



## Are plant factories the future of agriculture?

*This roundtable discussion originally appeared in Japanese in the Eco Products Guide 2014 published by Nikkei Business Publications, Inc. The APO News is publishing this translation to give its readers a fresh perspective on how others view eco-initiatives.*

*Plant factories are attracting widespread attention as innovative technologies are being developed for light-emitting diode (LED) bulbs. Can plant factories compete and coexist with traditional agriculture? In this roundtable discussion, a leading researcher on plant factories and a representative of a manufacturer striving to develop the plant factory business discuss the advantages and disadvantages of the facilities. Jun Chanoki, a senior consultant at 5 Plus 2 Corporation Ltd., served as the facilitator.*

**Chanoki:** Dr. Toyoki Kozai, Professor Emeritus of Chiba University and President of the Plant Factory Association of Japan, and Masatoshi Miyaki, who works in the Solutions Business Promotion Department of Panasonic Corporation Eco Solutions Company, are here to talk about the potential of artificial-light plant factories, which are being promoted as a form of eco-friendly agriculture. First, could you please explain what a plant factory involves?

**Dr. Kozai:** Basically, it is a closed space in an airtight building or other structure where plants are grown on tiered shelves under artificial light. In the factory, the concentration of CO<sub>2</sub>, temperature, humidity, light intensity, light-versus-dark hours, and other conditions are controlled to help the plants grow faster. Plant factories vary in scale from large ones for commercial use to smaller ones for households. Some factories extend over 1,000 to 2,000 m<sup>2</sup> with 10 to 20 tiers of shelving, while others can fit on a tabletop.

**Chanoki:** What is the artificial light source?

**Dr. Kozai:** Until recently, the major light source was fluorescent tubes, partly because they are economical. Now, LED bulbs are commonly used.

**Chanoki:** Mr. Miyaki, what is Panasonic's interest in the field of plant factories?

**Miyaki:** The Panasonic Group is developing technologies for plant factories, determining the feasibility of related businesses, and conducting research. We have not yet launched any commercial products in this field, but have been involved in a nearly 30-year project to grow plants using optical technology. LED bulbs are becoming more economical and their wavelength stimulates plant growth more efficiently than fluorescent lights.

### Saving resources

**Chanoki:** Are plant factories really environmentally friendly and sustainable?

**Dr. Kozai:** The technology for such factories is still being developed, but they are eco-friendly in that no waste is generated in the crop-growing process. Although the definitions of "chemical-free agriculture" differ, plants can be grown without chemicals in these factories. They also do not waste fertilizer. Unfortunately, a lot of resources and energy are required to set up a plant factory, and we need to increase their productivity to offset that.

**Chanoki:** Do plant factories save water?



*(L-R) 5 plus 2 Corporation Ltd. Senior Consultant Jun Chanoki, Chiba University Professor Emeritus Dr. Toyoki Kozai, and Panasonic Corporation Eco Solutions Company Adviser Masatoshi Miyaki. Photos courtesy of Yuji Ozeki.*

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## Adoption of lean manufacturing practices: An Indian case study

### Background

Realizing the tremendous contribution of microenterprises and SMEs (MSMEs) to industrial production, employment generation, and exports, the Government of India, Ministry of MSMEs, proposed a Lean Manufacturing Competitiveness Scheme (LMCS) under the National Manufacturing Competitiveness Programme (NMCP). Under the scheme, MSMEs are being assisted in reducing their manufacturing costs through proper personnel management, better space utilization, scientific inventory management, improved process flows, and reduced engineering time. The scheme is basically a business initiative to reduce waste in manufacturing in MSMEs and thus enhance their competitiveness. During the pilot phase, 100 mini clusters were formed to implement this scheme.

A detailed study report was prepared for each participating unit to identify the various projects to be taken undertaken and establish a baseline. The following five projects were identified to address manufacturing waste in the participating units.

- 1) 5S and culture building to prepare for lean interventions, create a culture for identifying waste, and responding to those with a positive attitude.
- 2) Manufacturing system building to strengthen the basic manufacturing system and initiate a culture of fact-based decision making. Designing formats for collecting data on daily management activities (production reports, quality reports, delivery reports, etc.) and standardizing critical operations were carried out under this project.
- 3) Institutionalizing kaizen, small group activities, and shopfloor meetings to bring problems to the surface and enable employees to make small improvements. Employees were trained in conducting brainstorming sessions and holding shopfloor meetings to discuss failures and abnormalities. Kaizen was performed in the areas of quick changeovers, mistake proofing,

and low-cost automation for reducing quality issues and manufacturing lead times.

4) Reducing manufacturing lead time by eliminating zigzag flows and backtracking and improving delivery compliance.

5) Improving material handling systems to supplement the initiatives to be taken under project 4) so that after making the flow linear, the velocity of material movement can be increased to achieve the overall goal of reducing manufacturing lead times.

### Case study

This case study was conducted in Grace Locks Limited, a family-owned producer of modular kitchens within the MIA Beta Light Engineering and Allied Cluster. The business head is Rajen Mohan Varma, and the change leader for the project was Reuben Varma. The Grace Locks project ran from August 2011 to March 2013.

When the assignment started, the company was maintaining large inventories. It was under pressure from customers to shorten lead times and was reeling under a cash-capital crunch. The major areas of concern identified that led to manufacturing waste and increased lead times are listed in Table 1. The areas of concern were grouped based on their correlation with the five projects. The key initiatives taken under each project are also shown in Table 1.

The key practices initiated were creating a billing format for materials purchased, standardizing the kitchen installation and servicing processes, devising checklists for inspection, and introducing low-cost automation in bottlenecks. In terms of upgrading human resources, the concept of multi-skilling was introduced and periodic audits and reviews are now conducted including 5S audits, work standard audits, worker performance reviews, and

**Table 1.** Major areas of concern, correlation with the five projects, and initiatives to overcome them.

Area of concern and effects	Project	Key initiatives
Random storage practices, resulting in accumulation of unnecessary items and long tool search times	5S and culture building	5S training, 5S zones, shadow boards, visual control, 5S audits
Miscommunication of work orders, lack of written work instructions, untrained workers, resulting in overstock of raw materials and insufficient stock of critical components	Manufacturing system building	Redesign of work orders, setting SoPs, training, developing purchasing process, setting limits on work in progress, multi-skilling
Frequent rework in carpentry, resulting in long set-up times in frame making, dust in paint shop, compressor breakdowns, and rework at customer sites	Institutionalizing kaizen, small group activities, and shopfloor meetings	Redesign jigs/fixtures, change to modern wood-cutting tools and welding equipment, low-cost automation for frame making, set maintenance schedule, determine spare parts inventory, redesign to simplify manufacturing and assembly
Zigzag material movement, resulting in poor space and manpower utilization	Improving layout and material handling system	Adopt cellular manufacturing and use trolleys



Storage area before the improvement project (proposed area for carpentry shop).



Improved layout of carpentry shop after the improvement project.

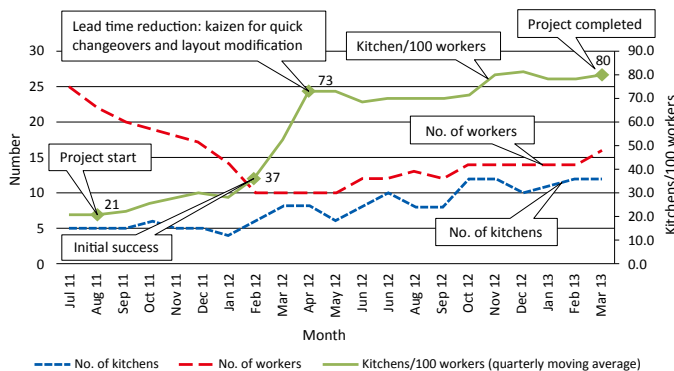
after-sales service reviews of kitchens installed. Table 2 shows the tangible results of the LMCS project within Grace Locks.

The initial success was achieved through 5S activities, training SoPs, and establishing procedures for purchasing, storage, and production planning. Breakthrough improvement in reducing lead time was achieved through kaizen for quick changeovers, design simplifications, layout modification, and improved material handling. Further capacity enhancement measures were taken through the adoption of low-cost automation where appropriate. The trajectory of productivity improvement is depicted in the Figure.

There were also a number of intangible improvements that have contributed to higher productivity within the company. For example, the workers are motivated to continue the improvements and absenteeism has dropped. Production planning is easier with the new systems in place. Perhaps most important for customers, the potential for customization of Grace Locks modular kitchens has increased significantly, pointing to further growth of this SME in the future. 🌀

**Table 2.** Tangible improvements after the LMC project in Grace Locks.

Item	Unit of measurement	Before (Aug 2011)	After (Mar 2013)	% Change
Space	m <sup>2</sup>	1300	650	50% ↓
Total inventory (raw material + work in progress)	Days	134	20	85% ↓
Manufacturing lead time	Days	30	12	60% ↓
Manpower deployment	Number	22	16	27% ↓
Production capacity	Kitchens per month	5	12	140% ↑
Productivity index	Kitchen/100 workers (quarterly moving average)	21	80	280% ↑
Savings (per annum)	US\$ thousand	–	74	



**Figure.** Timeline of productivity improvement in Grace Locks.



Naresh Chawla holds a BA in Production Engineering and postgraduate degree in Industrial Engineering. He is a certified Six Sigma Master Black Belt from the Indian Statistical Institute, New Delhi, and an APO-certified Productivity Practitioner. Chawla has abundant experience in consulting and training in productivity and quality leadership spanning diverse industrial subsectors. He served the National Productivity Council, India, as a Deputy Director for 15 years. Presently he is spearheading the Six Sigma Certification Program (Black Belt and Green Belt) and implementing lean manufacturing in MSME clusters as General Manager of Consultancy and Training of the Punjab Technical University Gian Jyoti School of TQM and Entrepreneurship in Mohali, India.



**Dr. Kozai:** When cultivating leafy vegetables, plant factories consume only 1% or less of the water required to grow them in the field, and 2% or less of that required in a greenhouse. Plant factories are therefore receiving a lot of attention in the Middle East and PR China, where water resources are scarce. About 95% of water is absorbed by the roots and evaporates through the leaves. When a plant factory is cooled to remove the heat generated by the light source, water vapor condenses on the cooling board of the air-conditioner, which can be recycled to water the plants.

**Chanoki:** Is it true that vegetables grown in a plant factory do not need to be washed before consumption?



**Dr. Kozai:** Yes. A lot of water is needed to clean field-grown vegetables. The outer leaves are disposed of at harvest or when packaging, and only about 60% of the total weight is actually consumed. In contrast, about 95% of plant factory vegetables, including the roots, can be sold.

**Chanoki:** Do plant factories make effective use of land and are they productive?

**Dr. Kozai:** The productivity of plant factories can be increased by optimizing the growing environment

and high-density cultivation. Plants are not exposed to pests, heavy rain, or strong wind, and there is no risk of associated losses. By installing 10 tiers of shelving instead of only one, the cultivation area and productivity increase by a factor of 10 or more. Therefore, the total productivity per square meter can potentially increase by 100-fold or more.

**Chanoki:** Is their energy efficiency acceptable?

**Dr. Kozai:** In an artificially lit plant factory, electricity is converted into light and then to chemical energy in the plants. In an outdoor field, the conversion rate of solar to chemical energy is about 0.1% to 0.2%, including losses due to pests and senescence. In a plant factory, the electricity-to-chemical energy conversion rate is estimated at about 11%, but in reality the rate is a maximum of 5% to 6%. The current rate is about 3%, and we expect that to double in future.

In terms of life cycle assessment (LCA), a plant factory saves more resources if it continues operations for more than 10 years. Traditional agriculture uses a lot of energy to operate agricultural machinery and apply pesticides and fertilizer. Field-grown plants need almost twice the amount of fertilizer compared with factory-grown ones. Unexpected weather-related losses also occur.

**Miyaki:** Yes, field yields can be wiped out by bad weather, but plant factory yields are stable.

**Dr. Kozai:** Many argue that agricultural products supplied to urban areas should be produced in those areas to reduce transportation costs and eliminate losses during transport. An LCA that takes all these factors into consideration will show that plant factories are competitive with traditional field cultivation.

### Reducing CO<sub>2</sub> emissions

**Chanoki:** CO<sub>2</sub> is a major contributor to global warming and regarded as harmful. Thermal power stations emit high levels of CO<sub>2</sub>, but can it be used as a resource in plant factories?

**Dr. Kozai:** Electricity use peaks during the day and declines at night, which is ideal for plant factories that operate using surplus electricity. Electric power companies are working to reduce peak electricity demand. If they adjust power generation based on peak daytime demand, electricity supply may exceed demand during the night. In most artificial-light plant factories, the lights are switched on only at night, and thus surplus electricity can be utilized. In greenhouses, plants are cultivated using sunlight. The electricity cost for artificial lighting is low but significant amounts of fuel are needed to heat greenhouses. On the other hand, plant factories are closed, insulated spaces with minimal air-conditioning costs and therefore environment friendly.

### Benefits to consumers

**Chanoki:** How do consumers benefit from plant factory produce?

**Dr. Kozai:** Plant factory produce does not need to be washed, is pest free, and is cultivated without chemicals. Plus plant factory crops contain more vitamin C, carotene, and polyphenols than traditional field crops. Further nutritional improvements can be expected through ongoing research.

**Chanoki:** Will the market for plant factories expand in the future?

**Miyaki:** Plant factories represent a new form of industrialized agriculture. They signify a shift from agriculture relying on human intuition and experience to Dutch-style agriculture relying on precise data management. The use of IT and the industrialization of agriculture offer manufacturers and other businesses opportunities to enter this field. Although problems remain, such as uncertainties about the availability of land for next-generation agriculture, I expect the market to increase substantially. Plant factories could



also be established within households, which would involve the creation of completely new demand. For this to occur, consumers must be convinced of the value of plant factories, and the size of that market cannot yet be predicted.

**Chanoki:** Recently, some sandwich shops in office districts have incorporated plant factories as part of their interior design. If these small factories increase, it could be interesting. Which factors may prevent the expansion of these commercial factories in terms of cost and technology?

**Dr. Kozai:** First, both installation and operation costs will be reduced by at least half over the first 10 years simply by making combined, optimal use of available technologies. The more important challenge is for consumers to accept the idea. Panasonic is focusing on household plant factories and we need to convince consumers of their advantages.

Huge amounts of food go to waste worldwide, mainly because consumers do not have hands-on gardening experience and do not appreciate how difficult it is to produce food. A household plant factory can give people the opportunity to grow their own food and realize how many inputs are required. This will encourage them to lead more eco-friendly lives. I hope that small plant factories will be established in households, local communities, and universities. I have been researching horticultural and closed plant-production facilities for nearly 50 years because I believe that they will help us lead sustainable lives.

### Database of “growth recipes”

**Miyaki:** We have created what we call “growth recipes,” which are essentially plant growth programs. At each plant factory, we input know-how on growing plants in our database. If small plant factories become popular, the recipes can be collected in a massive database and utilized for the operation of large plant factories. The data can also be used to create new agricultural methods.



**Chanoki:** The APO has been conducting training in different economic sectors, including agribusiness and food safety, to enhance productivity. Should there be a differentiation between traditionally grown agriproducts and those grown in factories?

**Miyaki:** We make a clear distinction between them. Basically, staple crops like rice, corn, soybeans, and potatoes should be cultivated outdoors under sunlight.

**Dr. Kozai:** Some crops are consumed less for energy intake than for functional ingredients, such as leaf vegetables, fruit, and medicinal plants. Others are eaten simply because they are delicious. Artificially lit plant factories are suitable for growing functional plants, and this clear distinction will continue for the next 40 to 50 years. About 80% of the world’s population will be living in cities by 2050, and some believe that perishable produce and crops with high transportation costs should be cultivated in urban areas. Many countries are already committed to urban agriculture. In densely populated countries with little farmland, such as Singapore, this trend is gathering speed. A lecture on plant factories at Chiba University in September was part of an APO project attended by international journalists, including those from developing countries who had never seen, heard about, or felt the necessity for plant factories. Afterward, they agreed that plant factories were necessary, and so I believe that the market has great potential for growth.

### Operation of plant factories by farmers

**Chanoki:** Do any laws or regulations hinder the establishment of large commercial plant factories?

**Miyaki:** We need to clarify the status and definition of plant factories. It is not clear currently whether they should be classified as “factories” or “farmland.”

**Dr. Kozai:** Existing systems might hinder their development, but this problem will be resolved over time. The Ministry of Economy, Trade and Industry and the Ministry of Agriculture, Forestry and Fisheries are both involved in the operation of plant factories, and the Ministry of Health, Labor and Welfare oversees medicinal plants. I hope that these three ministries will cooperate to avoid overregulation.

Some problems may originate in the private sector. For example, the efficiency of plant factories cannot be improved through isolated efforts by the construction and home electric appliance industries. All players in the private sector need to cooperate to meet the various challenges, and I believe that this will happen.

**Chanoki:** At present, publicly listed companies cannot easily participate in agriculture or make use of farmland.

**Dr. Kozai:** Some critics contend that the spread of plant factories will have an adverse impact on farmers. The number of farming households is already in decline. However, farmers can also begin operating plant factories, and about 100 farming households already are. The role of farmers is changing, and even those operating plant factories are still farmers.

**Chanoki:** It appears necessary to promote changes in the attitudes of companies, farmers, government agencies, and consumers to spread the idea of plant factories.

**Dr. Kozai:** Yes, it is critical to deepen public understanding of plant factories. We particularly need help from consumers. From the beginning, Chiba University and the Plant Factory Association of Japan have welcomed the general public and disseminated information on plant factories, including elementary and junior high school students, housewives, and members of consumers’ organizations. Some visited us to protest plant factories. Others mistakenly believed that crops from these facilities were artificial and not tasty. Most changed their minds after hearing our explanations and actually sampling the vegetables.

**Miyaki:** It is interesting that they completely changed their opinions even before leaving the facilities.

**Dr. Kozai:** We hold a study seminar on plant factories once a month for anyone who wants to learn more about them. The total number of participants has already reached 5,000. I hope that they will spread the word to others. Meanwhile, we need to continue making steady efforts to educate the public.

**Chanoki:** Thank you both very much for your interesting input. 🍵

*Dr. Toyoki Kozai became a professor at Chiba University in 1990 and subsequently served as Dean of the Faculty of Horticulture and President of the university. He is now an Emeritus Professor and President of the Plant Factory Association of Japan. Dr. Kozai received the Japan Prize for Agricultural Science and other awards. His publications include Seeds for Happiness published by Shodensha and books on sunlight-type and artificial-light plant factories, both published by Ohmsha.*

*Masatoshi Miyaki joined Matsushita Electric Industrial Co., Ltd. in 1984 and subsequently served as General Manager in charge of promoting the environment and maintenance business in the Solution Group of the Customer Create Center at the Electronic Materials Marketing Headquarters. He presently serves as Leader of the Wide-Area Marketing Group, Solution Business Promotion Department, Marketing Division, Panasonic Corporation Eco Solutions Company. He is also a member of the Ministry of Economy, Trade and Industry’s study group on green servicing.*

*Jun Chanoki worked for some 20 years for HSBC Securities of the UK, Rabobank Nederland, and other international companies in Japan. His positions included securities analyst, food and agribusiness consultant, and human resources development trainer. At present, he is involved in an investment consulting venture focusing on risk management.*

# SME productivity measurement and analysis

**S**MEs play a significant role in economic growth and development everywhere. They create jobs, promote private ownership, encourage diversification of economic activities, and provide opportunities for developing entrepreneurial skills. They are also significant sources of innovations that contribute to the productivity and competitiveness of industries. SMEs operate in all sectors and subsectors, engaging in the production of raw materials, processing, manufacturing, marketing, and/or providing logistical and transport service. This wide range of activities makes it difficult to use a common yardstick for measuring, comparing, and monitoring the productivity of SMEs.


To address the difficulty in measuring firm-level SME productivity, a workshop was organized by the APO on SME Productivity Measurement and Analysis for NPOs, 26–29 November 2013, in Singapore. The main objective was to review tools and techniques for SME productivity measurement and recommend a suitable SME measurement system for NPOs in the region. Sixteen participants representing 16 NPOs of APO member countries attended the project. Three guest participants from the Republic of Turkey's Ministry of Science, Industry and Technology, Directorate General for Productivity, also participated.

The workshop was facilitated by resource persons Dr. Charles Harvie, Director of the Centre for Small Business and Regional Research and Acting Director of the International Business Research Institute, University of Wollongong, Australia, and Senior Management Consultant Masahisa Mizumoto, Central Japan Industries Association.

Participants agreed that while they shared a common understanding of labor and capital productivity, NPOs differed largely on measurements of other indicators. Due to those differences, they proposed that the APO establish a common foundation of SME productivity measurement. In addition, they proposed that the APO website include a public-access online system for SME productivity assessment, similar to the Integrated Management of Productivity Assessment Tool of SPRING Singapore and Company Manual for Productivity Assessment of the Malaysia Productivity Corporation. This would allow entrepreneurs or NPOs to measure and analyze firm-level productivity as and when needed.



*Dr. Harvie facilitating group discussions.*

BreadTalk, a former SME that grew into large global company, hosted a visit so that participants could investigate its productivity measurement system and learn more about its business operations. The first day and a half of the workshop was combined with a conference organized by the Asia Competitiveness Institute of the Lee Kuan Yew School of Public Policy, National University of Singapore, in which presentations covered productivity drives for SMEs. 

## APO/NPO update

### **Cambodia**

#### **New NPO Head**

Name: Heng Eang

Designation: Director, National Productivity Centre of Cambodia

Effective date: 6 February 2014

### **India**

#### **New APO Liaison Officer**

Name: Mrutyunjay Behera

Designation: Deputy Secretary, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry Government of India

Effective date: 19 December 2013

### **Indonesia**

#### **New APO Director**

Name: Khairul Anwar

Designation: Director General of Training and Productivity, Ministry of Manpower and Transmigration

Effective date: 13 February 2014

### **New NPO Head and APO Liaison Officer**

Name: Estiarty Haryani

Designation: Director of Productivity and Entrepreneurship, Directorate Productivity and Entrepreneurship, Directorate General of Training and Productivity, Ministry of Manpower and Transmigration

Effective date: 15 January 2014

### **Islamic Republic of Iran**

#### **New APO Alternate Director**

Name: Firouzeh Khalatbari

Designation: Consultant, National Iranian Productivity Organization

Effective date: 17 February 2014

### **New APO Liaison Officer**

Name: Mitra Alipour

Designation: International Affairs Officer, National Iranian Productivity Organization

### **Republic of Korea**

#### **New APO Liaison Officer**

Name: Sang Yong Hang

Designation: Director, International Cooperation Department, Korea Productivity Center

Effective date: 27 January 2014

### **Nepal**

#### **New APO Alternate Director**

Name: Jeet Bahadur Thapa

Designation: Chairman of the Board of Directors, National Productivity and Economic Development Centre

Effective date: 4 February 2014

### **Pakistan**

#### **New APO Liaison Officer**

Name: Rabia Jamil

Designation: Manager (IR), National Productivity Organization

Effective date: 13 February 2014

### **Sri Lanka**

#### **New APO Liaison Officer**

Name: W.M. Maddumabandara Weerasekera

Designation: Director, National Productivity Secretariat

Effective date: 2 January 2014



## New Secretariat staff

The Secretariat Industry Department received new Director J.M. Thilaka Jayasundara on 6 January. Formerly Director of the National Productivity Secretariat (NPS) of Sri Lanka and Head of the NPO and APO Liaison Officer for the country, she also served as Director of Planning, Research and Development within the Ministry of Labour Relations and Productivity Promotion and as Deputy Director of the NPS. She holds a Master's in Public Administration from the Postgraduate Institute of Management of the University of Sri Jayewardenepura; Postgraduate Diploma in Information and Communication Technology from the Sri Lanka Institute of Information Technology; and BSC Special Degree in Public Administration, Public Policy, Public Accountancy, Public Financial Management, Governance and Economics from the University of Sri Jayewardenepura. She worked as a key resource person promoting productivity in Sri Lanka within several government agencies and the National Training Institute of the Bank of Ceylon.



Jayasundara is expected to work as a team member and provide visionary leadership to the Industry Department and contribute in particular to the APO's recent focus on public-sector productivity measurement and analysis. She is married and the mother of a son, and finds his personal growth and the development of feelings fascinating. Her hobby is reading Russian translations. She mentioned, "My ultimate wish is to serve the world, without being limited by boundaries. This is one world, there is one human race on the planet, and what we need to do is help others do better and create happiness among them."

A new Research and Planning Officer started working at the Secretariat on 6 February. Ngo Thu Huong, who was born in Hanoi, has an international educational and work background, along with trilingual capabilities, which all make her an asset to the regional productivity movement. After receiving a BA in Economics from Hanoi's Foreign Trade University, Huong studied for an MSc in Economics and Business Administration at Aalborg University in Denmark. Subsequently, she worked under the European Technical Programme for Vietnam, Phase 2, funded by the European Commission, and then in the private sector in Le Havre, France. Most recently, Huong acted as Project Coordinator for the Vietnam Energy Efficiency Standards and Labeling Project sponsored by the Australian Government and carried out under the Ministry of Industry and Trade of Vietnam.



In her free time, Huong enjoys traveling and taking photos. On the job at the Secretariat, she told the *APO News* that she looks forward to the challenge of "being creative and proactive to deal with emerging issues in the APO's member countries" with her new colleagues.

Secretariat colleagues walking past the tidy cubicle of new Research and Planning Department Director Naoki Ogiwara immediately notice four large sheets of paper on the wall behind his desk, headed with the labels "Vision," "Principle," "Discipline," and "Strategic Focus" and filled with colorful Post-it Notes. These principles of knowledge management (KM), which values the participation of members and stakeholders, govern the managerial style of Ogiwara, who took up his new post on 20 January.



After receiving a Bachelor of Law degree in Political Science from Keio University in Tokyo, he joined Fuji Xerox where he served as a management consultant for famed Knowledge Dynamics Initiative for 12 years, helping introduce KM, innovation management, and change management initiatives in major Japanese companies and central/local government agencies. Ogiwara studied at the F.W. Olin Graduate School of Business of Babson College in the USA and was awarded an MBA summa cum laude. Before joining the APO, he served as Senior KM officer at The World Bank in Washington, DC, for two-and-a-half years, where he practiced what he preached. He also served as an expert for APO projects on KM and innovation and helped guide early efforts in this area.

Ogiwara, who is a married wine-, travel-, and dog-lover, is glad to be back in Tokyo after an extended period abroad, because, "I have so much missed the three Fs in Japan (food, friends, and family). What did I miss most? Definitely, food!" One goal while serving as Director of Research and Planning is "to upgrade the APO to become a thought leader that advocates a unique Asian perspective on productivity increases."

Productivity veteran Jun-Ho Kim assumed a new position as Program Officer in the Secretariat Industry Department starting 10 February. The native of Jeju has worked in various posts within the Korea Productivity Center (KPC) since 1989, including a stint as the general manager of the KPC's Tokyo Office (August 1991–December 1994). Immediately prior to joining the Secretariat, Kim served as the Director of the International Cooperation Department of the KPC and APO Liaison Officer for the ROK and is therefore well known among member countries. His academic background includes a BA in English Language and Literature from Jeju National University, a Master's in International Convention Management from Hallym University International Graduate School, and he is currently writing the thesis that will lead to a PhD in Business Administration from Hallym University Graduate School.



Kim, who speaks four languages, mentioned that APO Secretariat staff and NPOs should be "one family" and hopes to communicate with NPOs on specific needs and issues for their productivity improvement while at the Secretariat. He is married with a son and daughter.

## APO outreach: the Secretariat goes to Jeju

In efforts to become the “world’s environmental capital,” the Environmental Hub Policy Division of Jeju Special Self-Governing Province of the ROK has organized a Global Environmental Experts’ Invited Lecture series for the past three years. In 2014, provincial Governor Keun-min Woo extended the invitation to the APO Secretariat, as represented by Senior Program Officer K.D. Bhardwaj of the Secretariat’s Industry Department, whose lecture at the Sulmundae Women’s Center on 15 January was entitled *The Green Economy and Directions for Municipalities (Moving Forward from Rio+20)*. The audience of approximately 250 was composed of members of environmental groups, government agencies, NGOs, the general public, and an officer of the Korea Productivity Center.

After outlining the APO’s environment- and Green Productivity-related activities over the past two decades, Bhardwaj briefed attendees on the various definitions of a “green economy” and explained the significance of urbanization. He noted that half of the world’s 7 billion people now live in cities, and by 2030 that figure will be nearly 60%. At the same time, cities can create efficiency gains and technological innovations to reduce resource consumption. The presentation then focused on how individual cities can contribute to establishing a global green economy. Bhardwaj referred to the Rio+20 outcome document “The Future We Want,” which “clearly acknowledged efforts and progress made at the local and subnational levels and recognized the important role that such authorities and communities can play in achieving sustainable development.” Basic actions recommended at the municipal level were: improve energy efficiency; provide sustainable transportation options; treat and recycle wastewater; safely manage solid waste; and limit air pollution. After completing a municipal environmental checklist comprised of 15 questions, which



*APO Senior Program Officer K.D. Bhardwaj being interviewed by a journalist from Jeju Free International City Broadcasting System prior to his presentation at the Global Environmental Experts’ Invited Lecture series event.*

formed part of the lecture, most audience members found room for improvement in their home cities.

In addition to a broadcast of the entire 1-hour lecture as simultaneously interpreted into Korean, a 30-minute interview of Bhardwaj on the same topic was aired by local television station Jeju Free International City Broadcasting System (JIBS).

With a population of nearly 600,000, the motto of Jeju Special Self-Governing Province is “The world comes to Jeju, and Jeju goes to the world.” The APO was honored to be invited to go to Jeju to promote greener municipalities for sustainable development and hopes that the message will spread from Jeju to the world. 🌐



### Model Projects for Green Productivity

The APO Center of Excellence on Green Productivity (COE on GP) held a workshop on Development of Model Projects for Green Productivity 4–8 November 2013 in Taipei. Experts from Asia and Europe attended along with 23 representatives of APO member countries and 60 industrial leaders from the ROC. ROC President Ying-Jeou Ma joined participants and experts to witness the launch ceremony for the APO COE on 5 November. Secretary General Dr. Chiou-Huey Chiou of the Industrial Development Bureau of the Ministry of Economic Affairs spoke at the opening ceremony of the workshop, kicking off the enhancement of GP through the sharing of knowledge and activities among national representatives and experts.

The workshop focused on four areas: resource recycling; green energy; green factories; and ecoagriculture. The attendees divided into four units based on these categories for intensive group work. On the final day of the workshop, the groups returned to share what they had learned and present their action plans. The recycling group visited two companies that have achieved great success in the recycling field, Da Ai Technology and Chung Tai Resource Technology Corp. The group examined the varied laws, regulations, and needs of the countries they represented.

Philippine delegates in the green energy group cited the frequent natural disasters in their country. They were impressed by their visit to LCY Group, a company that built solar power plants to provide energy to disaster victims. Group members planned to suggest these techniques to their governments and enterprises.

The green factory group visited Intelligent Living Space in Taipei as well as Champion Building Materials and Taiwan Semiconductor Co. to learn about strategies for pollution prevention and energy saving. Members of the group hoped to promote the



*ROC President Ying-jeou Ma (C) with APO Secretary-General Mari Amano (4th L) and other dignitaries launch the APO COE on GP, 5 November 2013. Photo courtesy of CPC.*

utilization of solar power, LED lighting, green building materials, and water-saving equipment in their home countries.

The ecoagriculture group visited an organic village and a rice farm in the eastern ROC, where symbiotic farming methods have been used for many years. Members learned how symbiotic relationships between rice and ducks, or fish and water bamboo, can improve crops and benefit the environment.

Through substantive communication on environmental issues and sharing of practical experience among all countries, the COE on GP in 2014 will continue to seek consensus for sustainable development and green technologies, working closely to maintain strategic positions in line with global trends and the needs of member countries. 🌐