

**Development of a
Framework for Cooperation
between the APO, NPOs
and National Institutes of
Technology for the
Development of
Productivity Courses**



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BACKGROUND

There is a need to expand the efforts of the Asian Productivity Organization (APO)¹ and National Productivity Organizations (NPOs) to meet the growing demand for productivity practitioners in the region. In doing so, they have to establish strong cooperation with local institutions in offering productivity courses, or enhance those existing courses to meet such demand. Therefore, various productivity training courses have to clearly emphasize these needs, and must be structured to ensure the building up of capabilities of students. As these institutions complement the training programs of the APO and NPOs and focus on specific areas, a framework of cooperation remains a very important aspect. In addition, productivity tools and techniques have different emphases, though they point to common outcomes.

Thus, this paper intends to explain the model framework of cooperation and to identify relevant productivity tools and techniques. It should be noted that this report is based on the review and synthesis of the country papers, resource persons' presentation materials, and the participants' discussion outputs during the Workshop on Development of Courses for Productivity Practitioners at Institutes of Technology, which was held from 13–16 May 2014 in Taipei, Republic of China (ROC). Seventeen participants from 14 member countries attended the workshop: Cambodia, Fiji, India, Indonesia, Lao PDR, Mongolia, Nepal, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand, and Vietnam, with one local observer from the ROC. The purpose of the workshop was twofold: 1) to assess opportunities for cooperation between the APO, NPOs, and Institutes of Technology in order to develop and offer productivity courses at national and local levels, and 2) to identify relevant productivity tools and techniques that Institutes of Technology could incorporate in their training programs.

¹ The Asian Productivity Organization (APO) is the sole nonprofit international organization in the Asia-Pacific region devoted to productivity enhancement. Established in 1961 as a regional intergovernmental organization, the APO contributes to the sustainable socioeconomic development of the Asia-Pacific region through productivity enhancement. The current membership comprises 20 economies. Three strategic directions guide the APO: strengthen NPOs and promote the development of SMEs and communities, catalyze innovation-led productivity growth, and promote Green Productivity.

Because the workshop was aimed at looking into the productivity courses and training for Institutes of Technology, this paper will present them in the hope of understanding their current situations, needs, and concerns, including issues and challenges, and will see how cooperation can be established and serve its purpose. More specifically, the purpose of the paper is as follows:

- To suggest a suitable framework model for cooperation between NPOs and National Institutes of Technology in offering and expanding productivity courses;
- To identify relevant productivity tools and techniques that National Institutes of Technology can offer and expand, following the recommendation(s) made at the workshop; and
- To recommend new courses that APO, NPOs, and National Institutes of Technology can offer.

DEVELOPMENT OF A FRAMEWORK FOR COOPERATION BETWEEN THE APO, NPOS, AND NATIONAL INSTITUTES OF TECHNOLOGY FOR THE DEVELOPMENT OF PRODUCTIVITY COURSES IN INSTITUTES OF TECHNOLOGY OF MEMBER COUNTRIES

The APO, NPOs, and National Institutes of Technology play major roles in the development of a framework for cooperation for the development of productivity courses. Figure 1 presents key players in the framework for cooperation. The key players are found in the circles, with their programs, courses, and services. The current productivity issues and challenges that all key players would like to address bind them together. The three players cooperate in the development of productivity courses aligned to the needs of productivity practitioners of the National Institutes of Technology, which will eventually create and enhance the pool of productivity practitioners in the APO member countries as a whole. At a larger scale, one of APO's strategies is to propagate productivity and quality improvements in the Asia-Pacific region is intended to create a

multiplier effect through the development of productivity practitioners in all member countries.

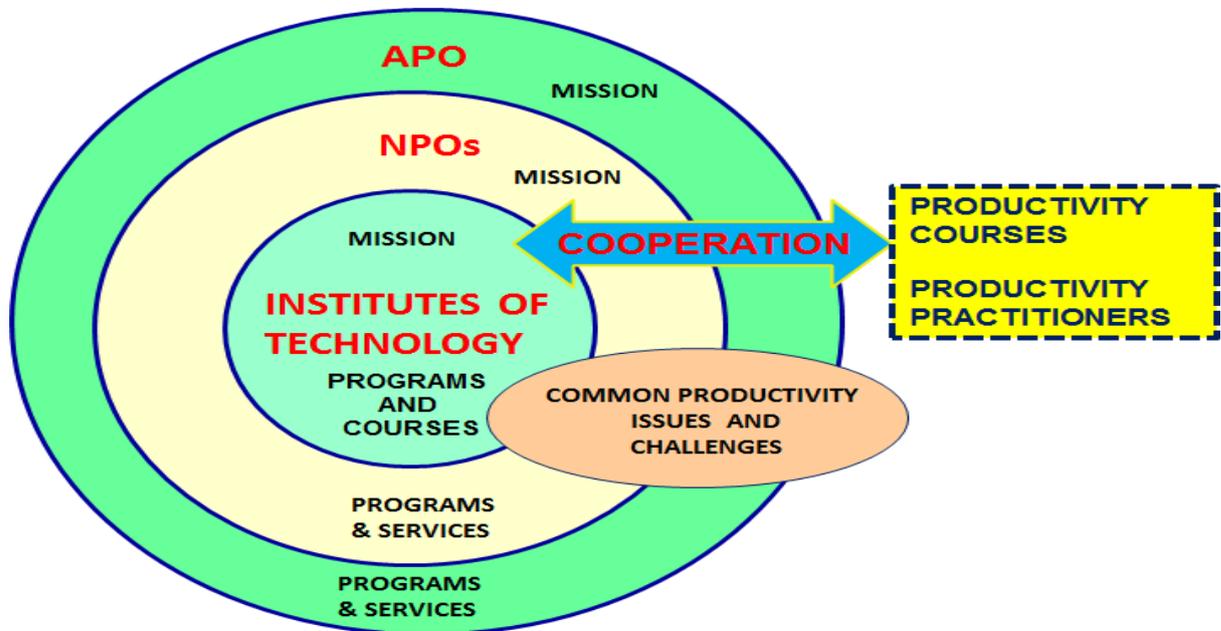


Figure 1. Key players in the framework for cooperation.

Cooperation requires voluntary, long-term relationships between the APO, NPOs, and Institutes of Technology. Partners form a mutually rewarding relationship with the purpose of improving some aspects of training. These partnerships might vary, depending on the circumstances of each country. The literature review suggests that effective cooperation shares a number of common elements [1]. The following characteristics were identified:

- Leadership and commitment are provided by leaders of the APO and NPOs.
- Communication is open, honest, frequent, and clear between the APO, NPOs, and Institutes of Technology. Communication means more than keeping people informed through meetings, letters, newsletters, brochures, posters and news releases. It also means providing ongoing opportunities for feedback.
- Trust and respect are an established part of the relationship. Positive relationships between the key stakeholders can best be developed by taking advantage of the

unique knowledge and skills that each has to offer. The sharing of expertise is the foundation for effective relationships.

- Formal, written agreements and/or policy statements that are signed by all involved can ensure both a clear understanding between participants and smooth implementations.
- Long-term commitment is required by all the partners. Participants need to be willing to commit their time and energy to cooperation.
- Recognition of shared goals helps to overcome difficulties and facilitate cooperation. Well-formulated objectives give direction for planning and implementing activities; develop a plan of action that establishes what the partnership hopes to accomplish.
- Recognition is a key element in keeping stakeholders involved. Create opportunities to privately and publicly acknowledge the value of each partner's contribution(s).
- Clear implementation strategies and purpose are necessary. Partners feel that they own the project, and this sense of ownership sustains them through the long, hard process of implementing projects and building cooperation.

Productivity is the relationship between inputs and outputs, and productivity improvements can be accomplished through collaborative efforts and systematic processes [2]. In this sense, the logic model was considered as a way to develop a framework for cooperation between the APO, NPOs, and National Institutes of Technology for the development of productivity courses. Planning a course of action generally implies some sort of logic model. The logic model is useful in planning, managing, accounting for, auditing, evaluating, or explaining the connections between resources, inputs, activities, outputs, and desired ends [3–6]. Logic models show causal relationships based on a systems approach as they relate to one another. Moreover, logic models enable one to understand what must be done to achieve the desired outcome. They also facilitate planning and managing interventions, and are a vital tool in facilitating communication between programs and stakeholders in terms of identifying targets, strategies, and performance measures [6–7]. A framework for cooperation between the APO, NPOs, and

National Institutes of Technology was developed on the basis of the logic model for the development of productivity courses, as shown in Figure 2.

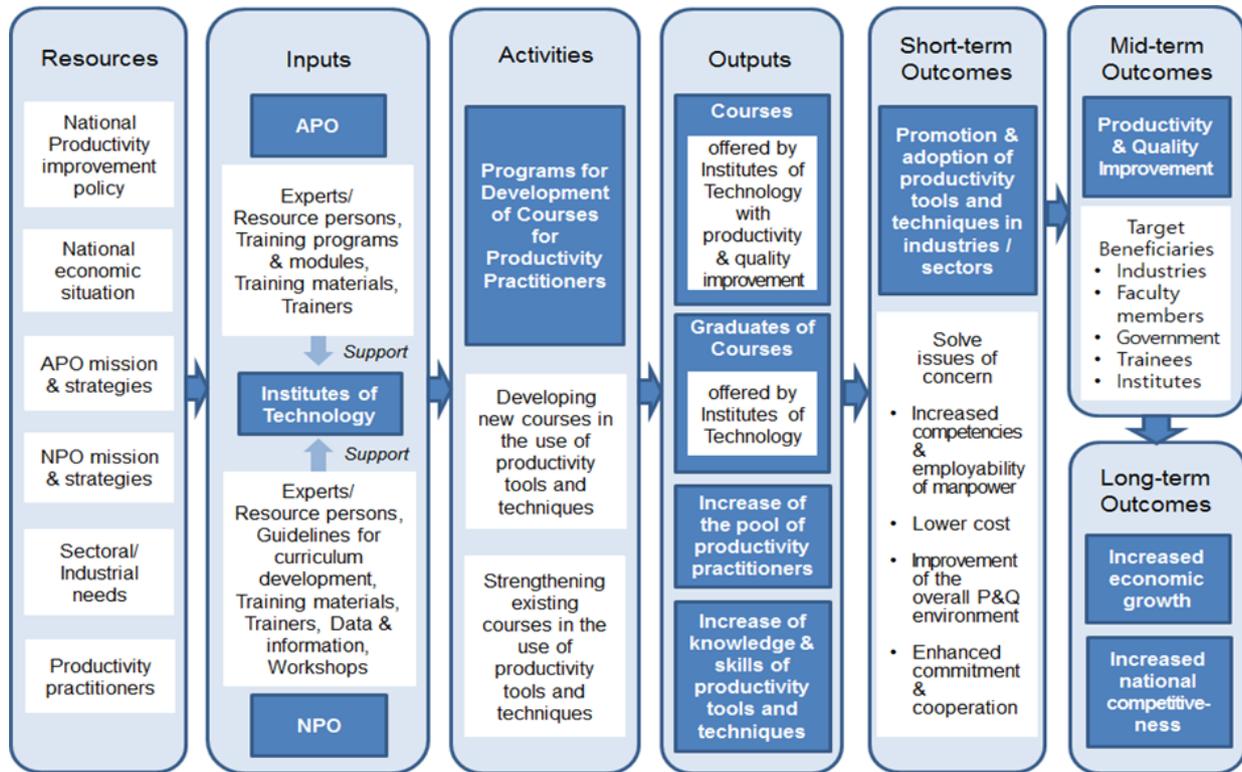


Figure 2. Development of a Framework for Cooperation between the APO, NPOs, and National Institutes of Technology for the development of productivity courses in Institutes of Technology in member countries. Conceptualized by the author following the models of [3–6].

The framework of cooperation shows how productivity courses can be developed and strengthened by the National Institutes of Technology, and can ultimately result in positive outcomes at the national level. Before initiating partnerships, the following steps are to be reviewed by the APO, NPOs, and Institutes of Technology:

- Consider why you are seeking cooperation and what you hope to gain.
- Examine the mission statement of your organization and consider revisions.
- Examine your current capacity in terms of training, and consider whether it is sufficient for your partnership needs.
- Ensure that you have adequate infrastructure for course development and

implementation.

- Assess training-related capabilities and needs for cooperation.
- Develop training objectives for the proposed partnership, and consider curriculum development needs.

Starting from the national productivity improvement policy, strategy, and programs, as well as sectoral and subsectoral productivity and business needs, these courses will then be initiated by key stakeholders or partners, the APO, NPOs, and National Institutes of Technology. The framework of cooperation uses its funds, materials, and personnel as inputs to provide for the development of courses for productivity practitioners at the National Institutes of Technology. Before the input stage, several resources should be considered: a national productivity improvement policy, a national economic situation, the APO's mission and strategies, each NPO's mission and strategies, sectoral or industrial needs, and productivity practitioners.

For Institutes of Technology to successfully develop courses for productivity practitioners, the roles of the stakeholders are critical. In other words, the involvement of key stakeholders such as the APO, NPOs, and National Institutes of Technology is essentially required, because they could provide useful information and resources for effective course development at the Institutes of Technology. Table 1 summarizes the roles of key stakeholders in the framework for cooperation in the input stage. The APO is recommended to provide related strategic directions and business plans, to actively interact with NPOs in member countries and Institutes of Technology to identify their needs, and to make suggestions to member countries through its research activities and outputs. The APO needs to have active interactions with NPOs to convey its policy directions. The NPOs need to assess current and future needs, seek out continuous improvement, and interact with the APO, other NPOs, and Institutes of Technology. Additionally, the Institutes of Technology are required to profile resources regarding course development and training, to identify areas of research and training from industrial and social perspectives, to assess training needs and types of training, to decide training components, and to plan criteria-based evaluation.

Table 1. Roles of stakeholders in the framework for cooperation in the input stage

Name of Stakeholder	Roles
APO	Offering the APO's strategic directions and business plans, interaction with NPOs and Institutes of Technology, and making suggestions to member countries through its research activities and outputs
NPOs	Assessment of current and future needs, continuous improvement, systems development, interacting with the APO, interacting with Institutes of Technology, and interacting with NPOs in other member countries
National Institutes of Technology	Resource profiling; identification of areas of research and training (from industrial and social perspectives); assessment of education and training needs, types of training, and training components; and planning of criteria-based evaluation

At the input stage, various types of support are needed from the APO and NPOs to develop and implement courses effectively. The APO is expected to give support to Institutes of Technology. The types of support needed for program implementation from the APO include: 1) experts on specific areas and resource persons, 2) training materials, 3) training personnel, 4) curriculum development (programs and modules for training), and 5) guidelines for course implementation. Among the types of support needed, the top priority has been found to be support for experts and/or resource persons. Following that, expertise on specific areas has been found to be the next most necessary form of support from the APO for successful program implementation. In addition, training materials and trainer support are also highly necessary. Participants expect the APO to be able to provide expertise through experts and resource persons, as well as through training materials and trainers for program implementation. Further, best practices, information, industry data, and relevant data are likewise noted as being forms of support needed from the APO.

The Institutes of Technology need support from NPOs for development and implementation. The NPOs are mostly expected to provide institutes with the following

types of support: 1) experts or resource persons, 2) curriculum development and guidelines for course implementation, 3) training materials and trainers, and 4) relevant data and information. As such, we have found expertise to be the main type of support needed from NPOs.

Taken together, the lack of expertise in certain areas, training materials, trainers, and relevant curriculums can be barriers to program implementation at Institutes of Technology. Therefore, the APO and NPOs need to offer expertise to Institutes of Technology by dispatching experts or resource persons to help them acquire the expertise needed. Moreover, the APO and NPOs should develop standardized training materials and learning resources, and deliver them to Institutes of Technology. The institutes could utilize or revise them for the purposes of their own training objectives. As such, close cooperation between the APO, NPO, and Institutes of Technology is essentially mandatory in order to achieve successful program development and implementation.

With support from the APO and NPOs, the National Institutes of Technology can develop new courses or improve existing ones through the use of productivity tools and techniques. If Institutes of Technology do not have productivity courses, an introduction to these courses can be made. However, if an institute has a program or courses for productivity practitioners, the existing courses can be improved. Curriculum discussions regarding programs for development of courses should begin by reviewing the overall training goals decided on during the initial planning sessions.

What the programs for development of courses produce (or output) includes: 1) courses offered by Institutes of Technology with productivity and quality improvements, 2) graduates of courses offered by Institutes of Technology, 3) an increase in the pool of productivity practitioners, and 4) an increase in knowledge and skills of productivity tools and techniques.

From these outputs, the framework of cooperation seeks to accomplish the following outcomes:

- Short-term outcomes: promotion and adoption of productivity tools and techniques in industries or sectors;
- Mid-term outcomes: productivity and quality improvement by solving issues of concerns such as a lack of competencies and employability of manpower, high costs, low levels of overall productivity and environment quality, and low level of commitment and cooperation; and
- Long-term outcomes: increased economic growth and increased national competitiveness.

The beneficiaries of the productivity and quality improvement programs include industries (companies), faculty members, government, trainees, and institutes. Industries such as multi-national corporations and small and medium-sized enterprises are included within the first listed beneficiary.

When partnerships among the APO, NPOs, and the Institutes of Technology are well planned and administered, every stakeholder involved wins. When leaders are able to clearly see that tangible benefits can be realized through energetic cooperation, they make collaboration a priority. When the benefits to organizations are vague, or not consistently reinforced, ownership is viewed as valueless and the end result is unwilling participation. The advantages of beneficiaries from cooperation are as follows:

- For industries (employers), there is the intrinsic reward of sharing their time and effort to enrich the curriculum by offering labor market information and training needs, and helping trainees or students see how what is learned in institutes relates to the real world. The employers who play an active role in the cooperation of frameworks can motivate trainees by helping them become aware of career possibilities and expectations, while also serving as positive career role models. In addition, employers can gain an expanded pool of qualified job applicants.
- For trainees, cooperating within frameworks allows for the realization that there is still much more to learn beyond the training materials and the classroom. Partnerships can also provide trainees with opportunities to learn new knowledge and skills through newly introduced courses.

- For Institutes of Technology, cooperation could bring new resources to enrich the curriculum and keep it up to date, which can lead to developing qualified trainees and productivity practitioners. Institutes of Technology receive a broader base of support from influential business leaders and the general public. The partnership provides natural channels to communicate with NPOs. By doing so, the institutes can be offered from NPO course development and related resources, such as training curriculums, training materials, and training personnel. The cooperation between NPOs and institutes will enable the courses to have successful outputs and outcomes.
- For the community and government, cooperation frameworks convey the idea that course development is a joint responsibility, improving the quality of the local community and, ultimately, national competitiveness.

In sum, the development of a framework for cooperation between the APO, NPOs, and National Institutes of Technology can help Institutes of Technology in APO member countries develop courses for productivity practitioners, increase productivity and quality in industries by enhancing employees' competencies and lowering costs, and ultimately improve national economic competitiveness. As such, cooperation between stakeholders can positively impact Institutes of Technology, local areas, and member countries.

A SUITABLE FRAMEWORK MODEL FOR COOPERATION BETWEEN NPOS AND NATIONAL INSTITUTES OF TECHNOLOGY IN OFFERING AND EXPANDING PRODUCTIVITY COURSES

On the basis of the participants' discussions and group work presentations during the workshop, the opportunities for cooperation between NPOs and Institutes of Technology in developing and offering productivity courses at national and local levels can be found in the following areas:

- Exchanging information about labor markets, necessary workforce, and high-demand occupations;

- Exchanging knowledge and training consultancy;
- Conducting training programs;
- Sharing facilities and equipment;
- Having NPO persons as instructors;
- Conducting research projects or joint research together;
- Inviting industry persons as instructors;
- Collaborating on joint training sessions and seminars to promote productivity; and
- Sharing publications on areas of interest related to productivity.

A system of collaboration between Institutes of Technology and NPOs is necessary. This cooperation is also needed among Institutes of Technology. In addition, Institutes of Technology and NPOs should get to know each other and communicate frequently for collaboration, due to the lack of cooperation between them at present. At the same time, NPOs need to assist Institutes of Technology in designing and implementing training courses. Moreover, the NPO in each country needs to collaborate with NPOs in other countries. The NPO expert exchange program is an example of cooperation among NPOs.

In terms of possible contributions of NPOs for a framework of cooperation to develop productivity courses for productivity practitioners in Institutes of Technology, experts or resource persons are first needed to provide expertise, as well as to design and update training programs, and to organize seminars, workshops, and conferences. Institutes of Technology can contribute to a framework of cooperation by designing training programs and developing learning resources or lecture materials. Moreover, evaluation methodology and research programs are suggested as possible areas for contributions to the framework of cooperation.

In addition, Institutes of Technology need to pre-plan before establishing partnerships with NPOs and the APO. Here are some suggestions of topics that Institutes of Technology can consider to clarify their thinking:

- Define your training identity.

- Consider whether current courses for productivity practitioners adequately support the missions and strategies of the APO and NPOs. How will participation in a cooperation framework support their missions?
- Determine your program needs that are not being met through onsite instruction, and consider how a partnership with the APO and NPOs can best meet those needs.
- Consider how a partnership can help to establish links with the APO and NPOs.
- Determine the resources that are available to support a partnership (e.g., curriculum development guidelines, trainers, training resources, etc.). What additional resources are required?
- Consider your degree of support for a partnership, and begin to develop additional support.

IDENTIFYING RELEVANT PRODUCTIVITY TOOLS AND TECHNIQUES THAT NATIONAL INSTITUTES OF TECHNOLOGY CAN OFFER AND EXPAND

Before identifying relevant productivity tools and techniques that National Institutes of Technology can offer and expand, the extent or level of implementation of productivity tools and techniques was first examined. Table 2 shows the current extents/levels of implementation of productivity and quality improvement tools and techniques, as well as reasons for the extents/levels of implementation at the institute or NPOs.

Some institutes and NPOs, such as the Institute of Management Sciences (IMSciences) in Pakistan, the Indian Institute of Technology Kharagpur, the Thailand Productivity Institute, the Vietnam Productivity Institute, the Center for Corporate Learning (CCL), the Singapore Manufacturing Federation, the National Productivity Council in India, the National College of Science & Technology and Don Bosco Technical College in the Philippines, the National Economics University in Vietnam and Vietnam National Productivity Institute, indicated a high level of implementation of productivity and quality improvement tools

and techniques. The reasons for the high level of implementation were revealed to be evaluation of the training programs and curriculums, problem solving, cost reduction, increasing efficiency and effectiveness, having pool of experts, and high demand.

The other institutes and NPOs pointed out medium or medium-to-high levels, and even low levels, of implementation of productivity and quality improvement tools and techniques. The University of Science and Technology in Mongolia, the National College of Science & Technology Institute of Industrial Research and Training (NCST-IIRT) in the Philippines, the Ministry of Education in Sri Lanka, the Industrial Enterprise Development Institute in Nepal, the National Training and Productivity Center in Fiji, the National Technical Training Institute (NTTI) in Cambodia, the Directorate Productivity and Entrepreneurship, Directorate General of Training and Productivity at the Ministry of Manpower and Transmigration in Indonesia, and the National Productivity Organization in Pakistan were found to implement productivity and quality improvement tools and techniques at the medium or medium-to-high level, as there is a lack of further training for an updated version of a productivity tool, a lack of conceptual knowledge, and a lack of enough experts.

Finally, the Lao IT Incubation Center from the National University of Laos was identified as having a low level of implementation because of low conceptual knowledge on productivity tools and techniques.

Table 2. The extent/level of implementation of productivity and quality improvement tools and techniques. Compiled by the author using the country papers of participants of the workshop.

Name of Institute/NPO	Extent/Level of Implementation of Productivity Tools and Techniques			Reason for the Extent/Level of Implementation of Productivity Tools and Techniques
	Low	Medium	High	
Institute of Management Sciences (IMSciences) in Pakistan			✓	Continuous evaluation of the training program and document learning
Indian Institute of Technology Kharagpur			✓	Expertise, learning methodology, implementation framework, problem-solving capabilities, continuous evaluation
University of Science and Technology in Mongolia		✓		Lack of experts, lack of training personnel and resources
Thailand Productivity Institute			✓	Problem solving, cost reduction, increasing efficiency and effectiveness
Vietnam National Productivity Institute			✓	Cost reduction, expertise learning, evaluation of the training program and curriculum

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Name of Institute/NPO	Extent/Level of Implementation of Productivity Tools and Techniques			Reason for the Extent/Level of Implementation of Productivity Tools and Techniques
	Low	Medium	High	
National College of Science and Technology, Institute of Industrial Research and Training (NCST-IIRT) in Philippines		✓		Lack of further training for updated version of productivity tool
Singapore Institute Center for Corporate Learning (CCL), Singapore Manufacturing Federation			✓	Strong demand of productivity and quality improvement
Ministry of Education in Sri Lanka		✓	✓	Low conceptual knowledge of productivity and quality improvement tools and techniques
Lao IT Business Incubation Centre, Faculty of Engineering, National University of Laos	✓			Low conceptual knowledge of productivity and quality improvement tools and techniques, lack of experts, lack of training personnel and resources
Industrial Enterprise Development Institute in Nepal		✓	✓	Insufficient demand for productivity and quality improvement

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Name of Institute/NPO	Extent/Level of Implementation of Productivity Tools and Techniques			Reason for the Extent/Level of Implementation of Productivity Tools and Techniques
	Low	Medium	High	
National Productivity Council in India			✓	Sufficient pool of experts, high demand for productivity and quality improvement
National Training and Productivity Centre in Fiji		✓	✓	Insufficient experts on productivity and quality improvement tools and techniques
National Technical Training Institute (NTTI) in Cambodia		✓		Lack of experts, lack of training personnel and resources
Directorate Productivity and Entrepreneurship, Directorate General of Training and Productivity Development, Ministry of Manpower and Transmigration in Indonesia		✓		Lack of efficiency and effectiveness, lack of conceptual knowledge of productivity and quality improvement tools and techniques
National Productivity Organization in Pakistan		✓		Lack of further training for updated version of productivity tool

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Name of Institute/NPO	Extent/Level of Implementation of Productivity Tools and Techniques			Reason for the Extent/Level of Implementation of Productivity Tools and Techniques
	Low	Medium	High	
National College & Science & Technology Don Bosco Technical College in Philippines			✓	Continuous evaluation of the training program and document learning
Institute in ROC*			✓	Problem-solving capabilities, continuous evaluation, demand for innovation
National Economics University in Vietnam			✓	Efforts for increasing efficiency and effectiveness

*Name of institute was not provided by the local observer of the workshop who worked as consultant.

In addition, existing productivity and quality improvement tools and techniques have been identified, as shown in Table 3. Most Institutes of Technology and NPOs indicate that existing productivity and quality improvement tools and techniques are: 5S, Kaizen, Quality Circle (QC), Total Quality Management (TQM), Six Sigma, Total Productive Management (TPM), Lean, and ISO system.

Table 3. Existing productivity tools and techniques offered by Institutes of Technology and the NPOs. Compiled by the author using the country papers of participants of the workshop.

Name of Institute/NPO	Productivity and Quality Improvement Tools and Techniques
Institute of Management Sciences (IMSciences) in Pakistan	Needs assessment (Survey, KII & FGD), structured questionnaires, observation
Indian Institute of Technology Kharagpur	Seven Tools, New Seven Tools of QM, MCDM, Six Sigma, TQM, LEM, TPM, QFD, CE, production planning and scheduling, OR, inventory management, HFE, ergonomics, NPPM, multi criteria productivity/performance measurement techniques
University of Science and Technology in Mongolia	Kaizen suggestion scheme, 5S, Quality Circle, TQM
Thailand Productivity Institute	TPM, QCC, Lean, Kaizen, Thailand Quality Award criteria (TQA)
National Economics University in Vietnam	5S, Kaizen, TQM, TPM, Lean, KPI, TPS, Six Sigma, Seven QC tools
National College of Science and Technology, Institute of Industrial Research and Training (NCST-IIRT) in Philippines	5S, Kaizen, Quality Circle, Lean Manufacturing, ISO, Why-Why analysis, Moto training in safety, 8 Ds in problem solving, Quality Circle, Mottainai with target zero
Singapore Institute Center for Corporate Learning (CCL), Singapore Manufacturing Federation	5S/Good Housekeeping, 7 wastes, Kaizen, QC, TQM, Six Sigma, Balanced Scorecard, knowledge management, energy management, total productive management

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Name of Institute/NPO	Productivity and Quality Improvement Tools and Techniques
Ministry of Education in Sri Lanka	5S/Good Housekeeping, 7 wastes, Kaizen, QC, TQM, Six Sigma, Balanced Scorecard, knowledge management, energy management, total productive management
Lao IT Business Incubation Centre, Faculty of Engineering, National University of Laos	5S/Good Housekeeping, 7 wastes, Kaizen, QC
Industrial Enterprise Development Institute in Nepal	5S/Good Housekeeping, 7 wastes, Kaizen, QC
National Productivity Council in India	5S/Good Housekeeping, 7 wastes, Kaizen, Quality Circles, TQM, Six Sigma, Balanced Scorecard, knowledge management, energy management, total productive management
National Training and Productivity Centre in Fiji	5S/Good Housekeeping, 7 wastes, Kaizen, QC
National Technical Training Institute (NTTI) in Cambodia	TQM, 5S/Good Housekeeping
Directorate Productivity and Entrepreneurship, Directorate General of Training and Productivity Development, Ministry of Manpower and Transmigration in Indonesia	5S/Good Housekeeping, ISO 9000, ISO system

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Name of Institute/NPO	Productivity and Quality Improvement Tools and Techniques
National Productivity Organization in Pakistan	Kaizen, ISO 9000
National College & Science & Technology Don Bosco Technical College in Philippines	TQM, 5S/Good Housekeeping, Kaizen, ISO 9000, ISO system
Institute in ROC*	TQM, Machinery Failure Mode Effect Analysis, Six Sigma, ISO 9000, ISO system
Vietnam National Productivity Institute	TQM, 5S/Good Housekeeping, Statistical Process Control, ISO 9000, ISO system

*Name of institute was not provided by the local observer of the workshop who worked as consultant.

Next, new and existing programs and courses relevant to current productivity and quality improvement concerns were identified, as summarized in Table 4. The issues of manpower and cost were first ranked as current productivity and quality improvement concerns at both the Institutes of Technology and NPOs. That is, a lack of workforce competencies (lack of knowledge and skills, lack of employability, lack of performance) accounted for the largest proportion of productivity and quality improvement issues and concerns. Additionally, high cost, inactive economy, and lack of funding were identified as major issues and concerns for productivity and quality improvement. Further, methods and techniques, along with proper programs, low commitment, and weak cooperation, were indicated as current productivity and quality improvement issues and concerns.

To address the productivity and quality improvement issues and concerns, the most frequently indicated existing programs or courses at NPOs and Institutes of Technology were consulting projects from government and private companies, industrial engineering and industrial safety engineering, and small business management. Other existing programs include business analysis, manufacturing technology, production technology, entrepreneurship development, ergonomics, process excellence, productivity management, and quality management.

Moreover, new programs or courses to be introduced were identified for solving current productivity and quality improvement concerns. The most frequently indicated programs or courses to be newly introduced by Institutes of Technology and NPOs were:

- Developing innovation framework;
- Green supply chain management;
- Productivity measurement;
- Quality engineering; and
- Service productivity management or service sector productivity.

Other new programs/courses to be introduced include Balanced Scorecards, innovation management, market research methodologies, occupational safety, risk management, and techno-preneurship.

Table 4. Existing and new programs/courses relevant to current productivity and quality improvement concerns at the Institutes of Technology and NPOs. Compiled by the author using the country paper of participants.

Name of Institute/NPO	Current Productivity and Quality Improvement Concerns	Existing Programs/Courses	New Programs/Courses to be Introduced
Institute of Management Sciences (IMSciences) in Pakistan	<ul style="list-style-type: none"> ● Curriculum ● New and proven methodologies ● Learning resources 	<ul style="list-style-type: none"> ● Small business Management & Research ● Small Business Management Skills ● Customer Care ● How to be an effective Manager ● Organizing exhibitions (Showcasing) 	<ul style="list-style-type: none"> ● Green supply chain management ● Market research methodologies ● Leadership for middle management staff ● Techno-preneurship ● Designing training programs ● Developing learning resources
Indian Institute of Technology Kharagpur	<ul style="list-style-type: none"> ● Human performance in environmental conditions ● Work stress management system ● Implications of technology on sustainability ● Environmental performance 	<ul style="list-style-type: none"> ● Process excellence and CI ● Industrial safety engineering ● HFE/Ergonomics ● Product development ● Business analytics ● Entrepreneurship development 	<ul style="list-style-type: none"> ● Environmental performance for SMEs ● Green supply chain management ● Occupational safety and risk management ● Quality engineering ● Service productivity management ● Innovation management ● Safety and health program ● Eco-design ● Environmental management system

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Name of Institute/NPO	Current Productivity and Quality Improvement Concerns	Existing Programs/Courses	New Programs/Courses to be Introduced
University of Science and Technology in Mongolia	<ul style="list-style-type: none"> ● Productivity management ● Measurement ● Analysis and evaluation ● Planning ● Improvement methods and techniques ● Improvement programs ● Best practices 	<ul style="list-style-type: none"> ● Productivity management subject for BA and MBA ● Quality management subject for BA and MBA ● Short-term courses (requested from companies) 	<ul style="list-style-type: none"> ● Master degree program on PQM ● Evening course on PQM ● Quality management system ● Best practices in productivity and quality ● Productivity and quality programs ● Business Excellence Framework ● Quality management system ● Productivity measurement ● Innovation framework development
Thailand Productivity Institute	<ul style="list-style-type: none"> ● Public Training ● In-house training 	<ul style="list-style-type: none"> ● Public Training ● In-house Training ● Distance Learning ● Consulting projects from government funding and private companies 	<ul style="list-style-type: none"> ● Service innovation ● Social accountability ● Environmental management system ● Designing training programs ● Developing learning resources
Vietnam National Productivity Institute	<ul style="list-style-type: none"> ● Measurement Productivity ● Best practices ● Productivity Improvement methods and techniques 	<ul style="list-style-type: none"> ● Public Training ● In-house Training ● Distance Learning ● Consulting projects from government funding and private companies 	<ul style="list-style-type: none"> ● Productivity measurement ● Productivity Improvement methods and techniques ● Employee suggestion schemes ● Just-in-time production system

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Name of Institute/NPO	Current Productivity and Quality Improvement Concerns	Existing Programs/Courses	New Programs/Courses to be Introduced
National College of Science and Technology, Institute of Industrial Research and Training (NCST-IIRT) in Philippines	<ul style="list-style-type: none"> ● 5S ● Kaizen ● Quality Circle ● Lean Manufacturing ● ISO ● Why-why analysis ● Moto training in safety ● 8 Ds in problem solving ● Mottainai with target zero 	<ul style="list-style-type: none"> ● Certificate in manufacturing technology ● Diploma in Production Technology ● Industrial engineering 	<ul style="list-style-type: none"> ● Manufacturing engineering ● 5S ● Kaizen ● Quality Circle ● Lean Manufacturing ● ISO ● Advanced Productivity Course ● Basic Productivity Course ● 3 Rs: Reduce, Recycle, and Reuse
Singapore Institute Center for Corporate Learning (CCL), Singapore Manufacturing Federation	<ul style="list-style-type: none"> ● Cost ● Manpower ● Economy 	<ul style="list-style-type: none"> ● Programs related to 5S/Good Housekeeping, 7 wastes, Kaizen, QC, TQM, Six Sigma, Balanced Scorecard, knowledge management, energy management, and total productive management 	<ul style="list-style-type: none"> ● SME, Quality Initiative Assist Nature Grow ● Business process engineering ● Quality management system ● Best practices in productivity and quality ● Productivity and quality programs

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Name of Institute/NPO	Current Productivity and Quality Improvement Concerns	Existing Programs/Courses	New Programs/Courses to be Introduced
Ministry of Education in Sri Lanka	<ul style="list-style-type: none"> ● Lack of knowledge ● Lack of resources ● Transportation barriers 	<ul style="list-style-type: none"> ● Programs related to 5S/Good Housekeeping, 7 wastes, Kaizen, QC, TQM, Six Sigma, Balanced Scorecard, knowledge management, energy management, and total productive management 	<ul style="list-style-type: none"> ● Best Kaizen school award program ● Preventive/productive maintenance
Lao IT Business Incubation Centre, Faculty of Engineering, National University of Laos	<ul style="list-style-type: none"> ● Cost ● Manpower ● Economy 	<ul style="list-style-type: none"> ● Programs related to 5S/Good Housekeeping, 7 wastes, Kaizen, and QC 	<ul style="list-style-type: none"> ● Productivity program to SMEs ● 3Rs ● Quality management system ● Best practices in productivity and quality in SMEs ● Designing training programs ● Business process reengineering ● Just-in-time production system ● Preventive/productive maintenance ● Balanced Scorecard ● Business excellence framework ● Innovation framework development

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Name of Institute/NPO	Current Productivity and Quality Improvement Concerns	Existing Programs/Courses	New Programs/Courses to be Introduced
Industrial Enterprise Development Institute in Nepal	<ul style="list-style-type: none"> ● Cost ● Manpower ● Economy 	<ul style="list-style-type: none"> ● Programs related to 5S/Good Housekeeping, 7 wastes, Kaizen, and QC 	<ul style="list-style-type: none"> ● Productivity program for micro enterprises ● Service sector productivity ● Quality management system ● Best practices in productivity and quality in SMEs ● Designing training programs ● Business process reengineering ● Just-in-time production system ● Preventive/productive maintenance ● Balanced Scorecard ● Business excellence framework ● Innovation framework development
National Productivity Council in India	<ul style="list-style-type: none"> ● Cost issues for SME ● Economy ● Sustainability 	<ul style="list-style-type: none"> ● Programs related to 5S/Good Housekeeping, 7 wastes, Kaizen, Quality Circles, TQM, Six Sigma, Balanced Scorecard, knowledge management, energy management, and total productive management 	<ul style="list-style-type: none"> ● Program on advanced tools like knowledge management or balanced scorecards ● Service sector productivity ● Developing innovation frame work ● Green productivity ● Business process reengineering ● Just-in-time production system ● Preventive/productive maintenance

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Name of Institute/NPO	Current Productivity and Quality Improvement Concerns	Existing Programs/Courses	New Programs/Courses to be Introduced
National Training and Productivity Centre in Fiji	<ul style="list-style-type: none"> ● Cost ● Manpower ● Economy 	<ul style="list-style-type: none"> ● Programs related to 5S/Good Housekeeping, 7 wastes, Kaizen, and QC 	<ul style="list-style-type: none"> ● Developing innovation frame work ● Productivity measurement ● Business process reengineering ● Just in time production system ● Preventive/productive maintenance ● Development of productivity practitioner
National Technical Training Institute (NTTI) in Cambodia	<ul style="list-style-type: none"> ● Lack of education ● Lack of career system 	<ul style="list-style-type: none"> ● Programs related to TQM, 5S, and Good Housekeeping 	<ul style="list-style-type: none"> ● Basic productivity and quality improvement tools and techniques ● Program on advanced productivity and quality improvement tools and techniques
Directorate Productivity and Entrepreneurship, Directorate General of Training and Productivity Development, Ministry of Manpower and Transmigration in Indonesia	<ul style="list-style-type: none"> ● Lack of education and funding ● Lack of commitment 	<ul style="list-style-type: none"> ● Programs related to 5S/Good Housekeeping, ISO 9000, and ISO system 	<ul style="list-style-type: none"> ● Manufacturing engineering ● Advanced Productivity Course ● Basic Productivity Course ● Business Process Reengineering

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Name of Institute/NPO	Current Productivity and Quality Improvement Concerns	Existing Programs/Courses	New Programs/Courses to be Introduced
National Productivity Organization in Pakistan	<ul style="list-style-type: none"> ● Low wage system ● Poverty ● Poor government policy ● Unemployment ● Overproduction ● Irregular inventory ● Electricity problems ● Lack of capacity building training ● No career counseling 	<ul style="list-style-type: none"> ● Programs related to Kaizen and ISO 9000 	<ul style="list-style-type: none"> ● Programs related to TQM, 7 wastes, QC, Six Sigma, and Balanced Scorecard ● Quality management system
Don Bosco Technical College in Philippines	<ul style="list-style-type: none"> ● Industrial partners too heterogonous ● Reluctant to fully cooperate ● Internal monitoring issues ● Cultural issues 	<ul style="list-style-type: none"> ● Programs related to TQM, 5S/Good Housekeeping, Kaizen, ISO 9000, and ISO system 	<ul style="list-style-type: none"> ● Programs on advanced tools like knowledge management and Balanced Scorecard ● Developing innovative frameworks ● Workplace cooperation ● Social accountability

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Name of Institute/NPO	Current Productivity and Quality Improvement Concerns	Existing Programs/Courses	New Programs/Courses to be Introduced
Institute in ROC*	<ul style="list-style-type: none"> • Innovation in productivity and quality • Advancement of productivity and quality tools 	<ul style="list-style-type: none"> • Programs related to TQM, Machinery Failure Mode Effect Analysis, Six Sigma, ISO 9000, and ISO system 	<ul style="list-style-type: none"> • Quality innovation and advancement • Productivity and quality programs for SMEs • Supply chain management
National Economics University Vietnam National Productivity Institute	<ul style="list-style-type: none"> • Low operation costs • Better employee attitudes • Good culture • Knowledge to work • Soft skills • Certificate with good brand name 	<ul style="list-style-type: none"> • Programs related to TQM, 5S/Good Housekeeping, Statistical Process Control, ISO 9000, and ISO system 	<ul style="list-style-type: none"> • Effective employee attitudes and culture for better productivity and quality • Business excellence framework • Lean management system • Service quality improvement • Energy conservation and management • Preventive and productive maintenance • Just-in-time production system

*Name of institute was not provided by the local observer of the workshop who worked as consultant.

RECOMMENDATIONS FOR NEW COURSES THAT THE APO CAN OFFER

Several new courses that the APO can offer were recommended during the workshop. The participants suggested the following new courses:

- Best practices in productivity and quality in small and medium-sized enterprises (SMEs);
- Programs on SME quality initiatives;
- Productivity and quality programs for SMEs;
- Occupational health;
- Risk management;
- Productivity measurement;
- Development of innovation frameworks;
- Programs on service sector productivity;
- Market research methodology;
- Designing training programs;
- Basic productivity course;
- Advanced productivity course;
- Six Sigma;
- 3Rs: Reduce, Recycle, and Reuse;
- Eco-design;
- Quality management system;
- Supply chain management;
- Business process reengineering;
- Preventive and productive management;

- Just-in-time production system;
- Employee suggestion schemes;
- Lean management system;
- Health and safety program;
- Social accountability;
- Workplace cooperation;
- Balanced Scorecard;
- Business excellence framework;
- Corporate social responsibility;
- Energy conservation and management;
- Environmental management system; and
- Quality management system.

New courses are expected to improve productivity and quality by solving issues of concern as specified in Figure 2. In other words, new courses to be introduced are most likely to achieve outcomes such as increased competencies and employability of manpower, lowered costs, overall productivity and environment improvements, and enhanced commitment and cooperation. Table 5 summarizes the new courses that the APO can offer based on the areas of expected outcomes by considering the frameworks of productivity-enhancing initiatives [2].

Table 5. New courses that the APO can offer. Compiled by the author using the country paper of participants.

New courses to be introduced	Areas of Expected Outcomes			
	Increased competencies and employability of manpower	Lower costs	Overall productivity and environment quality improvements	Enhanced commitment and cooperation
Cross-cutting				
5S/Good Housekeeping	●	●	●	●
7 Wastes	●	●	●	●
Benchmarking	●	●	●	●
Green Productivity	●	●	●	●
Kaizen	●	●	●	●
Knowledge Management	●	●	●	●
Quality Circles	●	●	●	●
Increased competencies and employability of manpower				
3Rs: Reduce, Recycle, and Reuse	●			
Eco-design	●			
Quality Management System	●			
Supply Chain Management	●			
Best practices in productivity and quality in SMEs	●			

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New courses to be introduced	Areas of Expected Outcomes			
	Increased competencies and employability of manpower	Lower costs	Overall productivity and environment quality improvements	Enhanced commitment and cooperation
SMEs' quality initiative	●			
Productivity and quality programs for SMEs	●			
Service Sector Productivity	●			
Market Research Methodology	●			
Designing Training Programs	●			
Developing Learning Resources	●			
Lower costs				
Business Process Reengineering		●		
Just-in-time Production System		●		
Preventive and Productive Maintenance		●		
Six Sigma		●		
Overall productivity and environment quality improvements				
Balanced Scorecard			●	
Business Excellence Framework			●	

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New courses to be introduced	Areas of Expected Outcomes			
	Increased competencies and employability of manpower	Lower costs	Overall productivity and environment quality improvements	Enhanced commitment and cooperation
Corporate Social Responsibility			●	
Energy Conservation and Management			●	
Environmental Management System			●	
ISO 9000 Quality Management System			●	
Risk Management			●	
Productivity Measurement			●	
Innovation Framework Development			●	
Enhanced commitment and cooperation				
Employee Suggestion Schemes				●
Lean Management System				●
Occupational Health				●
Safety Issues				●
Social Accountability				●
Workplace Cooperation				●

In addition, participating countries and new courses to be needed in each country are mapped based on the courses shown in Table 5. Table 6 presents the courses that need to be introduced in each country. Therefore, NPOs or Institutes of Technology in each country should consider introducing new courses or providing chances to take the courses from the APO with related practitioners.

According to the abovementioned courses, many participants from NPOs and Institutes of Technology seem to have high needs for improving productivity of SMEs and the service sector, as well as developing innovation within industries. More specifically, productivity-related programs include basic and advanced productivity courses, productivity measurement, and productivity programs for micro enterprises and SMEs. The findings also show that many NPOs and Institutes of Technology are interested in the service sector. Service-related programs include service innovation, service productivity management, research on the service sector, and service sector productivity. Other new programs to be introduced include developing innovation frameworks, green supply chain management, quality engineering, and quality initiatives.

Therefore, the APO needs to consider the abovementioned topics for future workshops to address the productivity and quality concerns of NPOs and Institutes of Technology. Considering that there are many SMEs in the member countries of the APO, future courses need to be offered regarding productivity and quality issues designed for SMEs. In addition, the issues of safety and risk management are highly recommended as future courses to be offered by the APO. Programs on service sector productivity, productivity measurement, and innovation framework need to be also prepared by the APO.

Table 6. Mapping of Participating Countries and New Courses to be needed. Compiled by the author using the country paper of participants.

New courses to be needed	Participating Countries													
	Cambodia	Fiji	India	Indonesia	Lao PDR	Mongolia	Nepal	Pakistan	Philippines	Singapore	Sri Lanka	ROC	Thailand	Vietnam
Cross-cutting														
5S/Good Housekeeping									●					
7 Wastes	●			●			●						●	
Benchmarking	●	●		●		●							●	●
Green Productivity	●		●				●							
Kaizen	●			●					●		●			
Knowledge Management	●	●	●	●	●	●	●		●	●				●
Quality Circles	●			●				●	●				●	

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New courses to be needed	Participating Countries													
	Cambodia	Fiji	India	Indonesia	Lao PDR	Mongolia	Nepal	Pakistan	Philippines	Singapore	Sri Lanka	ROC	Thailand	Vietnam
Increased competencies and employability of manpower														
3Rs: Reduce, Recycle, and Reuse	●		●	●	●		●		●					
Eco-design		●					●							
Quality Management System	●		●	●	●	●	●	●	●	●	●	●		
Supply Chain Management			●				●				●	●		
Best practices in productivity and quality in SMEs	●		●		●	●	●		●	●	●	●		●
SMEs' quality initiative	●		●	●	●	●	●			●	●			
Productivity and quality programs for SMEs	●		●	●	●	●	●		●	●	●			●
Service Sector Productivity			●				●						●	●
Market Research Methodology				●				●						●
Designing Training Programs	●	●			●		●	●					●	
Developing Learning Resources	●	●						●			●		●	

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New courses to be needed	Participating Countries														
	Cambodia	Fiji	India	Indonesia	Lao PDR	Mongolia	Nepal	Pakistan	Philippines	Singapore	Sri Lanka	ROC	Thailand	Vietnam	
Lower cost															
Business Process Reengineering		●	●	●	●		●				●			●	
Just-in-time Production System		●	●	●	●		●							●	
Preventive and Productive Maintenance		●	●		●		●				●		●	●	
Six Sigma		●	●	●	●		●							●	

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New courses to be needed	Participating Countries													
	Cambodia	Fiji	India	Indonesia	Lao PDR	Mongolia	Nepal	Pakistan	Philippines	Singapore	Sri Lanka	ROC	Thailand	Vietnam
Overall productivity and environment quality improvements														
Balanced Scorecard			●		●	●	●	●	●					●
Business Excellence Framework		●	●		●	●	●				●			●
Corporate Social Responsibility				●										●
Energy Conservation and Management			●	●								●		●
Environmental Management System			●										●	
ISO 9000 Quality Management System	●			●	●	●	●		●		●	●		
Risk Management			●	●								●		●
Productivity Measurement		●				●			●					●
Innovation Framework Development		●	●		●	●	●		●		●	●		

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New courses to be needed	Participating Countries													
	Cambodia	Fiji	India	Indonesia	Lao PDR	Mongolia	Nepal	Pakistan	Philippines	Singapore	Sri Lanka	ROC	Thailand	Vietnam
Enhanced commitment and cooperation														
Employee Suggestion Schemes	●			●										●
Lean Management System				●			●		●					●
Occupational Health			●											●
Safety Issues			●											●
Social Accountability				●					●				●	●
Workplace Cooperation				●					●					●

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CONCLUSION

This paper suggested a framework of cooperation between the APO, NPOs, and National Institutes of Technology for the development of productivity courses. To foster and enhance such cooperation in further promoting the productivity movement in the region, the roles and responsibilities of three key players in the framework, namely the APO, NPOs, and National Institutes of Technology, are truly essential.

Open and clear communication, trust and respect, long-term and dedicated commitment, and recognition are required by all the three parties. Further, recognition of shared goals, sharing of expertise, and a sense of ownership in implementing projects all help to facilitate cooperation. Most of all, the APO and NPOs should exercise strong leadership to establish cooperation.

A well-structured framework of cooperation could provide a systematic and sustained approach to support course development for productivity practitioners. For the APO workshop to have the desired outcome, some follow-up actions are recommended. This concerns the transfer of knowledge, which is a vital issue in training effectiveness. The participants should be able to use what they learned and discussed from the workshop back on the job for training to be considered effective.

Therefore, the APO could open a website for communication and workshop follow-up. The website could be used to exchange information, maintain contact with the workshop participants, and provide a place to suggest useful ideas for the APO. Follow-up support through newsletters and electronic means would also need to be provided, in order to link NPOs and Institutes of Technology with the APO.

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