manufacturing firms (1999)	Value added/wage bill and Gross output/wage bill	Firm size (wage bill)	Size relates negatively to productivity growth	+
Disney et al. [27]	142,722 UK manufacturing establishments (1980–92)	Output/person hour	Entrants: plants < 1 year	Entrants have a large effect on industry-wide labor productivity growth	+
Foster et al. [29]	1.5 million USA retail establishments (1987–97)	Output/hour worked	Entrants	Entrants (together with exiting establishments) have a large effect on labor productivity growth	–/0
Holtz-Eakin and Kao [33]	USA (50 states and 9 industries) (1986–98)	Gross state product per worker	Firm birth rate (also death rate)	Increase in firm birth rate leads to higher levels of productivity after some lag (higher death rates not related to productivity growth)	+
Carree and Thurik [34]	21 OECD countries (1972–2002)	National GDP growth/labor	Changes in business ownership rates	Higher start-up rates lead to direct labor productivity growth, not indirectly in the long run	+

Source: van Praag and Versloot [14], supplemented with other more recent studies compiled by author

<sup>1</sup>Evidence is positive (+) if findings indicate that entrepreneurial firms' contributions are relatively large. It is negative (–) if the opposite is found and indeterminate (0) if the study does not show significant differences between the contribution of entrepreneurs and their counterparts

## ANNEX 3

### Recent Empirical Studies on the Contribution of Entrepreneurship to Levels of TFP

Study	Sample	Measure of Value	Entrepreneur Definition	Main Finding	Evidence <sup>1</sup>
Disney et al. [27]	142,722 UK manufacturing establishments (1980–92)	Firm TFP level	Entrants: Establishments <1 year	Age relates negatively with TFP	+
Brouwer et al. [26]	4,566 Dutch manufacturing firms (1999)	(Value added)/(cost of factor inputs)	Firm size (wage bill)	Size relates positively to value	–
Nguyen and Lee [35]	10,318 USA manufacturing plants (1991)	Elasticity of output to all factor inputs	Plant size (employees)	No relation with size	0
Castany et al. [36]	Spanish manufacturing firms (52 in 1990, 668 in 1994)	Firm TFP level	Firm size (small is 10–200 employed) and Age	Small and young firms have lower TFP levels	–
Bjørnskov and Foss [16]	25 OECD countries (1980–2005)	National TFP	Harmonized self-employment rates	Entrepreneurship strongly and significantly impacts TFP	+
Sutter [37]	49 USA states (1997–2003)	Regional TFP	Single establishment firm formations	90% of regional variation in TFP attributable to the regional knowledge stock (patents) and regional new firm formation, entrepreneurship's effect is five times larger than that of knowledge	+
Andersson et al. [8]	Firm-level data (manufacturing and services) for 72 regions in Sweden from (1998–2004)	Firm TFP	i) New establishments ii) Business turbulence	Regional entrepreneurship influences the productivity of incumbent firms, effect varies over time: immediate negative influence on productivity followed by a positive effect several years after the initial entry. Productivity of services firms more responsive to regional than manufacturing firms	+ (with delayed entry effect)

Source: van Praag and Versloot [14], supplemented with other more recent studies compiled by author

<sup>1</sup>Evidence is positive (+) if findings indicate that entrepreneurial firms' contributions are relatively large. It is negative (–) if the opposite is found and indeterminate (0) if the study does not show significant differences between the contribution of entrepreneurs and their counterparts

## ANNEX 4

### Recent Empirical Studies on the Contribution of Entrepreneurship to Growth of TFP

Study	Sample	Measure of Value	Entrepreneur Definition	Main Finding	Evidence <sup>1</sup>
Disney et al. [27]	142,722 UK manufacturing establishments (1980–92)	Firm TFP/industry-wide TFP growth	Entrants: firms <1 year	Entrants positively affect industry-wide TFP growth	+
Castany et al. [36]	Spanish manufacturing firms, 523 in 1990, 668 in 1994	Firm TFP level	Firm size (small is 10–200 employed) and age	Small and large firms have similar TFP growth	0
Callejon and Segarra [38]	13 Spanish manufacturing industries in 17 regions (1980–92)	Industry/region/year TFP level	Firm entry and exit rates	Firm entry and exit related positively with TFP growth	+
Bosma et al. [39]	40 Dutch regions (1988–2002)	Industry TFP level	Firm entry and exit rates	Firm entry and exit related positively with TFP growth in services but not in manufacturing	+/0 (depends on sector)

Source: van Praag and Versloot [14], supplemented with other more recent studies compiled by author

<sup>1</sup>Evidence is positive (+) if findings indicate that entrepreneurial firms' contributions are relatively large. It is negative (–) if the opposite is found and indeterminate (0) if the study does not show significant differences between the contribution of entrepreneurs and their counterparts

## ANNEX 5

### Recent Empirical Studies on the Contribution of Entrepreneurship to Aggregate Economic Growth

Study	Sample	Measure of Value	Entrepreneur Definition	Main Finding	Evidence <sup>1</sup>
Blanchflower [40]	23 OECD countries 1966–96	Real GDP growth rate	Self-employment	Negative relationship between self-employment and economic growth	-
van Stel et al. [41]	36 countries (GEM participants) 1999–2003	GDP growth rate	GEM-TEA	In relatively rich countries, entrepreneurship has a positive effect on economic growth, while the relationship is negative in less developed countries	+/- (depends on national income level)
Carree et al. [42]	23 OECD countries 1972–2004	Real GDP per capita growth rate	Self-employment	Negative deviation from the equilibrium level of entrepreneurship restrains economic growth	0/+ (growth penalty for having too few business owners)
Braunerhjelm et al. [43]	17 OECD countries (1981–2001)	Real GDP growth	Self-employment (nonagricultural)	Positive relationship between entrepreneurship and growth	+
Reynolds et al. [44]	40 countries 2000–03 (GEM participants)	National growth in GDP in local currency at constant prices	GEM - overall TEA, Opp TEA, Nec TEA	Positive relationship between entrepreneurship (mainly overall and Nec TEA) and growth, but it takes some time before the effect appears	+
Carree and Thurik [34]	21 OECD countries 1972–2002	GDP growth rate	Self-employment	Initially a positive relationship, then a negative, and finally a positive effect. The net effect is positive	+ (net effect)
Wong et al. [45]	37 countries (GEM participants) 2002	Growth in GDP per employed person over a 5-year period	GEM - high-growth potential TEA, Nec TEA, Opp TEA, overall TEA.	The existence of entrepreneurs defined as high-growth potential entrepreneurs is positive for economic growth	+ (high-growth potential entrepreneurship only)
Salgado-Banda [46]	22 OECD countries 1980–95	Average real per capita GDP growth	i) Self-employment ii) patent applications filed by residents (measure of innovative entrepreneurship)	Negative relationship between self-employment and GDP growth. Positive relationship between patents and growth	+ (for innovative entrepreneurship) - (for self-employment)

Source: van Praag and Versloot [14], supplemented with other more recent studies compiled by author

<sup>1</sup>Evidence is positive (+) if findings indicate that entrepreneurial firms' contributions are relatively large. It is negative (-) if the opposite is found and indeterminate (0) if the study does not show significant differences between the contribution of entrepreneurs and their counterparts

## ANNEX 6

### Total Early-Stage Entrepreneurial Activity (TEA) Rate for Asian Economies from 1999–2010

Economy	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PR China				12.3	11.6			16.7	16.4		18.8	14.4	24.0	13
Hong Kong				3.4	3.2	3.0			10.0		3.6			
India		6.3	10.8	17.9				11.1	8.5	11.5				
Indonesia								19.3						
IR Iran										9.2	12.0			11
Japan	1.6	1.3	3.1	1.8	2.8	1.5	2.2	2.8	4.3	5.4	3.3	3.3	5.2	4
Malaysia								11.5			4.4	5.0	4.9	7
Pakistan												9.1	9.1	
Philippines								21.3						
Singapore		5.1	6.1	5.9	5.0	5.7	7.2	4.8					6.6	12
ROK		13.7	14.3	14.5						10.0	7.0	6.6	7.8	7
ROC				4.3								8.4	7.9	8
Thailand				18.9			20.7	14.0	26.9				19.5	19
Australia		10.9	14.7	8.7	11.6	13.4	10.9	10.4				7.8	10.5	
New Zealand			15.5	14.0	13.6	14.7	17.6							

Source: Compiled from Global Entrepreneurship Monitor [13]

Note: The APO member economies Bangladesh, Cambodia, Fiji, Lao PDR, Mongolia, Nepal, Sri Lanka, and Vietnam have not taken part in the GEM survey

---

# HEALTH CARE FOR THE AGING SOCIETY

DR. ANUWAT SUPACHUTIKUL

Chief Executive Officer  
The Healthcare Institute

---

## PRINCIPAL TRENDS IN HEALTH CARE AND TECHNOLOGY

The population of the Asia-Pacific region is rising at an unprecedented pace. It is estimated that the number of older persons in the region will triple from 419 million in 2010 to more than 1.2 billion by 2050. By this time, one in four people in the region will be over 60 years old. This transition will be more pronounced in East and Northeast Asia, where more than one in three people will be older than 60 by 2050. This demographic transformation is unmatched in scale anywhere else in the world [1].

According to the definition by the World Health Organization (WHO), a country will be defined as an “aging-oriented society” if the number of senior citizens aged over 65 accounts for 7% or more of the population. A nation is defined as an “aging society” if the senior citizens aged over 65 account for more than 14% of the population. The term “ultra-aging-oriented society” is used when the senior citizens of a country aged over 65 account for over 21%. Japan is a typical example with 21.2% of its total population meeting just above the criteria for ultra-aging society.

Such a rapid increase in the population of older persons has deep social, economic, and political implications. Rural-to-urban migration and changing family structures have left many older persons without traditional means of support. A large number of older persons in the region have no secure source of income due to the lack of social protection. Most countries’ health systems cannot meet the needs of older persons. In addition, there is a rising demand for age-friendly and barrier-free environments so that older persons can enjoy continued freedom of movement and can actively participate in society.

The feminization of the aging population is notable, with women constituting the majority of the older population, and an even greater majority of the “oldest old” population (80 years and older). Older women tend to live alone due to the death of their spouse. They are also more vulnerable to poverty and social isolation, and face greater risks of physical and psychological abuse.

Population aging strains social insurance and pension systems while challenging existing models of social support. It affects economic growth, trade, migration, disease patterns and prevalence, and fundamental assumptions about growing older.

The emerging trends in global aging are [2]:

- i. The overall population is aging. For the first time in history, people aged 65 and over will outnumber children aged 5 and under
- ii. Life expectancy is increasing. Most countries show a steady increase in longevity over time, which raises the question of how much further life expectancy will increase
- iii. The number of oldest old is rising. People aged 85 and over are now the fastest-growing portion of many national populations
- iv. Noncommunicable diseases are becoming a growing burden, and chronic diseases are now the major cause of death among older people
- v. While world population is aging at an unprecedented rate, the total population in some countries is simultaneously declining

- vi. Family structures are changing. As people live longer and have fewer children, family structures are transforming as well, leaving older people with fewer options for care
- vii. Patterns of work and retirement are shifting. Shrinking ratios of workers to pensioners and people spending a larger portion of their lives in retirement increasingly strain existing health and pension systems
- viii. Social insurance systems are evolving. As social insurance expenditures escalate, an increasing number of countries are evaluating the sustainability of these systems
- ix. New economic challenges are emerging. Population aging will have dramatic effect on social entitlement programs, labor supply, trade, and savings around the globe, and may demand new fiscal approaches to accommodate a changing world

Population aging presents not just challenges, but also opportunities. Older persons play crucial roles in supporting families and communities. Whether through giving such support or through directly engaging in economic activity, older persons also contribute to the economic well-being of society, as well as to its wealth and happiness.

However, their support depends on open opportunities through which the capable elderly can contribute their talents. These opportunities include volunteer work, setting up a brain bank as a forum for the elderly to contribute their ideas, establishing social enterprises for the elderly to join economic work, creating a community that the elderly can contribute to the socialization of the younger generation, etc.

To achieve this goal, there is a need to maintain the good health of older persons, who gradually face degenerative change, chronic conditions, and certain degrees of disability.

However, the current health care systems are not designed for chronic conditions. They are developed to respond to acute problems and to the urgent needs of patients such as testing, diagnosing, relieving symptoms, and expected cure, which are the hallmarks of contemporary health care. The WHO addressed problems on three levels [3]:

- i. Micro-level: Problems with patient interaction. Two common problems are the failure to empower patients and the lack of emphasis on quality interactions with health care personnel
- ii. Meso-level: Problems with health care organizations and their links to the community. Examples of meso-level problems are a) failure to organize care for chronic conditions that need proactive planned programs of care across time rather than reactive and discrete management of patients' complaints, b) practices that are not backed by scientific evidence, c) failure to address prevention, d) information systems that are not in place, and e) failure to connect with community resources
- iii. Macro-level: Problems with policy. Examples of macro-level problems are fragmented financing systems, misaligned provider incentives, insufficient standards and monitoring, and overlooked intersectoral links

Health care systems also face a number of challenges that may severely damage the systems and also give rise to new opportunities. For example:

- i. Democratic consciousness and the perception of health care as part of human rights. This may result in conflicts and legal issues, and need adaptation of health care practitioners
- ii. Emergence of new diseases while old problems cannot be solved. While

rapid progress of new knowledge and technology, e.g., personalized medicine and regenerative medicine, gives hope to solve many problems, it also creates a problem of equitable access and consideration of value for money on those technologies

A change in health care systems is needed, and it requires quality systems combined with professional responsibility and accountability, and for trust, respectability, and morale to be maintained or enhanced.

### **CONTRIBUTION OF HEALTH TECHNOLOGY AND HEALTH INDUSTRY TO DEVELOPMENT AND HIGHER PRODUCTIVITY IN THE AGING SOCIETY**

For health care systems to serve the increasing needs of the aging population and to encourage their contribution to society, there is a need for innovative approaches. Organized systems of care, not just individual health care workers, are essential in producing positive outcomes.

The WHO suggested eight essential elements for improving health care:

- i. Support a paradigm shift from acute care to chronic care models, e.g., using mass marketing strategies to persuade the population to think differently about their role in self-management and lifestyle modification
- ii. Manage the political environment, e.g., develop political leadership and commitment, and demonstrate the cost-effectiveness of innovative care models
- iii. Build integrated health care, e.g., establish information-sharing strategies across health care organizations and communities
- iv. Align sectoral policies for health, e.g., collaboratively implement population-based prevention activities and execute

a multisectoral private/public governing bodies

- v. Use health care personnel more effectively, e.g., develop a range of health care personnel such as self-management counselors to meet changing health care needs
- vi. Focus care on the patient and family, e.g., provide patients and families access to information and self-management support outside the health care setting
- vii. Support patients in their communities, e.g., encourage and involve community groups and NGOs in providing care
- viii. Emphasize prevention, e.g., ensure every patient-encounter addresses prevention and align provider incentives so that prevention efforts are rewarded

There is a need to strengthen both family-based and community-based care systems, which remain strong but are threatened by declining family size, migration, and globalization [4].

In the digital high-tech era of the 21st century, home lifestyle has undergone substantial changes. For instance, with technologies such as high usage of wire and wireless broadband networks, improved food technology, and rapid advancement of care-oriented medical aids/devices have created opportunities for better care of people at home and also opened a new market in the health care technology industry.

To implement and achieve the health care concepts outlined by the WHO, health and information technology may be applied as follows:

- i. Since the aging population is increasing but the number of hospital beds are not, it is ideal for patients to age at home with health care delivery provided to their door



step. The concept of digital home care bridges the distance between the patient and his care providers, both in terms of spatial distance and distance in time. This new form of care enables the patient to remain at home and yet receive quality care. It allows the demand for care to be satisfied at an affordable price. A wide range of issues are covered by digital home care. Electronic health records offer patients and care providers an overview of the results of delivered services as well as the output of various devices. Combined with the narrative input from the patient, it demonstrates a true participatory care. The latest disease management tools, messaging devices, and sensor technologies are increasing the ability to provide physiological monitoring on and around the patient's body from their own homes [5]

- ii. Robotics play a role in facilitating the daily lives of the aging population. Robots for household tasks such as domestic cleaning robots and robotic kitchen assistants are well documented. The future may see robots that can remind the elderly to take their medicines on time, guide them whenever they are lost, and locate lost items. A companion robot may be able to read interaction signals from the elderly (cues from speech command, touch-screen input, head position, body posture) and then adjust interaction output such as daily dialogues, news broadcasting, motion speed, and navigation assistance [6]
- iii. Health care robotic systems open up new perspectives in the way of promoting the right to physical integrity - robots may contribute by overcoming limitations in the sensory-motor capabilities of human doctors; they may perform some surgery and rehabilitation tasks faster and with greater precision than human operators; they may alleviate both post-surgery pain in patients and fatigue of health care personnel. Moreover, Brain-Computer Interface technologies may play a

significant role in contrasting extinction of thinking abilities in completely locked-in patients, thereby contributing to preserving their status as persons [7]

- iv. The use of bioengineering by applying the study of fluid flow or rheology brings a more scientific approach to the formulation and design of novel texture-modified foods. This eases the difficulties of chewing and swallowing food while making it appealing in terms of appearance, flavor, and aroma. Bioengineering research also develops new biodegradable materials that will reconstruct and regenerate the native tissue in chronic wounds to shorten the time of wound healing without scar formation [8]
- v. Personalized medicine can address the needs of a niche group of patients who are susceptible to specific and high-technology treatment, but it may be very expensive and not effective for other patients
- vi. The use of regenerative medicine that builds parts of degenerated organs (such as in vitro organ building and the use of embryonic stem cells) may open up new horizons to cure many diseases. However, it still faces critical dilemma

**NEED-BASED EFFORTS AND MARKET OPPORTUNITIES FOR HEALTH CARE IN AGING SOCIETIES, APPLICATIONS OF FUTURE TECHNOLOGIES, AND OBSTACLES TO OVERCOME**

In addition to challenges from the increased number of older people and a reduced number of professional caregivers, changing family structures also add to the challenges of caring for older people. Currently, care for the elderly is provided largely by relatives on an informal basis. Higher labor-force participation of women and increased geographical mobility also reduce the availability of informal care providers.

There is a need for new models of health care that can help deliver services in ways that are less human resource-intensive and make better use of geographically dispersed expertise. Health care and social systems still lag behind other sectors in making the best use of ICT to drive efficiency, quality, and access to care. There are opportunities to explore how best to exploit the potential of ICT to improve collaboration among organizations, make better use of expertise, and gain the ability to provide health care services anytime and anyplace - be it at home, in the community, or on the move. In addition, investments in managerial services include financial consulting, human resource management, facility management, land agency, and marketing services. The health care industry can expand its business to the long-stay industry, providing integrated health services to the elderly aged 55 to 65.

#### **DEVELOPMENT OF AGING SOCIETIES AND OPPORTUNITIES IN THE ASIA-PACIFIC REGION**

The Regional Forum on Elderly Care Services in Asia and the Pacific [9] identified the following gaps and challenges facing elderly care services in the Asia-Pacific region:

- i. Challenges at the national level are coordination of measures to enhance services for older persons, and a comprehensive social protection system that provides old-age insurance and health protection for older persons
- ii. Challenges for health and social systems are an overall strategy to ensure a continuum of care for older persons from home- and community-based care to institutional care; non-discrimination, and client-friendly health services; geriatric care including specialized diagnostic and therapeutic care for older persons; coordination among organizations in the provision of health and social care services for older persons; and age-friendly transportation services

- iii. Challenges in human resources such as inadequacy of caregivers, training that emphasises psycho-social needs and cultural factors, support of community-based care, and a need for specialized aged-care managers
- iv. Challenges of social attitudes to recognize older persons' knowledge and resourcefulness, and have a positive image of aging, including the mindset of sending older persons to institutional care when necessary
- v. Challenges of standardized data collection on the situation and needs of older persons, and knowledge of self-care and healthy aging practices among older persons in poorer communities
- vi. Challenges of feminization of aging, where there is a high proportion of women among older persons; women often assume the role of informal caregivers and their own socioeconomic and psychological needs may be ignored; and they are more prone to abuse and violence

The forum gave the following recommendations:

- i. To establish or review national policies on aging in conjunction with national development plans, and formulate comprehensive social protection systems, including providing universal income security at old age and universal health/social insurance
- ii. To provide a comprehensive continuum of care for older persons, which emphasizes home- and community-based care, and improve the coverage and quality of institutional care; to eliminate all forms of discrimination, abuse, and violence; and to promote the use of IT to better link homes and communities with health and social service providers

- iii. Capacity building activities for formal and informal caregivers in collaboration with community, non-profit organizations, private sector, intergovernmental, and international organizations
- iv. To promote the positive image of aging and older persons, including with the use of the media
- v. To invest in R&D on products, services, medicines, and technology for older persons, and to enhance knowledge of self-care among older persons and health care providers
- vi. To protect women's rights

Among the various stakeholders, the civil society - including the academia, the media, and associations of older persons - has roles to develop assistive and adaptive technologies to enhance older persons' functional abilities and increase access to information and communication. The private sector plays a role in developing quality products and appropriate technologies (including IT capacities) to fill the gaps in meeting the needs of older persons, and actively consider providing elderly care services as a business opportunity.

#### **POSSIBLE ROLES OF PRODUCTIVITY TOOLS**

To cope with increasing demands of health care, health care organizations in most countries have already implemented process improvement tools, or productivity tools, to enhance their performance. With support from the APO, Thailand implemented the "Demonstration Project for Lean Application in Healthcare Industry" in 2008–09. With the use of simple measurement and analysis of value-added and non-value-added activities, hospital staff learnt that their system was not sufficiently patient-focused. With the use of the Lean Application concept for improvement such as visual management or cell concept, a number of projects were implemented to reduce waiting time, improve patient flow,

reduce unnecessary use of resources, improve efficiency and raise the morale of team members, etc.

With the increasing demand for elderly care and other health problems, and possessing limited resources, the application of the Lean concept in health care is a possible solution to enhance the performance of future health care systems for aging societies.

#### **SUMMARY**

To cope with the rapidly changing demographic patterns, a new paradigm of looking at older persons is needed. The elderly have experience, talent and the capacity to look after themselves as well as to contribute to their families and communities. Supportive systems need to be developed and current technologies must be applied to enhance their abilities and add value to their lives while helping societies achieve their socioeconomic goals. The supportive systems can enable the elderly to live as healthily and as independently as possible. The system will also assist in maximizing their potential to think, advice, and work.

The APO can promote promising health care systems for the aging society, and with the collaboration of all APO member countries, we can learn from each other and use diversity to drive innovations.

#### **REFERENCES**

- [1] United Nations Economic and Social Commission for Asia and the Pacific. Ageing, challenges and opportunities. Available at <http://www.unescap.org/sdd/issues/aging/aging.asp>, 2012.
- [2] National Institute on Ageing. Why Population Ageing Matters: A Global Perspective. Washington: USA Department of Health & Human Services; 2007.
- [3] World Health Organization. Innovative Care for Chronic Conditions: Building Blocks for Action. Geneva, World Health Organization; 2002.

- [4] Mujahid G. Population ageing in East and South-East Asia, 1950-2050: Implications for elderly care. *Asia-Pacific Population Journal* 2006; 21: 136–139.
- [5] Yogesan K., Brett P., Gibbons M.C. *Handbook of Digital Homecare*. Berlin: Springer; 2009.
- [6] Ge S.S., Li H., Cabibihan J.J., Tan Y.K. Social robotics, *Proceedings from Second International Conference on Social Robotics*. Berlin: Springer; 2010.
- [7] Datteri E., Tamburrini G. Ethical reflections on health care robotics. In: Capurro R, Nagenborg M., ed. *Ethics and Robotics*. Heidelberg: IOS Press; 2009, pp. 25–47.
- [8] Gefen A. *Bioengineering Research of Chronic Wounds*. Berlin: Springer; 2009.
- [9] United Nations Economic and Social Commission for Asia and the Pacific. *Enhancing elderly care services in Asia and the Pacific*. Outcome document of the regional forum on elderly care service in Asia and the Pacific, Nanjing, China, 21–22 January 2011.

---

# SOCIAL ENTERPRISES FOR RURAL INNOVATIONS

DR. HARISH HANDE

**Co-Founder of SELCO**

SELCO Solar Light Pvt. Ltd.

---

## BASIC CONCEPT AND PRINCIPLES

The technology and economic development of the 21st century has not been able to eradicate poverty globally. While corporations have cashed in on the demands of the rich, charities have not been able to pull the poor out of poverty. The need for social enterprises with the heart of a charity organization and the approach of a corporation is acute as more than half of the world's population struggles to make ends meet [1].

For academic purposes, a social enterprise may be defined as "a business with primarily social objectives whose surpluses are principally reinvested for that purpose in the business or in the community rather than being driven by the need to maximize profit for shareholders and owners" [2]. The introduction of market-based approaches in profit-oriented or non-profit entities to solve problems of poverty would constitute a social enterprise [3].

The work of social enterprises is dependent on the existence or development of a sustainable ecosystem. More often than not, social enterprises must work on developing the ecosystem themselves - financial, technical, market linkages, human resources, partner development, and so on. Thus, by creating the appropriate ecosystem, enterprises are able to provide holistic value at the local level in areas of education, health, finance, and energy services. They increase the accessibility to appropriate products and services to make them affordable to the poor. In essence, social enterprises are able to put infrastructures in place, thus, providing the poor with opportunities to fight poverty.

## Social Enterprises in the Asia-Pacific Region

Social enterprises play a vital role in providing resources to communities and increasing its impact on the larger social sector. Their presence in areas where public services are poor or lacking is particularly important. They fill the large social service gaps in regions where resources are extremely scarce, where population is high, and where critical needs must be met to prevent exacerbation of societal ills.

In addition, social enterprises seek to add to economic development through the creation of employment and entrepreneurial ventures in local areas. A true social enterprise, by balancing social, economic, and environmental concerns, is able to improve accessibility to solutions for end users while creating local entrepreneurship opportunities in the process.

Specifically, the Asian region is one that has witnessed considerable socioeconomic change in the last two decades. Alongside economic growth, a number of challenges revolving around poverty alleviation and environmental conservation are obstructing the holistic development of the region today. Schwab Foundation recognizes more than 90 social enterprises in Asia, working across issues ranging from health, education, and energy to financial inclusion, labour rights, and enterprise development [4]. This number, however, represents only a subset of all organizations working in the social sector. There are a number of grassroots-level organizations run by non-English speaking locals that deliver solutions to the poor and can rightfully be referred to as social enterprises. Over the last decade, there

has been a significant increase of interest in the concept of social entrepreneurship. It is being projected as a win-win solution to deal with socially relevant issues in a financially sustainable manner. The interest has been accompanied by large investments in the sector. However, caution must be exercised to ensure that the efforts of social enterprises do not result in the encashment of the poor as a market but rather result in the creation of long-term assets for them.

### **Debates Concerning Social Enterprises**

There are a number of ongoing debates surrounding social enterprises, their definition, and scope. An important one concerns the scale of social enterprises. It is essential to appreciate that the poor are not a monolithic structure. Their problems are inherently different (depending on geography, type of work, social structure, etc.), requiring customized solutions. Therefore, solutions in this sector cannot be standardized. They require significant time, effort, and resources to be invested into separate individual concerns, contributing eventually to the relatively slow growth of most social enterprises today. However, when scale-up becomes the priority, an attempt is made to standardize solutions and make the process easier and faster. This has led to compromises with quality of impact and effectiveness, leading to frustrations among targeted communities that require help.

Another issue worthy of mention is the "shareholders versus stakeholders" debate. This issue is specific to for-profit social enterprises. Principles dictate that a true social enterprise must be answerable first and foremost to its stakeholders. Unfortunately, in practice due to the ideological differences between investors and the enterprise, social enterprises often become answerable to the shareholders alone and begin to drive business to meet the objectives of these shareholders, rather than prioritizing the interests of the stakeholders. This could adversely affect the underlying objectives of the enterprise. In the case of not-for-profit social enterprises, a similar effect

is triggered by the blind rush to provide time-bound deliverables, as specified by donors. In either case, the encouragement and time required for building of the ecosystem are curtailed.

### **Principles**

Looking at all aspects of product-service provisions, most social enterprises are dependent on creating (or attempt to create) comprehensive and holistic development. Social issues are to a large extent interrelated. For instance, the lack of clean cooking fuels has directly impacted the health of women, while the lack of financing or limited education would negatively affect employment and livelihood generation. Given these linkages, a holistic approach to addressing social issues would make the solution more effective.

A social enterprise should inherently work toward ensuring social, financial, and environmental sustainability. Socially relevant needs should be the motivating factor for the existence of the enterprise. A failure to include marginalized segments of the population in the larger framework of development could prove extremely expensive to the interests of society in general.

The enterprise's ability to cover all of its operational and maintenance overheads is a manifestation of financial sustainability—an important goal for many social enterprises. Although a number of social enterprises is dependent on donor contributions to sustain their programs and projects, they strive to find ways of ensuring that these contributions are not without returns of some sort. Long-term enterprise operation is highly dependent on the benefits provided to end users in the forms of livelihood generation, social empowerment, and monetary gains. A part of these benefits experienced by end users is used in accessing services and products, in turn making it financially viable to cover all costs of running the enterprise in the long run. Cost efficiency is another aspect of financial sustainability. Keeping the cost of the

“production-dissemination” chain low without compromising on quality is essential in making the product-service affordable to the target customer base.

Environmental sustainability becomes feasible when development needs are met through clean and affordable solutions. Education and awareness tend to form important links in incorporating environmental concerns into the business model of an enterprise. Current trends show that environmental protection can occur alongside development. In many cases, the most cost-effective and feasible options currently available for developing countries are also associated with some of the best environmental gains.

Developing solutions by being more concerned about satisfying an existing basic need rather than creating a demand for an existing product or service is an important principle of running a social enterprise. Instead of attempting to fit an existing solution to the problem at hand, efforts must be made to understand the problem and all its manifestations and work toward developing a solution by using local resources and local knowledge in the process.

## RELEVANCE OF SOCIAL ENTERPRISES IN INCLUSIVE DEVELOPMENT OF RURAL COMMUNITIES

By making it their mission to cater to the needs of a community and partake in the local development process, social enterprises create an invaluable ecosystem that can then stimulate further development. In addition, the structure of social enterprises allows for local community members to be active stakeholders, giving them a say in the products, services, financing, and technological solutions that are provided.

Social enterprises work toward satisfying an unmet need. The motivation is need- and impact-oriented rather than just number-oriented. Thus, they work toward ensuring that all members of the rural community, irrespective of social status or any economic consideration, are able to avail themselves of the services they are providing. It is inclusive to the extent that the goal of the social enterprise is to use a participatory approach in understanding the needs of the people and creating long-term impact.

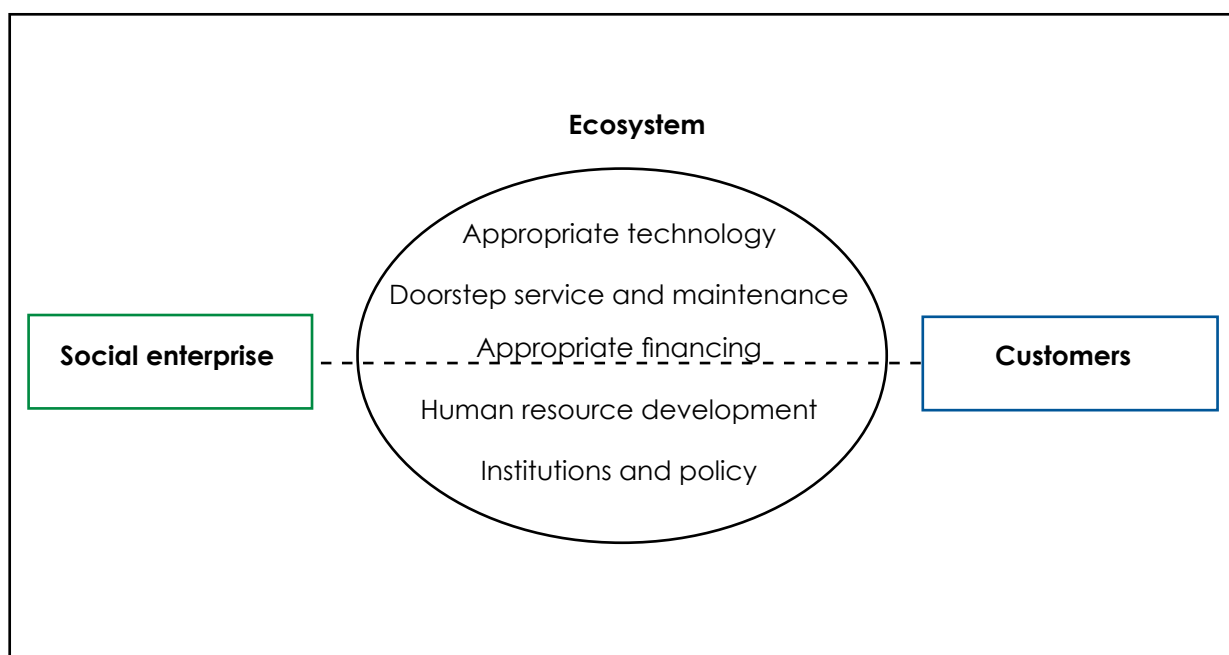


Figure 1. Schematic Representation of the Linkages Between a Social Enterprise, its Customers and the Ecosystem

## **Local Ecosystem Development**

Social enterprises often enter the local market to cater to a need that has not been adequately met. This requires that they work on the development of all facets - finance, technology, local human resource development, and training - to facilitate efficient product-service provision in rural areas. In addition, innovative models are introduced into production and dissemination to make services more accessible and affordable. While developing this ecosystem for their own existence, enterprises also succeed in building a foundation that local communities could capitalize on to improve their access to financial resources, clean technology, skill sets, and employability. This ecosystem would also provide the foundation for other socially-minded entities to enter and serve other relevant community needs.

SELCO, a 17-year-old social enterprise, realized early on that the development of an ecosystem was integral to its mission of providing the rural poor with affordable energy access [5]. By clearly defining its customer base and addressing the needs with customized solutions and services, SELCO created a space for itself as a social enterprise. The consciously adopted decentralized approach to meeting needs and the for-profit structure solely for enterprise sustainability has supported SELCO in working toward its mission.

### *Need Assessment and Technology*

Recognizing that needs cannot be standardized, SELCO adopted the policy of technology customization based on the specific needs and affordability of the end user. This requires rigorous need assessment and last mile innovations in product combination and installation. In addition, the enterprise has to be able to appropriately manage all installation, maintenance, and servicing of the technology provided.

### *Financing*

Over the years, SELCO has leveraged the existing network of rural banks and financial

institutions to support customers in obtaining doorstep financing to access need-based solar energy services. Owing to this linkage, so-called "non-bankable" households are able to engage in savings, build credit histories, and access financing for agriculture and other livelihood generation activities in the future.

For more than 60% of SELCO's end users, bank financing for solar energy is the first institutional financial transaction, vital to their inclusion in the mainstream banking sector. There are times when SELCO itself takes on the risk of financing the rural poor by providing bank guarantees and ensuring repayment from communities. This may be extremely essential in increasing the bank's confidence in the credit worthiness of the target customer base.

### *Human Resource Development*

By employing a decentralized approach, enterprises such as SELCO have been able to generate employment at the local level. With its branches across the state of Karnataka in southern India, the enterprise has not only established its presence at the local level and gained trust, but has also engaged in capacity building and training of local human resources. SELCO ensures that every service center is run by trained local manpower. This human resource development in areas of business processes, technical expertise, and community development have equipped individuals with skills, increasing the general productivity of local manpower and facilitating future livelihood generation.

### **Asset Creation**

The impact of social enterprises on community and households extends beyond the mere sale of consumer products to the creation of assets in a larger sense. Social enterprises are able to work with communities to facilitate the utilization of products and services that are assets in themselves, or could lead to the purchase or creation of other assets. In the case of SELCO, the solar energy technology is often the second most or the most expensive asset of the household. These assets become



crucial indicators and determinants of the financial standing and credit worthiness of the household in the future.

### Issue Linkage

Through ecosystem development and issue linkage, social enterprises are able to stimulate improvements in socioeconomic conditions of communities. While there may be limited direct impact on any particular socioeconomic indicator, services provided through social enterprises can provide an impetus to education, health, agriculture, and livelihood generation, among other development issues. The co-benefits of the initial services and products are an important part of the larger impact. As mentioned before, the financial linkages can prove advantageous in encouraging the rural poor to make use of the banking network and its facilities for their development. Perhaps one of the most significant advantages of all impacts is that of socioeconomic empowerment, critical to self-sustaining development of communities.

### Health

SELCO's provision of rural lighting solutions using solar energy reduces household expenditure on kerosene fuel. This reduction has lasting benefits on health, education, and household savings. Increased light brightness, and more importantly, the health benefits associated with a smokeless, clean source of energy reduces drudgery for the women while cooking and increases the convenience of completing household chores after dark.

### Education

The study habits of children are also said to have improved. Through a project in rural schools, existing technology was applied to solve the problems of poor lighting, low attendance, and poor school work in an innovative manner. With a centralized solar charging station in the rural school, a portable pocket-sized battery and a study lamp at home, the project allowed students to charge batteries when attending school and using the same to power study lamps at home. Beyond the use of lighting for education, energy access can be used for audiovisual devices, purified drinking water, and so on.

### Livelihood Generation and Savings

SELCO's provision of energy services for the rural poor has increased convenience and the time available for creating marketable homemade products that include cricket bats, baskets, and leaf-plates. These income-generating activities can improve the living conditions of households while simultaneously reducing fuel expenditure. The economics tend to work out because of the large amount of expenditure incurred on kerosene fuel for lighting purposes. The Equated Monthly Installment to be paid on a loan for a solar product is often equal to or less than the expenditure on kerosene, particularly for households that are completely without electricity and cannot access the Public Distribution System. Thus, in a number of cases, substituting kerosene consumption with a solar home-lighting system marginally reduces the monthly expenditure. These positive impacts on health, education, livelihood generation,



Figure 2. Use of Solar Energy Systems in Micro Enterprises - Basket Weaving, *Beedi* Rolling (Thin Indian Cigarette), and Petty Shop

and increased household savings - that could feed back into the banking system - far exceed the immediate effects of mere energy service provision.

### **Case Study: Leaf-plate Making in Bihar - Livelihood Generation for Women through Energy**

**Need:** In two remote unelectrified villages in Munger district of Bihar, India, it was found that women in the community engage in stitching leaves together to form leaf-plates that are sold in the nearby town. Due to lack of electricity, these women spent alternate days collecting leaves from the forest (after completing household chores) and stitching them together to form plates. In case of high demand, the women used kerosene lamps to complete the plates. Given the remoteness of these villages, charging the mobile phone also required long walks and would become a task in itself.

**Intervention:** In this case, SELCO identified an opportunity to directly impact income-generating activities. The community was linked with Self Employed Women's Association (SEWA) Bharat, a local NGO, which created a self-help group to provide financing. SELCO was able to install customized solar home systems with Light Emitting Diode lights and mobile charging points for individual households. The self-help group collects a monthly payment from the users to repay the loan to SEWA Bharat

at no interest. Local youths have been trained to maintain the systems.

**Benefit:** The women are now able to collect leaves and complete household work during the day and spend the evenings making leaf-plates under solar lighting. This has increased their productivity and doubled their income. The problems of using kerosene lamps have been eliminated and mobile charging made convenient and costless. The creation of the self-help group in the village has brought a sense of empowerment among women in decision making. Localization of payment collections and maintenance ensures long-term sustainability.

### **EMERGING MODELS IN RURAL INNOVATIONS**

Social entrepreneurship in its different models is becoming increasingly popular in the developing world today. The following models represent new perspectives and innovation in addressing the most pressing developmental issues of local communities. They have been extremely successful in imbibing the values and principles that make them sustainable across decades. While the organizations themselves are relatively well established, it is their approach that is new and path-breaking.

#### **Women, Finance, and Need-based Services**

One such example is SEWA in Gujarat, India [6]. First set up in 1972, SEWA began as a movement



Figure 3. Women Collecting and Making Leaf-plates in Bihar

by self-employed women (daily wage laborers and street vendors, in particular) for their right to undertake business in a safe and exploitation-free environment in the early 1970s, and went on to create solutions for every emerging need of women from low-income groups.

The SEWA model is unique in its target customer base and the basis of its expansion and operation. Registered as a trade union to look into the issues of women in the unorganized sector, SEWA is regarded largely as a cooperative, charging its members a fee. Under the SEWA umbrella there are more than 100 institutions, including SEWA Bank, SEWA Health, SEWA Childcare, and so on.

Realizing the need for financing for these self-employed women and those working in the unorganized sector, SEWA Bank was started. On analysis of the underlying problems of certain loan defaults at the bank, the medical issues faced by women came to the fore. This led to the creation of an insurance wing (SEWA Health). Similarly, the community production centers were established to create large, clean spaces for women to complete their homemade products and handiwork and make it marketable with SEWA Trade Facilitation Center). These centers revealed the need for childcare services to look after the children of the women working at the production centers. The solutions they have provided and institutions set up within the larger social enterprise have been driven by need as witnessed on the ground. These range from an exclusive bank catering to women's needs managed by women, to providing insurance services to its customers, and from supporting the installation of biogas plants, to improving the infrastructure and physical living conditions of women in the informal sector.

Today, SEWA has over 1.3 million members across seven states of India, with services that include insurance, banking, renewable energy, trade facilitation, infrastructure development, and research on relevant issues of poor women.

Although SEWA has not made any aggressive attempts to replicate its efforts across the country, the cooperative has successfully scaled across a number of issues relevant to poor women, emphasizing the social angle of productivity and creating a social safety net for all their members.

### **Energy, Financing, and Empowerment**

Grameen Shakti (GS) is a non-profit social enterprise that has established a very significant role in providing access to solar home systems in rural Bangladesh [7]. By enabling users to purchase their systems on microcredit with affordable terms tailored to their specific needs with local servicing, the organization has been able to increase the uptake of solar systems at the household level. In recent times, Bangladesh has been credited with promoting renewable energy and pushing for its successful implementation. GS's contribution toward the provision of energy access in the country has been very strong. Over the years, GS has been able to appropriately balance market and social objectives to install more than 320,000 systems.

GS uses Grameen Bank's experience to evolve a financial package based on instalment payment that reduces costs and helps capitalize on the economies of scale. GS has worked to earn the trust and goodwill of the rural people and provide effective after-sales services to ensure the success of its program. GS engineers are also called social engineers. Women technicians are also trained and provided employment. GS engineers pay monthly visits to households during installment payments and offer their services for a small fee.

GS has set up a training and capacity development program that focuses on developing both in-house and local capacity. This includes training users on basic maintenance, local technicians for cost-effective doorstep servicing, development of technical and social engineers, and women technicians to decentralize GS's production,

marketing, repair, and maintenance services. GS has set up 45 Grameen Technology Centers (GTCs) under a pilot program to scale up its solar program, especially the production of solar home system accessories by manufacturing them locally. GTCs also contribute to women's empowerment by developing Solar Technicians.

GS is one entity within the larger group of Grameen organizations. The Grameen group has worked over the years through its various wings to tackle issues of education, communication, fisheries, and other business development. The innovation in financing mechanisms through the bank has been core to the development of other portfolios within the Grameen model.

## **CHALLENGES AND MEASURES TO SUSTAIN SOCIAL ENTERPRISES**

Often, the toughest challenge social enterprises are faced with is the acceptance of the idea. The ecosystem may not be mature enough to willingly trust an idea created to serve a basic need of the poor through a sustainable business model.

### **Appropriate Social Investors**

Sourcing capital to finance the enterprise itself is one of the first and most significant challenges an entrepreneur has to face. Finding investors or funders who are truly social minded, committed to the cause of the social enterprise with the willingness to provide "patient capital" is an extremely arduous task.

Social enterprises, in the process of pleasing an investor/funder, or perhaps in desperation of receiving money, begin to promise returns or achievement of unrealistic numbers, contrary to the realities of the social sector. Returns in double digit figures, in the case of for-profit enterprises, are extremely tough to meet in a sector where the customer base is primarily from the low-income strata. Forced to provide high returns to their investors and shareholders, social enterprises begin to focus on numbers. Many a times, this pressure of returns coupled

with high operational expenses result in steep increases in the price of products and services, neglecting principles of affordability, quality, and service. In many cases, they also abandon the concept of reaching out to the poor and begin looking upwards in the economic strata.

Before realizing it, a number of so-called social enterprises divert complete attention to monetary returns and increasing the numbers. What begins as the challenge of finding truly social-minded investors goes on to affect the long-term sustainability and impact of the enterprise itself. SKS Microfinance in India is a good example. SKS, which claimed to be the largest microfinance institution in the world at that point of time and went public with an IPO to raise money, collapsed in less than a year due to lack of focus on its core objective of serving the poor, among other reasons [8]. With the IPO, they attempted to show the investors that there was a lot of money to be made from the poor, which was completely against the core values of social enterprises.

In SELCO's case, establishing a relationship with like-minded social investors has allowed the enterprise to concentrate on key indicators of impact and on efficiently delivering the technology-finance-service package for solar energy. With three not-for-profit investors committed to the same mission and realistic expectations of returns, SELCO in some sense has set the precedent for ideal social enterprise investments. An enterprise must be willing to confidently state its core mission with no compromise.

Under current circumstances, Indian policies do not allow retail enterprises to avail of debt from outside the country. Reviewing this policy proactively and providing social enterprises with the possibility of accessing such money has the potential to make the sector more financially viable.

### **Human Capital**

In the social sector, enterprises are bound to face the challenges of finding the right people at the right price with a passion for

working in the sector. Social enterprises may be forced into paying unsustainable salaries merely to hold on to well-qualified employees. Eventually, the burden of high employee salaries are transferred to the service cost and borne by the end customer. This is inherently unfair to a customer seeking to access a basic social need.

It would not be incorrect to say that the education system as it exists today perpetuates the challenge of finding the right manpower. The system has failed in creating people who will work in the sector with an inherent passion for changing social conditions. Greater emphasis must be laid on mainstreaming social issues into the education system and creating sensitivity to rural conditions. Perhaps an important part of this lies in incubating and encouraging innovative ideas, particularly at the grassroots level, to solve existing problems in the sector.

### **Technology**

While this may be specific to social enterprises operating in certain areas such as energy or health, it is a challenge that requires attention. Over the years, there has been a fair amount of technology transfer from the West, with an attempt to directly disseminate them among rural users in the country. With such dissemination have come significant rates of technological failure, indicating that the technology, as it is, may not be appropriate to meet the needs of the rural population. Little attention has been paid to tweaking the equipment or modifying it to aid utilization at the local level. This may require changes in scale since the uses at the rural level are likely to be at a smaller scale than intended for the equipment. It also requires changes in raw materials and operation to adapt it, keeping in mind the technological capabilities and raw materials available to communities in the rural sector.

With specific reference to energy services, renewable energy technologies have

undergone developments and are relatively easy to access. However, the problem tends to lie with the low-energy efficiency of electrical appliances available in the market today. As a result, renewable energy systems have to be installed to meet the large energy requirement of existing appliances, making renewable energy more expensive. Decentralization of manufacturing and simplifying the utilization and maintenance is vital to successful application of technology in the rural sector. Efforts must be made, on the one hand, to help local users access appropriate technology, and on the other hand, to increase the efficiency of appliances.

### **Policy**

Government policies in a number of developing countries, including India, have not been framed to address the concerns of this category of enterprises. While there are specific taxation rates, exemptions, and incentives that distinguish commercial establishments from not-for-profit entities, little attention has been paid to creating separate legal and financial frameworks, and regulatory structures to govern social enterprises. This requires that they legally register themselves as for-profit or non-profit entities with no middle ground. The implication is that social enterprises often have to register as for-profit simply because they are not dependent on donor funding for carrying out activities. This also means that despite their target customer base consisting of low-income groups, these enterprises have no option but to pay taxes at the same rate as large profit-making enterprises that cater to the needs of more affluent income groups.

Given the relatively small number of enterprises that exists in the social sector today, they are unable to form an influencing group in themselves. Thus, a number of issue-based policies (in education, financial inclusion, energy services, etc.), in which realities and ground-level implementation are known to social enterprises, cannot be modified or influenced by them.

## SUMMARY AND MODES OF ENGAGEMENT

It is amply clear that rural communities benefit immensely from interventions organized through enterprise models that are focused on sustainable impact. However, what is less clear is the manner in which the current challenges will be overcome to encourage entry of others who are socially minded. The development of the ecosystem will play an important role in determining the accessibility and affordability of services to communities.

While providing services to the poor, social enterprises have a responsibility to ensure that the core objectives and principles are not compromised. These examples of a few successful models show that it is possible to establish and run a social enterprise in very challenging environments. At the same time, scalability of the model cannot be the sole motivation for the enterprise and it must be looked at through a different lens. One of the examples above shows how a social enterprise can scale across issues in the same area, serving various needs of the same people.

### Ways in Which the Asian Productivity Organization (APO) Can Engage

An organization like the APO through its country projects can facilitate and promote the functioning of social enterprises. There are opportunities, particularly at the micro level, that could utilize the expertise and resources of an organization like the APO. Some of the possible areas for engagement are elaborated below:

#### i. Skill development

This is a critical gap that social enterprises across the board are attempting to bridge. Supporting existing micro, small, and medium enterprises in the field to build human resource capacity at the operational, technical, and community levels could be a means to engage. More specifically, the APO could find appropriate ways in which Industrial Training Institutes (ITIs) or other Rural

Development and Self-Employment Training Institutes (RUDSETIs) could be used to create comprehensive skill development programs that would feed into the employment requirements of social enterprises.

#### ii. Research

Social enterprises could benefit from greater research - based on ground level conditions - on ways to improve productivity, efficiency, and delivery of not just the final products and services but also the processes.

#### iii. Policy advocacy

Through the engagement of skill development and research, the APO would be in an optimal position to influence policy within each country to look more closely at the bottom-up approach. Ideally, this would bring about a change in policy making to take into consideration the practitioner's perspective that is key to policy implementation.

The four billion poor of the world are now seen as a huge market for many. This perspective, if perpetrated, will eat into their non-expendable income and may destroy any opportunity for them to come out of poverty. The role of social enterprises become increasingly important to make sure a sustainable business model is created for these four billion, where they are equal partners and not merely consumers. The long-term solution through social enterprises can only be provided when the value of technology, finance, and market linkages are linked to the community's needs and spoken about in the same breath.

## REFERENCES

- [1] Global Issues. Poverty facts and stats, <http://www.globalissues.org/article/26/poverty-facts-and-stats>.
- [2] Department of Trade and Industry. Social Enterprise: A Strategy For Success. London: Department of Trade and Industry United Kingdom; 2002; pp. 13.

- [3] Ayllu Initiative. <http://aylluinitiative.org>, accessed on 31 March 2012.
- [4] Schwab Foundation. Schwab Foundation for social entrepreneurship. <http://www.schwabfound.org/sf/index.htm>, accessed 31 March 2013.
- [5] SELCO. Selco Solar India Index. <http://www.selco-india.com>, accessed 31 March 2012.
- [6] Self Employed Women's Association. [http://www.sewa.org/About\\_Us.asp](http://www.sewa.org/About_Us.asp), accessed 31 March 2012.
- [7] Grameen Shakti. <http://www.gshakti.org>, accessed 30 March 2013.
- [8] The New York Times. India microcredit faces collapse from defaults. <http://www.nytimes.com/2010/11/18/world/asia/18micro.html?pagewanted=all&r=0>, accessed on 8 July 2013.







ASIAN PRODUCTIVITY ORGANIZATION

ISBN: 978-92-833-2437-9  
eISBN: 978-92-833-2438-6