

## Standards Education Policy Development: Observations based on APEC Research

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ABSTRACT AND KEYWORDS	
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# Standards Education Policy Development: Observations based on APEC Research<sup>1</sup>

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## Abstract

*This paper stems from a research project carried out for the Asia Pacific Economic Cooperation (APEC) to make an inventory of national standards education policies. Twenty countries - sixteen Asia-Pacific economies and four European nations – have been investigated. The paper relates similarities and differences between these policies to the standardization education activities in place. The paper concludes with policy recommendations.*

*Keywords: standards education; national standards strategy; policy development; APEC*

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## INTRODUCTION

Education is a social infrastructure which enables citizens to prepare for intellectual and professional life in a society. Given the socio-economic impacts of standardization (Blind, 2004; Centre for International Economics, 2007 ; DTI, 2005 ; WTO, 2005), one might expect students in schools or universities to be educated about the fundamentals and implications of standards and conformity assessment to prepare them for their career in government, businesses, standards and conformance related organizations or research institutions (Kurokawa, 2005).

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However, the majority of the just-graduates from schools or universities have hardly heard about standards and conformance in their classes; they rarely recognize its importance or impacts in the real world, and they are not ready to quickly adapt themselves to relevant job develop like developing technical standards, or business strategy or trade/regulatory policy related to standards and conformance.

By the early 1990's - most countries just offered some standards education for professionals like business experts, government officials, and standardization committee members. The situation changed since the late 1990's; governments and national standards bodies in several countries worldwide have started paying increasing attention to standards education in schools or universities (Kurokawa, 2005; de Vries and Egyedi, 2007), that is to say formal education. One good example is Korea; there were about one hundred courses in fifty universities offering classes about standardization in 2008 and those standardization classes were initiated by the Korean national standards strategy. Some of the policy makers in the arena of standardization want to question how other countries develop national strategy (policy) for education about standardization, if any, and its relationship with practices. This paper explores the commonalities and differences in development status of education policy in the national standards strategies in twenty countries - sixteen Asia-Pacific economies and four European nations, and tries to identify some of the reported successes which could be useful for the policy makers in other countries.

The number of academic studies on standardization education is very limited. De Vries (1999) applied Kuhn (1972)'s distinction of subsequent periods in the development of a scientific discipline to standardization, and concluded that the standardization 'discipline' has shown the first characteristics of the cluster period, in which groups of scientists contact each other and the first academic journals in the field appear. Now it seems that standardization shows the symptoms of Kuhn's next period: the specialization period, where occupational and academic training emerge. The need for standards education can be studied in four ways: by making an inventory of current courses, by making an inventory of standards-related tasks and knowledge and skills required for these tasks, by starting at standards-related problems to be solved, and by studying the standardization process and the human tasks related to this process (de Vries & Egyedi, 2007). Needs for standards education have also been addressed in several professional publications (APEC, 2006; ASTM, 2003; De Vries, 2003; Hesser & Czaya 1999; ISO, 2007; Kang, 2005; Purcell 2003; KSA, 2003; KSA, 2006). Kurokawa

(2005) distinguished three main target groups for standards education: general standards users, those who actually work with standards, and those who strategically address standards. De Vries and Egyedi (2007) list more specific audiences for standards education and add learning objectives. Both formal and professional education are needed (de Vries, 2005; Kurokawa, 2005). The next step is to develop a curriculum per target group. De Vries (2005) developed conceptual approaches to the development of a standardization curriculum based on tasks and competences needed, and De Vries and Egyedi (2007) list elements of the contents of different academic curricula which show many common elements. The most recent academic publication is the special issue on standardization education of the *International Journal of IT Standards and Standardization Research* (Vol. 5, No. 2, July-December 2007). This special issue nor the other papers mentioned address policy or have dealt with it as a background issue only. Therefore our paper fills a gap in current academic literature.

This special issue nor the other papers mentioned address policy or have dealt with it as a background issue only, except De Vries and Egyedi (2007). They concluded that there is a gap between manifest and latent needs for standardization education. Few policy makers notice the contribution of standards to industry and society. Company managers lack awareness of the strategic importance of standards for their company in terms of market share and effectiveness of the organization. People who do the standards work, e.g. experts who participate in standards committees, mostly do so without any education or training. They are not aware that findings in standardization research and training in professional skills could enhance their effectiveness considerably. To bridge this gap, a strong national standardization education policy would be essential or at least helpful. De Vries and Egyedi did not tell anything more about a national standards education policy.

Our paper aimed to fill this gap in academic literature by investigating national standards education policies: are such policies available and, if this is the case, what are its main elements?. The paper concludes with some lessons for developing national standards policies.

## RESEARCH APPROACH

This paper is based on the strategies in twenty different countries – sixteen from APEC region and four countries in European region.

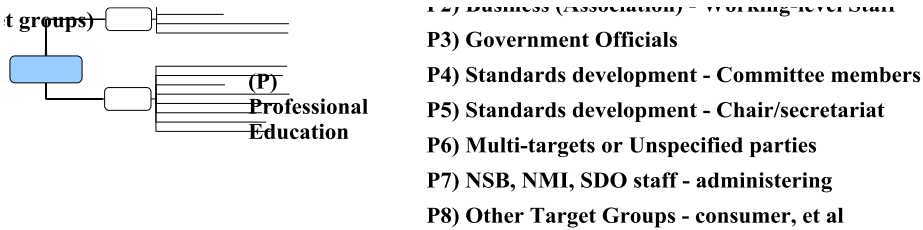
The results of sixteen APEC countries mainly stem from the “APEC Strategic Standards Education Programs – Phase I” (Choi (Ed), 2008). The Asia Pacific Economic Cooperation funded this program. In phase I a guideline was developed which provides a curriculum model for standards education (Choi (Ed.) 2008). The present paper is based on the research underlying this report. Phase II of the APEC project plans to develop a textbook and teaching manual by the end of 2009. Because of this background, our study mainly deals with standards education policies of countries in the Asia Pacific region but we supplemented these with four European countries. To collect information in the APEC region, a survey was sent to the representatives of APEC Sub-Committee on Standards and Conformance (SCSC) whose affiliations are either governments or national standards bodies. The key components of the survey are summarized in <Table 1>. Out of the 21 APEC member countries, 16 countries responded.

Also, additional research and a literature review was done to complement the survey result; it includes additional investigation about four European countries, France, Germany, Netherlands, and UK. These countries were chosen because the literature search showed that they are relatively active in standards education.

**< Table 1 > Survey Questionnaire**

Questions	Detailed Items
1. National Strategy	1.1 Having strategy in general? 1.2 Having education strategy? 1.3 If having education strategy: Plan to include education in strategy?
2. National Strategy Committee	2.1 Having standardization policy committee? 2.2 Having standardization education committee? Work scope, objectives? 2.3 Contact points for the education committee?
3. National Priority	3. Priority Level - Not Specified, Medium, High
4. National Activity	4. Activity Level - None, Plan, Developing,

In order to set up an appropriate policy direction and to successfully implement the policy in a more ‘target oriented’ way, education should be reasonably categorized. The paper therefore proposes to categorize the standards education programs by its target groups into two major categories with twelve sub-categories as described in <Figure 1>.



<Figure 1> Classification of education programs

The two major categories are Formal education (F) and Professional education (P). Formal education (F) is classified into four sub-categories which are traditional education in schools or institutions for Primary education (F1), Secondary education (F2), and Higher education composed by Undergraduate (F3) and Graduate education (F4). The Professional education, non-formal education or training (P) is classified into eight sub-categories such as Business executives (P1) and Business working level staff (P2). Therefore the term education in this paper includes all formal and professional education.

This paper analyzed current policies in twenty countries. The comparison and observations of the different policies might be able to redefine the issues and considerations for policy makers in developing a standards education strategy. The next section examined in order elements of standards education policy. Then classified scope and objectives of the policy per country. Subsequently we related national priorities to the standards education activities in place in the country. Finally we paid attention to three other issues: the role of a national standards education committee, the importance of networking and the supporting role of IT and Web technologies.. Throughout the sections, the policy analysis of twenty countries was referred to. The final section presented summary observations and discussions.

**DIVERSE DEVELOPMENT STATUS OF THE STRATEGY**

This section provides an overview of national strategies about standards education. Table 2 shows results of 4 European countries and Table 3 shows responses from 16 APEC countries on the following questions: 1) Do you have a national standardization strategy? 2) Do you have national strategies including the importance of education activities? 3) Do you have a strategy to raise public awareness on the value of standards and conformance? 4) Do you have a strategy to develop and implement education programs for professionals like policy makers, businesses, et al on standards and conformance? 5) Do you have a strategy for formal education to embed the value of standards and conformance in curriculum of schools/universities? 6) Do you have a strategy to promote networking for standards and conformance matters among academia, business, etc.? Do you have a strategy boosting to develop a database to facilitate relevant activities such as lectures, education providers, etc.?

**< Table 2 > Education Policy of selected European countries**

Question \ Country	1.	2	3	4	5	6	7
	Strategy	education	awareness	(P).edu	(F).edu	networking	database
1. France	Yes	Yes	Yes	Yes	No	No	No
2. Germany	Yes	Yes	Yes	Yes	Yes	Yes	No
3. Netherlands	Yes	No	No	No	No	No	No
4. UK	Yes	Yes	Yes	Yes	Yes	Yes	Yes



**< Table 3 > Survey Responses about Education Policy from APEC countries**

Question	1.	2	3	4	5	6	7
Country	Strategy	education	awareness	(P).edu	(F).edu	networking	database
1. Australia	No	No	No	No	No	No	No
2. Brunei Darussalam	Yes	No	No	No	No	No	No
3. Canada	Yes	Yes	Yes	No	Yes	Yes	No
4. Chile	Yes	Yes	Yes	No	No	Yes	No
5. China	Yes	Yes	No	No	Yes	No	No
6. Hong Kong, China	Yes	Yes	Yes	Yes	Yes	Yes	No
7. Indonesia	Yes	Yes	Yes	Yes	Yes	Yes	No
8. Japan	Yes	Yes	Yes	Yes	Yes	No	No
9. Korea (Republic)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10. Malaysia	Yes	Yes	Yes	Yes	No	Yes	No
11. Philippines	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12. Singapore	Yes	Yes	Yes	Yes	No	Yes	No
13. Taipei, Chinese	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14. Thailand	Yes	Yes	Yes	Yes	Yes	Yes	No
15. United States	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16. Viet Nam	Yes	Yes	Yes	Yes	Yes	Yes	Yes

***Observations:***

All the 19 investigated countries, except Australia, have a national standards strategy and in most cases this strategy includes an education strategy (17 countries). In descending order in terms of number of countries, the strategies include raising public awareness (16), implementing education for professionals (14), for students (13), promotion of networking between stakeholders (13), and developing a standards education database (5). The numbers show that most nations recognize the importance of standards education, and have developed a national strategy.

**Generally, the analysis of strategy elements shows that the countries with more elements in the survey are relatively active in standards education such as Indonesia, Korea, Philippines, Thailand, Germany, and UK. Some of the activity details can be found**

in De Vries and Egyedi (2007) and Choi (Ed.) (2008). Also, Indonesia and Vietnam reported in the APEC SCSC meeting in June 2007 that they plan to expand standards education activities nationwide. In the USA, the number of standards education activities is limited which shows that having a policy does not guarantee success. The case of the Netherlands shows the opposite: this small country has more standards education activities than the USA but without a proper strategy.

## **DISSIMILAR EPTH AND BROADNESS**

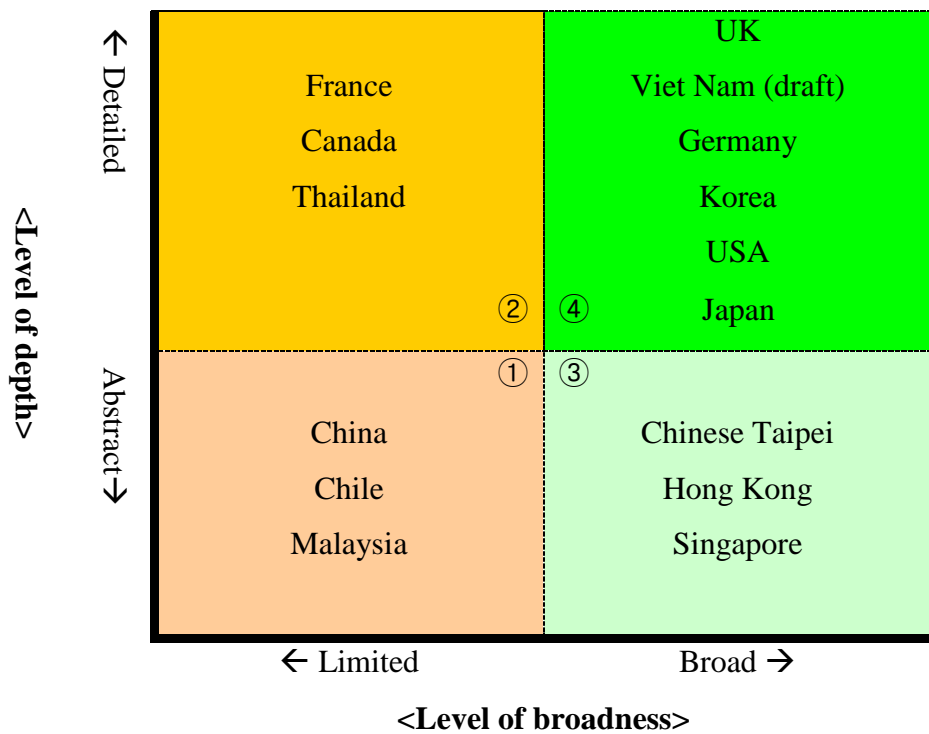
This section further analyzed the different development status of the strategy policy by answering two questions about the level of depth and the level of broadness of the policy/strategy, see <Figure 2>.

Question1. Level of Depth(length):

- How specific is the policy/strategy?
- Which action items are mentioned to implement policy/strategy?

Question2. Level of Broadness:

- How broad is the policy/strategy?
- Which parts of education are covered by the policy – professional education and/or formal education? Does it include all kinds of education?



**<Figure 2> Different Levels of Strategy**

Three countries (China, Chile and Malaysia) are categorized into in sector ① as their policies are very general with limited level of broadness and depth. China provided only one line of text as their policy: “Establish and improve the training system on standardization education”.

Three countries (France, Canada and Thailand) are categorized into sector ②, as their policies are general or focus on specific target group only, but include some specific action items comparing to those of sector ①. The policy of Thailand is a good illustration; it includes three action items: “The project on integrating standardization in education; the project on promotion of industrial standards, enhancement of quality of life, protection of consumers’ right; the project on increasing manufactures’ capacity of production and management systems to international level.” France (AFNOR, 2006) focuses on young professionals while Canada focuses on technical colleges and universities (SCC, 2005).

Three countries (Chinese Taipei, Hong Kong and Singapore) are categorized into sector ③ as their policies include a broad range of standards education activities describing

both formal and professional education but described in global terms. Hong Kong China's policy is a good illustration in this sector: "... to promote general awareness of standards and in particular to local enterprises, provide them with the latest information on local and overseas standards... In terms of school education, general concepts of the benefits of international standards compliance would be infiltrated across subjects..." (Choi (Ed.), 2008)

Six countries (Germany, Korea, Japan, UK, USA and Viet Nam) are categorized into sector ④ as their strategies show relatively in-depth and broad range of contents. Good policy does not guarantee good implementation of education program, but may increase the possibility of success. Therefore, the strategies of Germany (DIN 2004), Japan (JISC 2005), Korea (KATS 2005), UK (BSI 2003a), USA (ANSI 2005), and Viet Nam (2007) would deserve to be considered good references for developing standards education policies. Particularly, UK (BSI 2003a) published not only the NSSF strategy, but also its implementation annex (BSI 2003b), guide (BSI 2003c) and regular activity report (BSI 2006) – a useful reference for policy makers. We presented some sentences from the strategies of the five countries (Japanese strategy is now available only in Japanese):

- Intensify education and training in standardization; Increase targeted marketing; Create networks for public relations and information activities; Improve the flow of information on standardization in companies – *Germany (DIN 2004; [www.din.de](http://www.din.de))*
- Establish a department of standardization in universities in order to build the education infrastructure; Operate professional education for businesses; Initiate a private certification scheme for standardization experts; Utilize IT & web technology to build and manage standards experts. - *Korea (KATS 2006; [www.kats.go.kr](http://www.kats.go.kr))*
- Intergrate knowledge of standards into the policy of raising the skills base for business, and embed the concept of standardization in formal education curricula to ensure appropriate levels of understanding in future generations of users, developers of standards and consumers. - *UK (BSI 2003a; [www.nssf.info](http://www.nssf.info))*
- Encourage universities and colleges within the United States to create standardization education programs in fields of study such as engineering, science, technology, government and public policy, business, economics and law. - *USA (ANSI 2005;*

*www.ansi.org)*

- Set up and implement appropriate education/training programmes on standards and conformance in academic and professional institutions such as: universities, colleges, vocational/technical schools, etc. -*Viet Nam (STAMEQ 2007; www.tcvn.gov.vn)*

### ***Observations:***

The results of this section involve two interpretations. First, **the countries, having national strategy with both broad and detailed scope and objectives, are active or potentially active in standards education**, but the cases of Netherlands and Thailand imply that the active countries in the education do not always have a broad and detailed strategy; this is a similar observation as in the previous section.

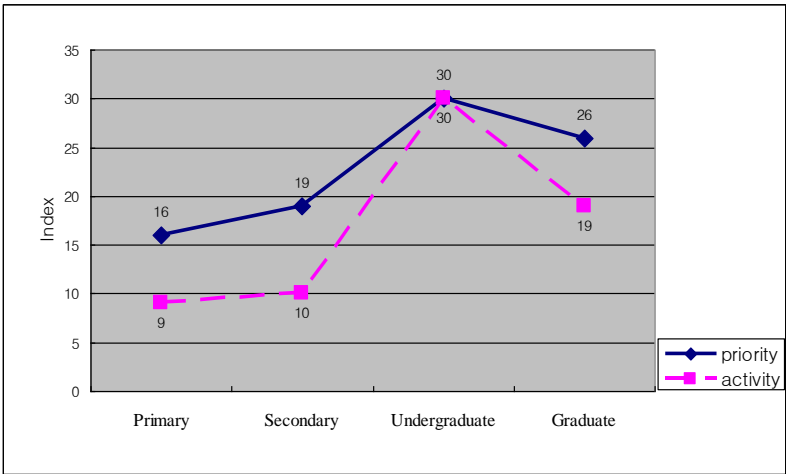
Second, some strategies are found to be too general, or focus on only specific areas like higher education and professionals; the scope and objective of the strategy are either indistinct or mixed. This could be due to either intentional focus, or lack of recognition about possible scope and objectives of standards education: from raising awareness to building specialized skills; from primary education to NSB staff education. Therefore, the strategies in sector ④ in the <Figure 2> which are both broad and detailed could be considered as good practices.

## **EDUCATION PRIORITIES AND ACTIVITIES**

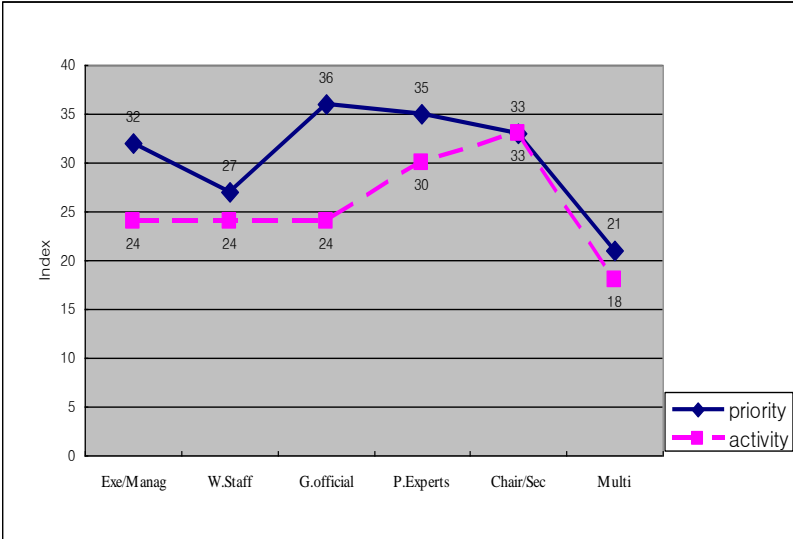
In formal education, the survey results from sixteen APEC countries showed that these countries give priority to undergraduate education followed by graduate education, secondary education and primary education as shown in <Figure 3>. (The numbers in <Figure 3> and <Figure 4> are the sum of the transformed numbers from the inputs: High-medium-low's in priority are transformed to 3-2-1 and operating–developing–planning–none to 3-2-1-0 to make data comparable easily.)

The order of priority was well balanced with that of current activity; the level between priority and activity matches well with each other; the gap between priority and

activity is widest in secondary education (19-10=9) followed by graduate education (7), primary education (7).



<Figure 3> Priority and Activity in Formal Education



<Figure 4> Priority and Activity in Professional Education

In professional education, the survey results showed that APEC countries gave priority to government officials followed by participating experts in standardization, chair/secretariat of relevant committees, business executives/managers, and business working level staff as shown in <Figure 4>.

The order of priority was well balanced with that of current activity except education for government officials; the gap between priority and activity is widest in government officials (12) followed by biz executives/managers (8), and participating experts (5).

### ***Observations:***

The two figures suggested three points. First, the APEC countries gave priority to higher education in formal education; and to government officials, committee members and business executives in professional education. Second, there was a clear correlation between priorities mentioned in the national strategies and the standards activities that are actually in place but some activities tend to lag behind. Third, the gap between priority and real activity seem to represent the common difficulty level of implementation – it was relatively less complicated to attract undergraduate students or committee chair/secretariat, it was more complicated to attract secondary school students, government officials, and business executives. This observation is useful when policy makers need to decide the sequence of target groups in policy design and implementation.

## **FACILITATING MECHANISMS**

### **1. Standards Education Committee**

Is it recommended to organize a standards education committee? What are the objectives of such a committee? The APEC survey reveals that seven countries, Canada, Japan, Korea, Malaysia, Chinese Taipei, USA and Viet Nam have an official standards education strategy committee. All of the seven countries have been reported to have an official standards education strategy. Some sentences were selectively excerpted from the survey responses of the three countries.

- To support establishing standards education as a high priority within the United States private, public and academic sectors - ***USA (ANSI Committee on Education)***
- To introduce the basics of standards and the process of standardization to university students - ***Canada (CSA Committee on Standards and Education)***
- To advise KSA in developing a strategy for and in implementing the university education program on standards - ***Korea (KSA Committee for University Education Promotion on Standardization)***

### ***Observations:***

The main objectives of these committees are to support and implement education strategies. If the committee unites different stakeholders of standardization to cooperate with; organizing and cooperating with such a committee makes it easier to develop and implement a national standards education policy.

## **2. Networking Community**

Instead of or in addition to having a standards education committee, organizing a networking among academia, researchers, businesses or policy makers across the nation or internationally is a good option to facilitate standards education.

The Netherlands has such an academic network of academic researchers in the field of standardization and conformity assessment, and its chair of standardization functions as the informal centre of these activities under the sponsorship by the national standards body NEN. Membership includes researchers from most Dutch universities, the general directors of NEN and of the national accreditation organization, the president of the national standards users organization, and the main standards and conformance officer from the Ministry of Economic Affairs. Some countries like France, Germany, Indonesia, Malaysia have a national standards user society, and usually they have shown interest in standards education particularly for consumers. The International Federation of Standards Users IFAN ([www.ifan.org](http://www.ifan.org)) also discusses standards education issues with its WG16 'Education and Training'.

The European Academy for Standardization EURAS ([www.euras.org](http://www.euras.org)) is a Europe-based network of academic researchers. Membership is open for non-academic and non-European participants. The APEC region does not have a similar network or society to discuss standardization research and education issues. If any, the Standards Engineering Society SES ([www.ses-standards.org](http://www.ses-standards.org)) would be the counterpart of EURAS in North America region, but it is rather focused on professional issues or networking. SIIT ([www.siit2007.org](http://www.siit2007.org)) conference is a good forum to discuss standardization research and education, but it is not a formal organization. The EC provides an academic standardization network catalog to facilitate cooperation among the universities ([ec.europa.eu/enterprise/standards\\_policy/academic\\_network/catalogue.htm](http://ec.europa.eu/enterprise/standards_policy/academic_network/catalogue.htm)). The University



of Agriculture and Technology in Tokyo, the China Jiliang University in Hangzhou and the Rotterdam School of Management, Erasmus University, The Netherlands recently established a cooperation on standardization education and research which is intended to become open for other participants.

The International Cooperation on Education about Standardization ICES ([www.standards-education.org](http://www.standards-education.org)) is the only international forum worldwide solely focusing on standards education issues. It was formalized in its Gaithersburg meeting in Feb 2008. The mission of ICES is to promote education about standardization and improve its quality and attractiveness for all stakeholders (Hill, 2006). APEC SCSC organized an ad hoc group, Project Advisory Group on Education (PAGE). The group is mainly to facilitate cooperation about standards education among the SCSC members and advise its standards education project.

### ***Observations:***

In order to facilitate standards education, it will be constructive to facilitate networking to exchange information and experiences about teaching methods and textbooks, and to discuss cases and research issues among academia, businesses, and policy makers.

Policy makers of a country should consider organizing such a networking within their countries, and participating in regional or international forums. Also, the policy makers in regional bodies including APEC or international organizations could assist in organizing a networking or cooperate with such a forum.

### **3. IT and Web Technologies**

A website, database or eLearning platform for teachers and students is a good tool to facilitate standards education by increasing accessibility to education contents and effective sharing of relevant information.

The KSA-UEPS' website ([www.kssn.net](http://www.kssn.net)) facilitates university education program by providing around 90 universities nationwide participating in the program with the functions of managing the lectures' database, and sharing teaching materials and exams. The website operated by ANSI ([www.standardslearn.org](http://www.standardslearn.org)) provides four courses in the form of eLearning modules. The EC funded project outcome 'Standardisation in Companies and Markets' (Hesser et al, 2007) has a website with an e-Learning service, which are available for

contracted partners. The education website of BSI in UK ([www.bsieducation.org](http://www.bsieducation.org)) is providing teaching materials for students and teachers for all level of formal education groups by internet; page hits recorded for 2005-06 were 588,000, with over 88,000 PDF files being downloaded (BSI 2006).

Of course, the websites operated by EURAS, SIIT, ICES provide good contents regarding standards education. A different type of website operated by a private company is Consortiuminfo.org; this site includes around 1,000 academic or professional articles and most of them are available for free downloads – a good resource for teachers and students.

### ***Observations:***

Using IT and Web technologies will increase accessibility or diffusion of standards education contents, communications among stakeholders, and the effectiveness of education systems of standards education programs – useful tool for consideration. The websites of KSA-UEPS, ANSI, EU-Asia Link, BSI and Consortium-Info could be considered as good references.

## **SUMMARY OBSERVATIONS AND DISCUSSION**

This paper added to the existing academic and professional literature on standards education by addressing the topic of national strategies. It provided information about policy development based on twenty different national policies worldwide. To systematically compare the standards education strategies, the paper categorized the target into formal education with four sub-categories, and professional education with eight sub-categories. The paper further investigated the elements of the strategies, scope and objectives, priority and current activity, and other issues, and proposed following observations and discussions.

First, in most cases, the analysis of strategy elements that showed that the countries with more elements in their strategies are relatively active in standards education such as Indonesia, Korea, Philippines, Thailand, USA, Germany, and UK. The elements should be considered in standards education policy include the scope, objectives, target groups, and other considerations like education committee, networking, IT/web technologies. However, the case of the Netherlands can be argued that a strategy does not guarantee that such activities are in place.

Second, the detailed investigation into the scope of objectives of the strategy suggested a similar story with the first observation. In most cases, the countries having national strategy with both deep and broad scope and objectives, are active in standards education, but the cases of Netherlands and Thailand implied that the countries active in the education do not always have broad and detailed strategy. Also, it is observed that some of the scope and objective of the standards education strategies are either indistinct or mixed; this could be due to either planned focus, but also due to being short of recognition about possible scope and objectives of standards education. In the latter case, the strategy could be improved by referring to other policies. For policy makers in such a case, the strategies of UK, Viet Nam, Germany, Korea, USA, and Japan could be considered as useful references to develop standards education strategy.

Third, our findings suggested that the surveyed countries give priority to higher education and to education for government officials, committee members, and business executives; a clear correlation exists between priorities mentioned in the national strategies and the standards activities that are actually in place; the gap between priority and real activity seems to represent the common difficulty level of implementation – it is relatively less complicated to attract undergraduate students or committee chairs/secretariats; it is more complicated to attract secondary school students, government officials, and business executives. This observation is useful when policymakers need to decide the sequence of target groups in policy implementation.

Fourth, some other mechanisms are considered in standards education strategy were investigated. Organizing an education committee are a useful for policy makers to get advice about policy development and implementation. Also, policy makers of a country could positively consider organizing a networking within their country, and participating in regional or international forums. For effective dissemination and communication, using internet or eLearning platform is a good option. The relevant websites of KSA-UEPS, ANSI, BSI, EU-Asia Link, and ConsortiumInfo could be considered as good references.

Summing up, the policy analysis shows some similarity as well as dissimilarity in the standards education policy of twenty countries - the scope, objectives, priority and detailed action items. The resemblance of policies in different countries might imply that standards education is considered as a common interest. The differences could indicate that the different interests and socio-economic infrastructure per country require differences in standards education strategy.

On the other hand, these differences could indicate a lack of recognition about possible policy considerations and ideas. In this case, the policies of some countries which are active standards education could be referred as good practices as to other countries when they develop their national policy or strategy for standards education.

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[www.pro-norm.de](http://www.pro-norm.de) and [www.asia-link-standardisation.de](http://www.asia-link-standardisation.de) (The EC project website)

## ACRONYMS

ANSI	American National Standards Institute (USA)
APEC	Asia Pacific Economic Cooperation
APEC SCSC	APEC Sub-Committee on Standards and Conformance
APEC SCSC PAGE	APEC SCSC Project Advisory Group on Education
ASTM	American Society for Testing and Materials
BSI	British Standards Institution (UK)
BSMI	Bureau of Standards, Metrology and Inspection (Chinese Taipei)
BSN	National Standardization Body (Indonesia)
CBI	Confederation of British Industry (UK)
DSM	Department of Standards Malaysia (Malaysia)
DTI	Department of Trade and industry (Philippines; UK)
DTI BPS	Bureau of Product Standards (Philippines)
EC	European Commission
EURAS	European Academy for Standardization
ICES	International Cooperation for Education about Standardization
IEC	International Electro-technical Commission
IFAN	International Federation of Standards Users
ISO	International Organizations for Standardization
KATS	Korean Agency for Technology and Standards (Korea)
KSA	Korean Standards Association (Korea)
METI	Ministry of Country, Trade and Industry (Japan)
NSB	National Standards Body (usually corresponding to ISO, IEC)
SCC	Standards Council of Canada (Canada)
SDO	Standards Developing/Development Organizations
SES	Standards Engineering Society (based on USA)
SPRING	Standards, Productivity and Innovation Board (Singapore)
STAMEQ	Directorate for Standards and Quality (Viet Nam)
UEPS	University Education Program on Standards (Korea, KSA)

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