2017 ASEM Eco-Innovation Capacity-building Program

Malaysia

December 2017

ASEM SMEs Eco-Innovation Center

Executive Summary

Overview

The global paradigm shift in the industrial environment has put businesses under pressure to tackle climate change and secure cost-competitive energy and natural resources. However, many small and medium-sized enterprises (SMEs) in developing countries are ill-equipped to cope with climate change. This project aims to build the Eco-Innovation capacity of SMEs in ASEM member states, focusing on four major areas as outlined by the OECD: system, process, product, and business innovation. To this end, the 2017 ASEM Eco-Innovation Capacity-building Program in Cambodia offers seminars and workshops that train SMEs to run their own Eco-Innovation programs and ultimately lays the foundation for enhancing the green competitiveness of Malaysia, an ASEM member.

Project Results

A capacity-building module was developed through this project to increase awareness of Eco-Innovation in Malaysia and to disseminate the know-how and knowledge of the Eco-Innovation field. The "Eco-Innovation for industrial parks" module was selected as the capacity-building module for Malaysia as a result of local demand surveys and expert consultation. The 2017 capacity-building project has increased Malaysia's awareness of Eco-Innovation by 43 percentage points, from 34% to 77%.

Follow-up Measures

Malaysia is expected to pursue an Eco-Innovation pilot project for its local industrial parks to identify further demand for technologies, and technical workshops can be held to enhance local capability for related technologies.

Contents

1. Project Background

1.1 Definition of Eco-Innovation

Background of Eco-Innovation

Sustainable Development General Goals (SDGs) are the common goals for all nations from 2016 to 2030. Following Millennium Development Goals (MDGs), they set antipoverty MDGs aimed for as the top priority, but they also aim to alleviate global common threats for all nations, such as polarization of economy and society, intensification of various social inequalities, and environmental destruction, that can threaten continuous developments.
Open Working Group suggested 17 SDGs. These are differentiated from the existing MDGs, as they are in consideration of overall economy, society and environment areas, such as economic growth and climate change.
Major advanced countries, such as EU, the U.S. and Japan are reinforcing environmental regulations every day aiming for cleaner production and building economic system with resource recycling. They are also taking actions to improve environmental characteristics of their products. This applies not only to large enterprises, but also to SMEs, thus they are expected to be gradually exposed to increased costs and regulatory risks from environmental regulations as time goes on.
The large enterprises are responding to the green paradigm, which emphasizes on sustainability of industries by adapting green management system, cleaner production and green technology. However, the SMEs relatively lack human resources, information and etc. compared to large enterprises, thus they cannot actively respond to the green paradigm, such as by adapting environmental management systems.
In order to solve such problems of the SMEs, a green capability reinforcement project, such as ASEM Eco-Innovation Capacity-building Project for the SMEs, was introduced. Eco-Innovation Capacity-building Project identifies demand in each country, develop modules and programs according to the demand to enhance the greens capacity, and furthermore, it supports in responding the change of environment in the international community spontaneously.
In particular, the SMEs in developing countries lack information, finance, human resources and etc. needed to build green management system and cleaner production compared to the SMEs in advanced countries, therefore it seems that they are in dire need for the support from Eco-Innovation Capacity-building Project.

Basic Concept and Development of Eco-Innovation

According to the European Commission (EC), the definition of Eco-Innovation is "all types of innovations that seek for provable developments, aiming for sustainable developments though alleviation of environmental pollution and utilization of resources with responsibilities, which also includes environmental technology, process, system, service and Eco-Innovation that provides environmental effects though it did not mean to."

The Eco-Innovation Observatory (EIO), operated by a three-year plan of EC, also defines Eco-Innovation as "all types of innovations that use natural resources and reduce emissions of harmful materials in daily lives." The definition by EIO is ahead of the existing idea that it is a kind of innovation aimed to reduce negative environmental impacts. Furthermore, such definition includes the means and methods that minimize the use of natural resources during the processes of designing, producing, using, reusing and recycling products and materials.

Meanwhile, according to the definition of the Organization for Economic Cooperation and Development (OECD), Eco-Innovation is differentiated from all of the other innovations for the following reasons: "It results in alleviation of environmental impacts regardless of intention. It also has a wide range that can surpass the traditional structural limits of innovative organizations, therefore accompanies wider range of social agreements that accelerate social-cultural and structural changes."

Eco-Innovation technology reduces or prevents pollutant formation directly from the source; it is any technology that minimizes environmental degradation occurring over the entire product life cycle, from the extraction of raw materials through the manufacturing and consumption of products to their disposal, either by recycling or returning them to nature. It not only includes production technologies that reduce or prevent pollutant formation directly from the source, but also those that provide further management. This can include recycling or conserving materials and energy used in the production process, substituting raw materials with eco-friendly ones, designing processes and improving operation to minimize pollutant formation during production, and better utilizing raw materials to reduce losses.

The concept of Eco-Innovation can be applied to any industry or product. Cleaner production removes or reduces all emissions and wastes in the production process by conserving raw material, water, and energy and eliminating toxic or hazardous materials. While there are many ways to mitigate impact on the environment, safety, and health throughout the entire process, there are three critical factors in realizing Eco-Innovation: change in mindset, utilization of expertise, and advancement of technology.

1.2 Promotion of Eco-Innovation

[Figure 1] Promotion of Eco-Innovation

One of the main roles of ASEIC, which was established to promote eco-friendliness and low carbon green growth among ASEM members in Europe and Asia, will be to leverage ROK's strong Eco-Innovation capabilities to promote Eco-Innovative practices in other Asian ASEM member states. Since many developing countries are not aware of Eco-Innovation, have not yet recognized the need for it, or lack the technology for it, they are still experiencing the vicious cycle of serious environmental problems and weakening global competitiveness.

Eco-Innovation should be a tool, not for competition, but for sharing technology and experience among companies and countries in an effort to solve global environmental issues together. It is therefore essential to promote best practices (success stories) of Eco-Innovation and cleaner production technologies with countries that have limited access to them through close cooperation with their governments.

Accordingly, the 2017 Eco-Innovation Capacity-Building Project worked with the government and other relevant organizations of the Malaysia to lay the foundation for promoting the idea of Eco-Innovation and building local competencies.

2. Malaysia

Country Overview

<Table 1> Country Overview

Capital	Kuala Lumpur
Area	300,000km²(1.5 times Korean Peninsula)
Climate	Hot humid tropical
Population	30,900,000 ('16)
Ethnicity	Malay (50%), Chinese (23%), Indian (7%)
Language	Malay(Official), Chinese, English
Religion	Islam(61%), Buddhist(20%), Christian(9%), Hindu(6%)

(Source : Malaysia Country Facts, Korea EXIM Bank, 2017)

Economic Indicators

<Table 2> Economic Indicators

GDP	302.7 billion USD ('16)
GDP per capita	9,546 USD ('16)
Economic Growth Rate	4.3% ('16)
Inflation Rate	2.1% ('16)
Currency Unit	Ringgit or Malaysian Dollar (M$)
Exchange Rate	US$ 1= 4.1 M$ ('16)
Industrial Structure	Services(53%), Manufacturing(38%), Agriculture(9%)('15)
Trade Scale	Export 7.735 Billion USD; Petroleum products, semiconductors, bronze ('15) Import 8.609 Billion USD; Natural gas, semiconductors, petroleum products ('15)
Major Trading Products	Export: Semiconductor and electronics, palm oil, petroleum and natural gas, lumber, rubber('15) Import: Electronics, machinery, petroleum products, plastics, automobile, steel ('15)

(Source: Malaysia Country Facts, Korea EXIM Bank, 2017)

Defining Malaysian SMEs

Malaysia classifies Small and Medium Enterprises (SME) into 'manufacturing' and 'services and others'. In regards to manufacturing firms, firms that have less than 50 million ringgits of revenue or employs fewer than 500 permanent employees are classified as SMEs. The specific classification is as follows.

<Table 3> Definition of SME in Malaysia

	Micro Enterprise	Small-sized Enterprises	Medium-sized Enterprise
Manufacturing	Less than 300,000 in sales or less than 5 permanent employees	0.3 to 15 million in sales or 5 to 75 permanent employees	15 to 50 million in sales or 75 to 200 permanent employees
Services and other	-	0.3 to 3 million in sales or 5 to 30 permanent employees	3 to 20 million in sales or 30 to 75 permanent employees

SMEs in Malaysia

As of 2013, reports indicate there are more than 400,000 SMEs in Malaysia. SMEs account for more than 99.2% of businesses, and there is a high degree of imbalance with 86.6% in services, 7.2% in manufacturing, and 6.2% in agriculture.

<Table 4> SMEs in Malaysia

Classification	Micro	Small	Medium	SME		Established Business	Total
				Number	Percentage		
Manufacturing	21,516	15,796	2,061	39,373	7.2	1,420	40,793
Services	381,585	83,037	10,084	474,706	86.6	2,819	477,525
Agriculture	31,838	1,775	575	34,188	6.2	343	34,531
Total	434,939	100,608	12,720	548,267	100	4,582	552,840

(Source: Malaysia Bureau of SMEs (2013))

In the manufacturing sector, the industries with the most SMEs are in the following order: clothing and textiles (19.4%), food (14.4%), metals excluding machinery and equipment (10.5%), and other industries (55.7%). In terms of geographic location, there are 17.7%, 14.4%,

12.4%, and 11.4% of SMEs located in Selangor, Johor, W.P. Kuala Lumpur, and Perak, respectively.

Support Policies for Malaysian SMEs

The SME Master plan 2012-2020 is a core policy of the Economic Transformation Plan, which the Malaysian government has been strongly pursuing since 2010. The SME Master plan mainly involves the development of SMEs. The Malaysian government has been developing the SME Master plan 2012-2020 as one of the core policies of the Economic Transformation Plan (ETP) since 2010 in order to intensively develop SMEs, which account for 99.2% of Malaysian businesses. The SME Master plan seeks to remove barriers to growth for SMEs (lack of technology, lack of personnel, market entry barriers, and lack of market information), stimulate business growth, and develop SMEs into a driver of growth that can lead the Malaysian economy.

Response to Climate Change

Malaysia has submitted a NDC to the UNFCCC which proposes to reduce GHG Emissions Intensity by 45% relative to the Business as Usual model by 2030. Of the aforementioned 45%, 35% will be reduced unconditionally. The remaining 10% will be reduced on conditions of international financial support, technological support, and capacity-building support. Malaysia plans to focus its greenhouse gas reduction efforts in (i) energy, (ii) industrial process, (iii) waste, (iv) agriculture, and (v) land. The 3 major objectives of the 11th Malaysia Development Plan 2016-2020 are (i)[Supply goal] to assure the provision of sufficient, stable, and cost-effective high quality energy; (ii)[Utilization goal] to promote the efficient usage of energy, and (iii)[Environmental goal] to promote the production and usage of energy that takes environmental effects into consideration.

Industrial parks in Malaysia

There are 200 industrial parks established in Malaysia by government entities such as the State Economic Development Corporations (SEDCs), Regional Development Agencies (RDAs), and Port Authorities and city governments. The total number of industrial parks in Malaysia is estimated to be around 600. Agencies such as the Iskandar Development Region (IDR), Northern Coast Economic Region (NCER), and East Coast Economic Region (ECER) oversee

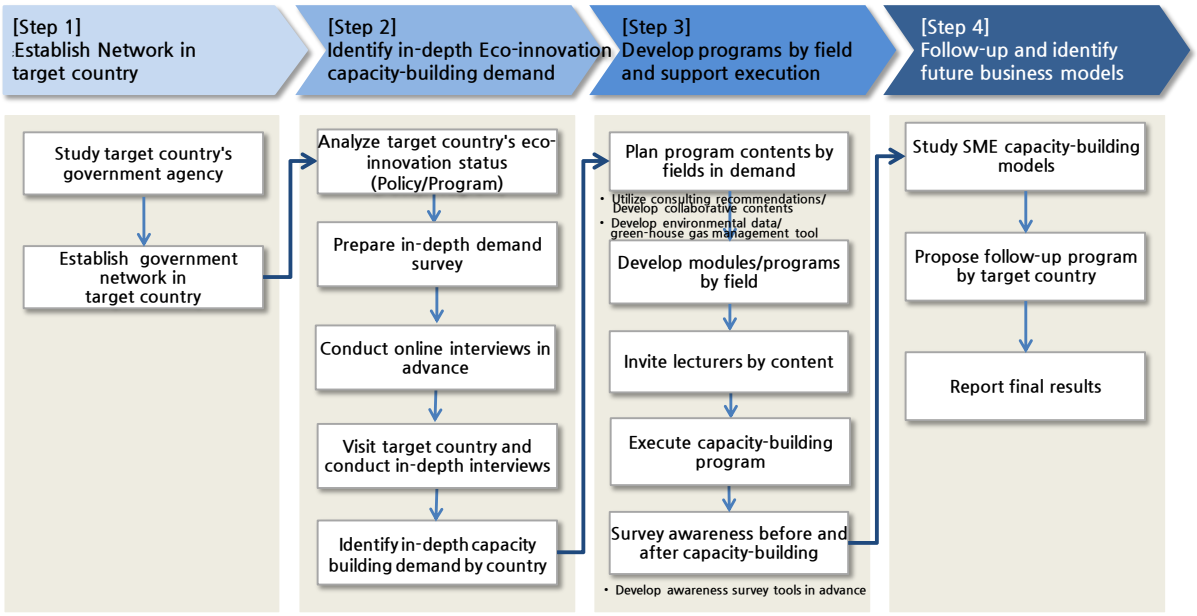
industrial parks in the Malaysian peninsula, while in East Malaysia, they are directed by institutions such as the Sabah Development Corridor (SDC) and Sarawak Corridor of Renewable Energy (SCORE). ECER in particular has the Pekan Automotive Park (PAP) specializing in automotive technologies, the high-tech Malaysia-China Kuantan Industrial Park (MCKIP), the Kemaman Heavy Industry Park, and Halal food complexes such as Gambang Halal Park Pasir Mas Halal Park.

3. Results of Eco-Innovation Capacity-building

3.1 Project Execution Details

Objective Framework

The project consists of four steps. Step 1 establishes a cooperative network with government and partners. Step 2 identifies the demand for capacity-building towards Eco-Innovation in depth. Step 3 develops the capacity-building and training programs for respective sectors. Step 4 builds a system that encourages voluntary participation from the recipient country and prepare for follow-up programs.



[Figure 2] Eco-Innovation Framework

3.2 Main Activities

3.2.1 Establishing Networks

SIRIM (Standard and Industrial Research Institute of Malaysia)

[Figure 3] Malaysia SIRIM

SIRIM is an agency under the wing of the MOSTI's Strategic Technology and Application Division. However, the agency belongs to the Ministry of Finance. The SIRIM's functions include developing new technology, executing national Science, Technology and Innovation (STI) programs, industrial research/development, and product standardization and quality assurance.

3.2.2 Identifying Demand

Request for Proposals

Malaysia was interested in dealing with capacity-building in the following seven areas: i) eco-friendly products and technology, ii) green marketing and eco-labeling, iii) waste management, iv) energy efficiency model, v) EIC model, vi) one-on-one business matching, and vii) market mechanism. The target industries are food processing, plastics, chemicals, and biomass. The purpose of this program is to resolve obstacles for Malaysian SMEs and to transfer knowledge regarding new technologies that can improve the operating efficiency of businesses.

Related Legislation/Program

In Malaysia, there are ongoing programs, in terms of capacity-building and Eco-Innovation technologies, supporting SMEs and promoting green technology. Notably, these include programs such as the "Capacity-building Program for SMEs": enhancing the abilities of SMEs manpower, the "Enrichment and Enhancement Program": providing consulting and technical support in order to strengthen capabilities, the "Green Technology Financing Scheme":

improving competitiveness and environmental technology development, the "Guarantee Scheme for Green Technology Financing Scheme": supporting, through financial support, technology development and the "My Hijau Industry & SME": promoting the adoption of environmental technologies and green practices.

The Malaysian government, as part of the efforts to achieve the Sustainable Development Goals (SDG) 2030 goals, seeks to realize the "sustainability of industry, innovation, and infrastructure" and "sustainable consumption and production" through the adoption of Eco-Innovation model for industrial parks. Meanwhile, in 2014, the Malaysian Housing and Local Government Ministry announced plans to construct industrial parks with Waste Generation Centers that enable the reuse of industrial waste.

Online Demand Survey

Malaysia applied for this project, in order to enhancing Eco-Innovation capability of its own industrial park. Also, it requested the sharing of environmental technologies and management techniques for the execution of Eco-Innovation for industrial parks. Along with the survey, local site visits were planned to assess the viability of Eco-Innovation for industrial parks.

<Table 5> Online Demand Survey

ASEM Eco-Innovation Preliminary Demand Interview
• Date(s): May 24 2017, 18:00 • Method: Conference call • Interview hosts: Hankyung Lee, Kyeong yeon Kim (Consultants from ECO&PARTNERS) • Interviewees: Ms. Isnazunita bt Ismail, General Manager, Ms. Shireen Shaharina bt Mohamed Shamaun, Researcher

Visit Demand Survey

Malaysia's Economy Planning Unit (EPU) is tasked as the coordinator for SDG 2030. As part of an SDG 2030 objective, "sustainability of industry, innovation, and infrastructure", it seeks to adopt the concept for Eco-Innovation for industrial parks to Malaysian industrial parks to transform it into a sustainable model. This is in accordance with the Sustainable

Consumption and Production Plan, which one of the eleven plans for development in Malaysia. As such, the Malaysian government has requested policy tools for government use and capacity-building for industry, in anticipation of adopting the eco-industrial park innovation.

<Table 6> Malaysia Visit Demand Survey

Date	July 25th, 2017 10:30AM
Project	ASEIC Eco-Innovation capacity-building program / to develop modules and identify demands
Location	EPU Conference Room, Putrajayah
Korean Participant	- ASEIC : Kang Yoon Ji PM, Jung Mi Hoon Manager - ECO&PARTNERS : Lee Han Kyung President, Kim Kyeong Yeon Senior Consultant
Malaysia Participant	• **EPU (Economic Planning Unit)** - Ravi Muthayah (Director) - Dr. Ting Kok Onn (Principal Assistant Director) - YM Engku Zakir Hussein Bin Syed Abdullah (Deputy Director) • **SIRIM** - Isnazunita Bt Ismail (General Manager, Environmental Technology Research Centre) - Tan Yong Nee (General Manager, Environmental Technology/ Research Centre) - Shireen Shaharina bt. Mohanmed Shamun (Researcher)
Agenda	**Demand for capacity-building: Preparation for eco-industrial park introduction** - Solutions to adopt the eco-industrial park concept to existing industrial zones - Businesses in industrial parks require technologies for reducing waste, improving facility efficiency, and reducing energy usage - Government needs to incentivize businesses with policy (environmental regulation, energy usage regulations, subsidies, incentives) - Seminar to increase awareness on Eco-Innovation for industrial parks and capacity-building for government agencies - Improve understanding by using case studies of Eco-Innovation for industrial parks • **Capacity-building target** - Businesses located in Malaysian industrial parks • **Capacity-building format** - Lecture type of seminar on Korean institutions for introducing Eco-Innovation for industrial parks and case studies - Feasibility study on adoption of Eco-Innovation for industrial parks by visiting local industrial parks

Picture		

3.2.3 Program Development

Overview of Capacity-building Seminar

Malaysia planned a site inspection program and a seminar on Eco-Innovation for industrial parks. On the first day of the program, a seminar in the form of a lecture was held for relevant government agencies and businesses. On the second day, a visit to an industrial park and waste processing facility was conducted to assess the operational situation.

<Table 7> Malaysia Program Overview

	Day 1	Day 2
Date	Nov 1st (Wed)	Nov 2nd (Thur)
Subject	Eco-industrial park innovation	
Location	Marriott Hotel Putrajaya	PIIP industrial park, POIC industrial park, CENVIRO waste treatment plant
Participants	Government officials and SMEs in industrial parks	Industrial park staffs
Agenda	Case study of eco-industrial park innovation Cases of industrial symbiosisadoption Collaboration between stakeholders	Feasibility of adopting eco-industrial park innovation based on field survey
Format	Lecture	Field Survey

Lecturers

The major concept of Eco-Innovation for industrial parks is the "industrial symbiosis", and it is more important to understand the various industrial symbiosis cases that result from industrial park characteristics than standardized theories. In order to assist the seminar participants in their understanding of Eco-Innovation for industrial parks and the industrial symbiosis concept based on various case studies, experts with experience in planning and establishing such systems in domestic and overseas locations were invited as lecturers. Field experts with the qualifications to conduct on-site diagnosis and technical consultation based on collected data were also invited during on-site inspections to assess the possibility of the adoption of Eco-Innovation for industrial parks in Malaysia.

- **Deok Gyu Han, Climate Change Team Leader, Ansan Environment Foundation**

The current Ansan Environment Foundation Climate Change Team Leader, with ten years of experience in various projects on Eco-Innovation for industrial parks in the Korean industrial complex institution Gyeonggi EIC project division.

- **Sang Yoon Lee, Representative Director, L&E**

The representative director of L&E, a firm that provides resource circulation network development and management services between businesses. Director Lee has experience establishing various industrial symbioses in the Ulsan industrial complex EIC project group, along with ecological industrial parks in Ulsan, Mipo, and Onsan for the past eleven years.

- **Sang Jun Ahn, Clean Infrastructure Planning Division PM, Institute of Industrial Technology**

The PM of the Korea Institute of Industrial Technology clean infrastructure planning division, with 6 years of experience in regional Eco-Innovation projects and green partnership projects for Korean industrial parks, as well as experience establishing clean production systems in industrial sites.

- **Ji Un Park, Specialist, IFC (International Finance Corporation)**

In charge of Climate Competitive Industries at the International Finance Corporation, with experience in industry development projects.

- **Mi Hoon Jung, Manager, ASEIC**

Current manager of ASEIC with a Ph.D. in natural environment management. Planned

various international cooperation programs at the Korea industrial complex institution such as knowledge exchanges for promoting Eco-Innovation, research tours, and consulting projects.

Capacity-building Seminar Module Overview

In "EIC1," an overview of Eco-Innovation for industrial parks and effects of its adoption was provided, and in "EIC2," the current status, problems, and achievements of Eco-Innovation for industrial parks in Korea and other countries were analyzed. In "EIC3," the expected benefits of the Eco-Innovation for industrial parks model was presented.

<Table 8> Modules used in Malaysia Project

Category	Classification Number	Module Name	Usage
Energy Efficiency	EE1	Trend on global climate change	
	EE2	Status of climate change response of Korea	
	EE3	Cases of energy efficient technology application	
	EE4	Theory of energy utilities and its characteristics	
	EE5	How to measure the utilities with equipment	
Cleaner Tech	CT1	The need of 3J5S in workplace	
	CT2	3J5S Methodology	
	CT3	Cases of 3J5S application	
	CT4	Introduction to Eco-Innovation	
	CT5	Cases of Eco-Innovation application (general)	
	CT6	Cases of Eco-Innovation application (dyeing wastewater management)	
	CT7	Introduction to GreenBiz	
Eco-Innovation for industrial parks	**EIC1**	**Introduction to Eco-Innovation for industrial parks and its status**	○
	EIC2	**Eco-Innovation models for industrial parks**	○
	EIC3	**Benefits of Eco-Innovation models for industrial parks**	○
Eco-design	ED1	Introduction to eco-design	

	ED2	Procedures to adopt eco-design	
	ED3	Global enterprise's eco-design tools and cases	
	ED4	Cases of eco-design products	
	ED5	Eco-design practice	
Eco-labeling	EL1	Introduction to eco-labeling and its need	
	EL2	Cases of eco-labeling application	
	EL3	Introduction to Environmental Product Declaration	
	EL4	Introduction to Green Building Certificate and cases	
Green marketing	GM1	Introduction to green marketing and its trend	
	GM2	Cases of green marketing	

Capacity-building Seminar Program

The capacity-building seminar in Malaysia was held in the form of a lecture for government agencies involved in Eco-Innovation for industrial parks and representatives from SMEs located in industrial parks. By analyzing the case studies of Eco-Innovation for industrial parks in Korea and other nations, the lecture explored the possibility of adopting Eco-Innovation model for industrial parks in Malaysia. A stakeholder cooperation module was prepared in order to preemptively investigate possible conflicts that may arise from adopting Eco-Innovation model for industrial parks along with conflict resolution measures. Since this project aims to build capacity for SMEs, the lecture also introduced the results and industrial symbioses drawn by Eco-Innovation for industrial parks in regards to SMEs in Korea.

An agency that manages state industrial parks (POIC), a business located in the industrial park, and a waste processing facility were visited for on-site inspection, and examined to evaluate the possibility of adopting Eco-Innovation model for industrial parks.

<Table 9> Day 1 Program

Establishing a foundation for adopting Eco-innovation model for industrial parks in Malaysia for a transformation to sustainable industrial park					
Time	Module	Module Name	Specifics	Lecturer	Format
0830-0900	Registration				
0900-0915	SIRIM Welcoming remarks ASEIC Opening ceremony				
0915-0920	ASEIC Video				
0920-1000	EIC 1	Introduction to Eco-Innovation for industrial parks and its status	EIC overview and effect of adoption	Dr. Jung Mihoon, Manager, ASEIC	Lecture
1000-1010	Break				
1010-1100	EIC 2	Eco-Innovation models for industrial parks	Shairng Korea's experience with EIC establishment	Dr. Ahn Sangjoon, PM, KNCPC	Lecture
1100-1200	EIC 2	Eco-Innovation models for industrial parks	EIC cases by country	Park Jiun , Advisor, World Bank	Lecture
1200-1210	Q&A				
1210-1330	Luncheon				
1330-1415	EIC 2	Eco-Innovation models for industrial parks	Problems and resolution strategies for developing a symbiotic network between stakeholders and their cooperation	Dr. Han Deokgyu , Team Leader, Ansan Environmental Foundation	Lecture
1415-1545	EIC 3	Benefits of Eco-Innovation models for industrial parks	Energy area industry incubating case study	Dr. Lee Sangyoon , Representative Director, L&E	Lecture
1545-1600	Break				

1600-1645	EIC 2	Eco-Innovation models for industrial parks	EIC local adoption strategy seen from Korean SME's cooperation case	Dr. Han Deokgyu , Team Leader, Ansan Environmental Foundation	Lecture
1645-1715	-	-	Discussion on role of public sector and responsibilities	Dr. Jung Mihoon, Manager, ASEIC	Discussion
1715-1730	Wrapup and final sesion				

<Table 10> Day 2 Program

Team 1		**Team 2**	
0700-0900	Move (Putrajayah hotel → PIIP industrial park, KLK Oleomas)	0700-1300	Move (Putrajayah hotel→ Sabah POIC management office)
0900-1200	**KLK Oleomas field survey**	1300-1700	**POIC personnel meeting**
1200-1400	Move (PIIP → Negeri Sembilanregion CENVIRO)		
1400-1700	**CENVIRO field survey**	1700-2100	Move (POIC management office → Putrajayah hotel)
1700-1900	Move (CENVIRO → Putrajayah accomodation)		

3.2.4 Seminar Organization Support

The capacity-building seminar for Malaysia was held on November 1, 2017, at the Marriott Hotel in Putrajaya. 40 representatives related to government and SME industries participated in the seminar.

The field survey on November 2 was divided into two teams. Team 1 visited the KLK Oleomas in the PIIP industrial park and collected information detailed factory-specific. The team 1 conducted an inspection of the factory to verify the possibility of creating industrial symbioses with other factories. At the waste processing facility, CENVIRO, the team examined the type of waste material collected within the facility along with measures to utilize the waste. Team 2 visited the POIC management of the Sabah state industrial park to examine the possibility of creating industrial symbioses within the complex, and assessed the possibility of adopting Eco-Innovation model for industrial parks.

[Figure 4] Malaysia capacity-building seminar

3.2.5 Awareness Improvement

To quantitatively identify the effectiveness of the capacity-building project, an evaluation tool was developed to measure the improvement in the participants' awareness on the topics that were discussed and their level of satisfaction with the seminar. The level of understanding before and after the seminar was evaluated on a five-point scale (i.e., fully aware, fairly aware, partly aware, limitedly aware, and not aware). The level of satisfaction on content/lecturer/seminar was similarly evaluated using a five-point scale (i.e., excellent, good, average, fair, and poor).

<Table 11> Survey items and survey sheet

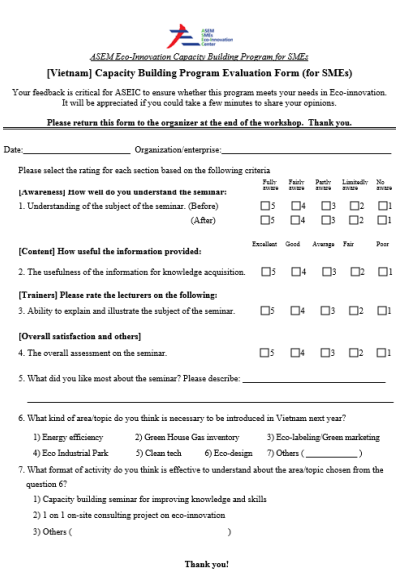
<Survey Overview>

1. [Awareness] Level of awareness before and after seminar
   - Understanding on seminar topics (before/after)

2. [Content] Evaluation of seminar content
   - Usefulness of lecture material in acquiring subject matter knowledge

3. [Lecturer] Evaluation of lecturers
   - Ability to explain and express content

4. [Seminar] Overall evaluation



ASEM Eco-Innovation Capacity Building Program for SMEs

[Vietnam] Capacity Building Program Evaluation Form (for SMEs)

Your feedback is critical for ASEIC to ensure whether this program meets your needs in Eco-innovation. It will be appreciated if you could take a few minutes to share your opinions.

Please return this form to the organizer at the end of the workshop. Thank you.

Date:_____ Organization/enterprise:_____

Please select the rating for each section based on the following criteria

	Fully aware	Fairly aware	Partly aware	Limitedly aware	No aware
[Awareness] How well do you understand the seminar:					
1. Understanding of the subject of the seminar. (Before)	☐5	☐4	☐3	☐2	☐1
(After)	☐5	☐4	☐3	☐2	☐1

	Excellent	Good	Avarage	Fair	Poor
[Content] How useful the information provided:					
2. The usefulness of the information for knowledge acquisition.	☐5	☐4	☐3	☐2	☐1
[Trainers] Please rate the lecturers on the following:					
3. Ability to explain and illustrate the subject of the seminar.	☐5	☐4	☐3	☐2	☐1
[Overall satisfaction and others]					
4. The overall assessment on the seminar.	☐5	☐4	☐3	☐2	☐1

5. What did you like most about the seminar? Please describe: _____

_____

6. What kind of area/topic do you think is necessary to be introduced in Vietnam next year?

1) Energy efficiency 2) Green House Gas inventory 3) Eco-labeling/Green marketing
4) Eco Industrial Park 5) Clean tech 6) Eco-design 7) Others (_____)

7. What format of activity do you think is effective to understand about the area/topic chosen from the question 6?

1) Capacity building seminar for improving knowledge and skills
2) 1 on 1 on-site consulting project on eco-innovation
3) Others ( )

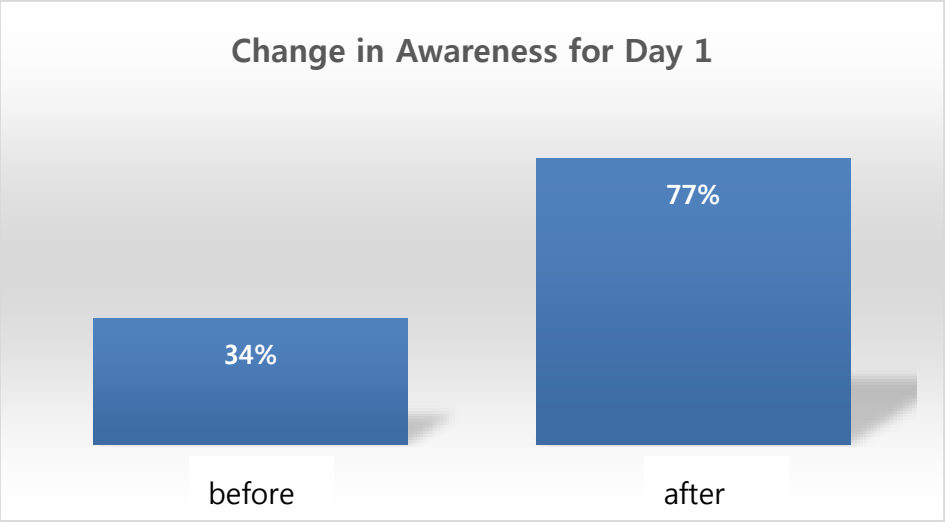
Thank you!

The five-point scale was converted to 0%–100%, as shown in the following figure, to analyze the change in awareness. A paired sample t-test was conducted to compare the difference between before and after the capacity-building in a single group to test the change in value. If the *p*-value of the t-test is less than 0.05, then the change can be considered significant. However, if it is greater than 0.05, it is not significant because, this indicates that there was no actual change although the average may have improved.

<Table 12> 100% conversion table for 5-point scale

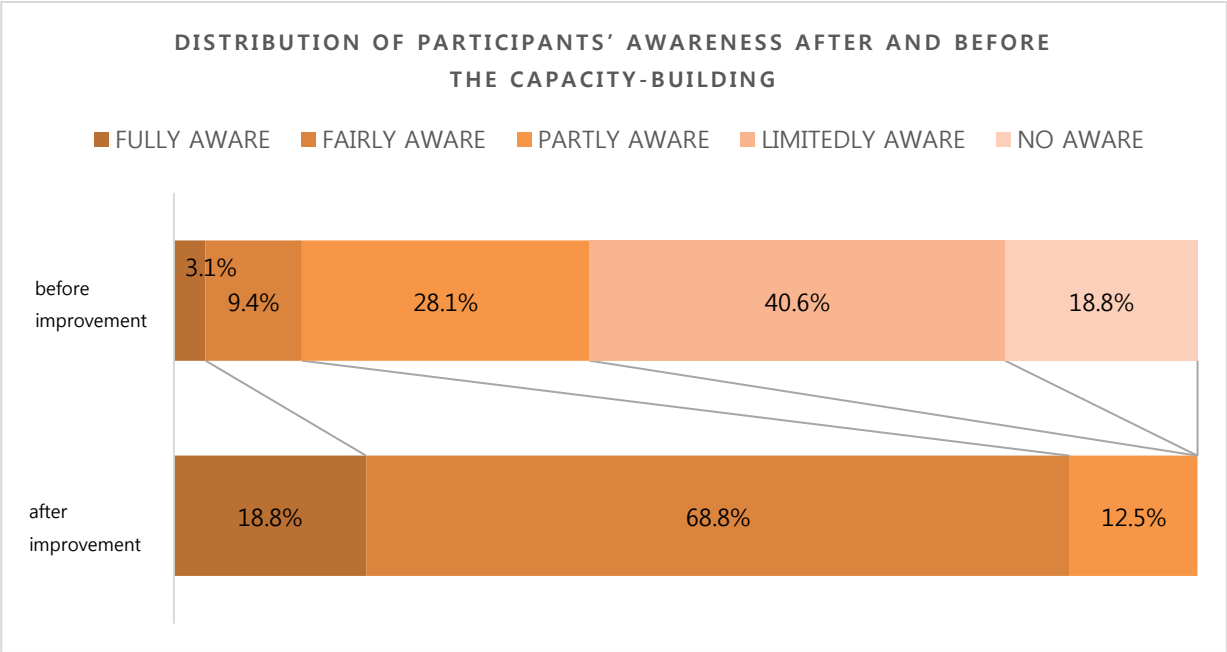
No aware	Limitedly aware	Partly aware	Fairly aware	Fully aware
0%	25%	50%	75%	100%

After the first day of the seminar, the participants' awareness increased from 34% to 77%, with 43 percentage point. The paired sample t-test yielded *p*-values of 3.4×10^{-12} for the two days, which are less than the statistically significant level of 0.05, signaling an actual improvement in awareness.



[Figure 5] Changes in awareness for day

From 12.5% of participants that responded with fully aware / fairly aware before the seminar, the number increased to 87.6% after the seminar, yielding 75.1 percentage point increase.



[Figure 6] Distribution of participants' awareness before and after the capacity-building

4. Follow-Up Measures

4.1 Need for a Voluntary Follow-Up System

The target countries' continuous engagement in Eco-Innovation activities following the conclusion of this project is important. Therefore, the target countries must possess the necessary capabilities to enable them to respond to environmental problems autonomously. These capabilities can be developed through a long-term capacity-building program. A permanent capacity-building program of which purpose is to identify country-specific environmental problems that reflect local demand should be established. The target countries can participate in the capacity-building program to build their own abilities to respond to the changes in the environment actively.

4.2 Identifying Country-Specific Eco-Innovation Model and Feasibility

A survey for the seminar participants was undertaken to reflect the local demand and identify future Eco-Innovation project models. The survey results indicated that most of the participating countries have demand for the areas of capacity-building that are equal to or more specific but similar to those having been discussed in the seminar. Based on the survey results, we conducted interviews with partners from each country and identified that the followings are the particularly necessary to build their capabilities towards Eco-Innovation.

<Table 13> Next year project demand survey

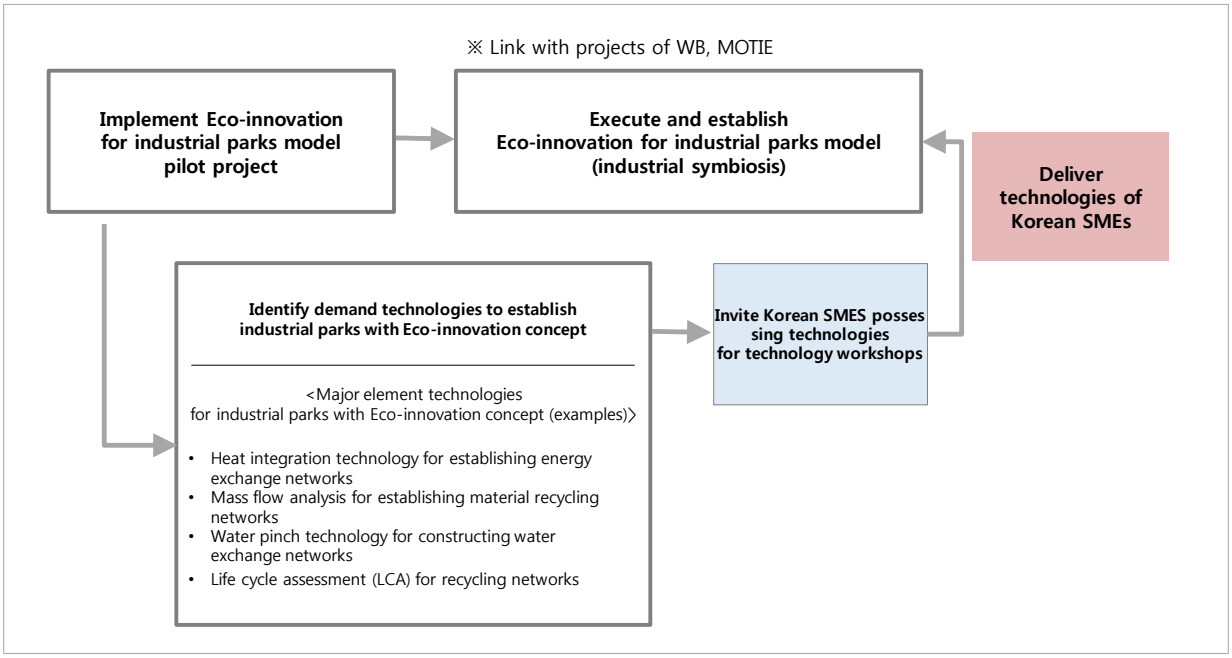
Country	**Survey Results**		**Partner Institute Interview Results**
	Demand Area	Capacity-building Format	
Malaysia	[1] Eco-Innovation for industry parks (14) [2] Clean-tech/energy efficiency/eco-design (10)	[1] Seminar (20) [2] 1:1 Consulting (16)	Pilot program for adopting Eco-Innovation for industry parks

In this year's Malaysia capacity-building program, the possibility of adopting Eco-Innovation for industrial parks was examined by visiting a local industrial park, a factory located within mentioned complex, and a waste treatment facility. As a result of the visits, it was found

many industrial parks where quite a number of factories were concentrated in that area exist in Malaysia. It was concluded that adopting Eco-Innovation model for industrial parks is feasible, due to circumstances that even many factories get rids of recyclable materials, such as by-products.

Based on these findings, it is expected to conduct an Eco-Innovation pilot project for industrial parks which are interested in applying the Eco-Innovation model to themselves. To adopt the Eco-Innovation model for industrial parks, it is essential to establish industrial symbioses among factories located in the complex. A pilot project for industrial parks in Malaysia is expected to draw industrial symbioses and identify demanded technologies for implementing the industrial symbioses. The demanded technologies for facilitating the Eco-Innovation model include heat integration technology, mass flow analysis for establishing a material recycling network, water pinch technology for constructing a water exchange network, and life cycle assessment for recycling networks.

Successful Korean cases of industrial symbiosis which were established with Korean technologies can be introduced as a good example, based on findings from the pilot project. Technology workshops with invited Korean enterprises possessing the technologies are expected to be held to enhance Malaysia's technology capability.



[Figure 7] An Eco-Innovation Model Appropriated to Malaysia