

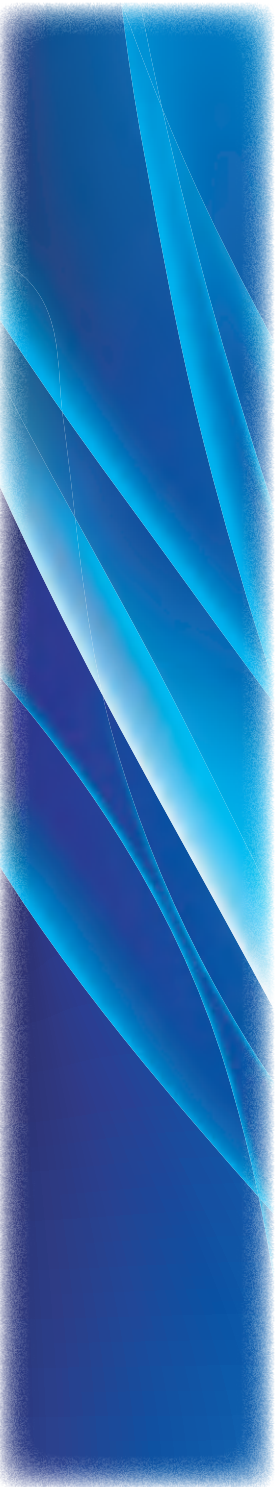
APEC Sub Committee on Standards and Conformance  
Education Guideline 4 - Case Book

# *Teaching Standardization in Universities : Lessons Learned from Trial Program*

October 2011



Asia-Pacific  
Economic Cooperation





**Sponsored by**

Korean Agency for Technology and Standards (KATS)

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APEC#211-CT-03.3

ISBN 978-981-07-0110-9



**Asia-Pacific  
Economic Cooperation**

**Education Guideline  
On Standards and Conformance  
for APEC Member Economies**

**APEC SCSC  
Education  
Guideline**

**4**

**APEC SCSC Education Guideline 4 - Case Book**

**Teaching Standardization in Universities:  
Lessons Learned from Trial Program**

10 October 2011

APEC Sub- Committee on Standards and Conformance (SCSC)  
APEC Committee on Trade and Investment

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## Preface

Noting the views expressed by the Ministers in the 2006 Ministerial Joint Statement on the importance of education about standardization, the APEC Sub-Committee on Standards and Conformance (SCSC), which has been working since 1994 for APEC Economies to address key issues in standards and conformance, initiated a multi-year project entitled, ‘APEC Strategic Standards and the Conformance Education Program’ 2007-2011.

This casebook is the fourth series of ‘Education Guidelines’ produced with the funding provided for the APEC Strategic Standards and Conformance Education Program. The third Education Guideline, ‘Standardization: Fundamentals, Impact, and Business Strategy (APEC#210-CT-03.4)’, was published in June, 2010. The second Education Guideline, titled ‘Strategy for Education and Outreach on Standards, Conformity Assessment, and Technical Regulations (APEC#208-CT-03.3),’ was published in July of 2009. The first Education Guideline, ‘Case Studies for How to Plan and Implement Standards Education Programs and Strategic Curriculum Model (APEC#209-CT-03.3),’ was published in March of 2008.

The objective of this guideline, titled ‘Teaching about Standardization in Universities: Past Experiences and Lessons Learned’, is to provide more practical comments and the lessons learned from trial implementation programs for education programs about standardization in higher education in the APEC region. This casebook can also be used in the senior level of the undergraduate program as well as for professional training of business managers and government officials. This casebook is an outcome of the APEC project CTI 37/2010T jointly funded by the APEC and Korean Agency for Technology and Standards (KATS). Eight universities in Korea were funded by KATS while six universities in other economies are funded by APEC project funding for their course operation. The project to develop this casebook was proposed and managed by the Korean Standards Association (KSA).

This casebook can be considered as a follow-up to the first Education guideline, which includes 88 case analyses of education programs. As there are few books on education courses for standardization, individual economies, particularly developing economies, have been faced with the demanding task of developing teaching programs themselves or seeking assistance help due to a lack of experiences. The development of this casebook will not only enable members to save time and effort in their planning process, but also build the cooperative bases for future education on standardization in their regions, one that will indeed increase public awareness in companies and public authorities in the member economies in addition to universities. It will thus contribute to greater trade facilitation in our region.

Fourteen universities from six economies participated in the trial program described in this casebook – China, Indonesia, Japan, Korea, Peru, and Vietnam. The courses were held in the semester that ran from January to July of 2011 depending on the university. Ten courses

were fully dedicated on standardization as a primary subject of their courses, while the other five courses dealt with standardization as a secondary topic. The trial programs operated in both colleges of engineering and social science disciplines, and therefore the trial programs have been taught in diverse divisions including business departments, technology and innovation management, IPR programs, quality institute, electronics engineering, and industrial engineering. Students in the programs are enrolled in only undergraduate level and also Master's and PhD levels. In total, 468 students have attended the trial programs as listed below.

University (Economy)	Major/Department	Students' Level		
		Bachelor	Master	Doctor
01.CJLU (China)	Business Management	70		
02.Chungang (Korea)	Business		5	13
03.Diponegoro (Indonesia)	Industrial Engineering.	32		
04.EWHA (Korea)	MBA		10	
05.HUFS (Korea)	Industrial Engineering	6	1	
06.Hanyang (Korea)	Business		4	6
07.Kookmin (Korea)	Open for all majors	39		
08. KNU.Educ. (Korea)	Technology Education.		12	4
09.Korea Un. (Korea)	Elect. &ICT Engineering	3	3	2
10.NEU (Vietnam)	Business - Quality	47		
11.P.U.C.P(Peru)	Quality Institute		19	1
12.Trisakti (Indonesia)	Industrial Management		21	
13.Waseda (Japan)	Global Business School	54	98	
14.Yeonsei (Korea)	International Management		18	
<b>Total: 14 Universities - 468 Students</b>		<b>251</b>	<b>191</b>	<b>26</b>

Please note that the contents in this report were commissioned by the project editor to be developed and written by individual authors from Fourteen universities. The governments of the APEC member economies, including the co-sponsoring economies, do not endorse or take any position on the views or opinions expressed in 'Teaching Standardization in Universities: Lessons Learned from Trial Programs'. The views and opinions expressed in the chapters of this book are those of the respective authors. The contents of these chapters and case studies do not necessarily represent the views of APEC, the SCSC, and the member economies of APEC or the APEC Specialist Regional Bodies.

This casebook is designed to provide future teachers and interested standardization-related organizations with details of education programs on standardization. Each chapter contains a case report from one particular university, and therefore, this book has 14 chapters of trial programs. Each chapter contains syllabus, class summary, course operation strategy, student characteristics, key references, feedback from students, main activities of the class, and most importantly lessons learned. Additionally, many of these chapters include extracted sample

essays, case studies, and/or presentations by both students and lecturers. Chapters are alphabetically sorted by the name of the contributing universities.

The last chapter 15 followed by the lessons learned from trial programs of 14 universities is a summary report of the 2011 Joint Meeting of the APEC Sub-Committee on Standards and Conformance (SCSC)'s Project Advisory Group on Education (PAGE) and the American National Standards Institute (ANSI) 's Committee on Education (CoE). The workshop was held on February 28, 2011 in Washington D.C, USA. We include this briefing in this casebook because the workshop is an important part of the phase III project, and presents important discussions and recommendations.

I would like to thank participating experts who made this casebook available as well as you all the SCSC member delegates. Particularly, special thanks should be given to the governments of the proposing economy Korea, and the eight co-sponsoring economies of this education initiative – China, Indonesia, Japan, Peru, Singapore, Thailand, USA, and Vietnam.

You are more than welcome to visit [www.wisestandard.org](http://www.wisestandard.org) (APEC SCSC education website) or [www.standard-education.org](http://www.standard-education.org) (International Cooperation for Education about Standardization) for more information on standardization education.

*Editor, Dong-Geun CHOI*  
*(Chief Researcher, Korean Standards Association)*





# Ch.1 International Trade and Standardization

**Economy** : **China**

**University** : **China Jiliang University (CJLU)**

**Department** : **Business Management**

**Students** : **Bachelor (Junior) (70)**

**Written by** : **Vice President & Prof. Mingshun SONG**

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## 1. EXECUTIVE SUMMARY

This course is offered to bachelor level students majoring in Business Management under its title, “International Trade and Standardization”. Seventy junior undergraduate students’ seeking a Bachelor degree in Business Management have now taken this course.

The main objectives of the course are to have students understand the major aspects of standardization, including the basic theory of standardization, standard development procedures, conformity assessment, standardization and international trade, and standardization and innovation. To this end, this course reviews five topics, i.e., basic knowledge of standardization, methods and the procedures for making standards, relationship between standardization and international trade, and relationship between standardization and innovation.

To enhance the quality of the class, 3 guest speakers were invited to lecture on the following topics: How to draft standards based on ISO/IEC Directives, Part 2---Rules for the structure and drafting of International Standards:2011, the outline of conformity assessment and its role in international trade, and the relationship between innovation and standardization. Each speaker has major experience in their own area.

Students finished five homework assignment on the following topics: The terminologies of “standard”, “standardization”, “conformity assessment” explanation with respective examples;

how to use a geometric case to classify the grades of extended range of products; the main provisions and explanation for ISO 9001: 2008 ; drafting a standard using proper technical methods based on ISO/IEC Directive Part 2:2011; investigate the influence of TBT on a company or a regional economy; analyze the relationship between standardization and innovation. All students also took a field trip to examine the standardization bodies, ZIS(Zhejiang Institute for Standardization) and HIS(Hangzhou Institute for Standardization) for what is really going on these s bodies. ZIS and HIS are the bodies that make standards, management systems and product certifications for various areas, and undertaking standardization scientific research, i.e., the technical barriers to trade (TBT), standardization strategies, and innovation policies. Students and staffs in ZIS and HIS delivered a very productive Q&A session during these field trips.

Two students attended “ICES Workshop and WSC Academic Day 2011”, organized by ISO, IEC, ITU, ICES (The International Cooperation on Education on Standardization), and CJLU (China Jiliang University) on 27.-29Jun. 2011 in Hangzhou. They gave presentations at this international conference on “Analysis on laptops using QFD---A Case Study on Improving the Lenovo ThinkPad X201i 3249J4C”, and “The Best Ingredient for Apple Juice --- Orthogonal Design”. These presentations described how to use technical methodology (such as QFD (Quality Function Deployment), and DOE (Design of Experiments)) to determine the key parameters of a product’s standard. The presentations were the results of class homework and practice as mentioned. Each presentation was completed by a different team group. Each team group consisted of 4 or 5 students, and each team group elected a leader. That leader organized the team to complete the homework and practices and writ the presentation in English. The leaders also presented their presentations in English at the conference and answered questions asked by the professors and the experts who attended the conference. Both praised the students for their “excellent performances”.

Grading was based on a final examination, homework and practice, the presentation, and class participation.

Overall evaluation of this class indicated that new aspects of standards and standardization were indeed introduced, and the students showed strong interest in the standardizations, conformity, TBT, and innovation, topics. This course does provide a foundation for those who took this course to study and research further in the area of standardization. The students expressed very satisfactory feedback on this course during the course closing session. They believed this knowledge and practices are very important for their employment after graduation.

## **2. COURSE OVERVIEW**

### **2.1 SYLLABUS**

#### ***2.1.1 Course Objectives***

In this course, students learn the general aspects of standardization including the basic theory of standardization, standard development procedures, conformity assessment, standardization and international trade, and standardization and innovation. The main objective is to have students

understand these overall aspects of standardization including standard methods, conformity assessment, TBT, and innovation, and then build a foundation for further study on the strategic implications of standardization in the business world.

### **2.1.2 Course Period and Characteristics**

- ◆ Start: 1 Mar. 21011 ~ End: 15 Jun. 2011
- ◆ Class Time: 3 credits (each class is 3 hours)

### **2.1.3 Syllabus – Class Planning**

- ◆ Definitions and Functions
- ◆ Classifications
- ◆ Lifecycle of Standards
- ◆ Standards-Related Organizations
- ◆ Standards- Development Procedures
- ◆ Overview of Conformity Assessment
- ◆ System Certification  
Guest speaker: Lu Jianxiang; Vice Director of the Hangzhou Administration of Standardization; email:lujx@zjj.hz.gov.cn; phone number:+86-571-87152556
- ◆ Product Certification System  
Guest speaker: Chen Zili; President of the Zhejiang Institute for Standardization,;email: test668@sohu.com; phone number:+86-571-85786958
- ◆ Conformity Assessment and Multilateral / Mutual Recognition Arrangement and Agreement
- ◆ Technological Innovation
- ◆ Standards for Technological Innovation
- ◆ Technological Innovation Using Standards
- ◆ Standards Battles in Technological Innovation
- ◆ Market, Strategy, and Standardization
- ◆ Interface Standards and Market Expansion
- ◆ Presentations of Term Projects
- ◆ Lecturer: Yang Yi; Vice director of Zhejiang Bureau and Technical Supervision; email: yy@zjbts.gov.cn; phone number:+86-571-85026655
- ◆ Final Examination

## **2.2 STUDENT CHARACTERISTICS**

Seventy students enrolled in this class. They were junior undergraduate students majoring in Business Management. They have learned there are necessary courses that relate to standardization:

Advanced mathematics, linear algebra, probability and statistics, electrics and electronics, machinery foundation, information management, computer science, machine drawing, management principles, marketing, microeconomics, macroeconomics, accounting, financial management, metrological management, and quality management. They finished course designs, experiments in laboratories, and social practices outside the campus. All were full-time students registered in 2008, and come from more than 30 provinces, autonomous regions, and municipalities. The features of their major are standardization and quality. If they pass all examinations, finish all papers and practices, they will receive their Bachelor's degrees.

### **3. OPERATIONS STRATEGY AND CLASS SUMMARY**

#### **3.1 OPERATIONS STRATEGY**

For undergraduate students, the basic philosophy for the course operation strategy was to give classroom lectures and then assign homework based on the syllabus. After finishing the key teaching units, the practices or investigations were done by the students or the groups (i.e. all students were divided into 16 groups; each group had 4 or 5 students). The student or the leader of the student group make a presentation in class, discussed the issues presented, and reviewed the scores for the presentation by the students. Teaching was made for the topics to be discussed at the next class. Relevant articles, books, and material were assigned to those students who were going to do the practice or make a presentation.

#### **Quality of homework and class participation were considered for grading.**

Students were asked to complete their homework independently. The professor and his or her aide had to make appropriate comments on their homework and give a homework score. The professor or aide should review each piece of homework in the class. The mechanism to encourage students to participate discussion in class positively was also set up, and any student who answered questions actively or participated in discussion actively, would get a basic score, and if his or her performance was excellent, he or she could get a higher high score. The teamwork and practice or presentation must be illustrated in the class, and all students took part in the review and given the comments. This process helped them not to proceed in the wrong direction. Consultations with students were made on an individual basis. Each student visited the professor's office and discussed about homework and presentation issues, and directions that the student needed.

Grading was based on a final examination, homework and practice, the presentation, and class participation.

#### **3.2 CLASS SUMMARY**

The following are the details of each class.

(1) Definitions and Functions

As an introductory class for the course, the main purpose here is to have students understand the terminologies for standardization: Standard, standardization, conformity assessment, technical regulation, technical barriers to trade (TBT) etc.. The history of standardization also is introduced in this teaching unit. The basic values and extended values of standardization and their various functions are discussed with case studies and/or examples. The principles or rules used to classify the standards are illustrated in this teaching unit, and the de facto standard, de jure standard, forum standard, international standard, regional standard, national standard, industrial standard and company standard are explained.

In addition, course descriptions including assignments for the homework, presentation, reading materials, grading policy, field trip, etc., are provided, and all suggestions to improve the quality of the course are welcomed.

(2) The Life Cycle of Standards

This teaching unit lets students understand that every standard has its own life cycle and the life cycle depends on a product, service, or process lifecycle. It makes students focus on standardization activities and the perspectives of the life cycles utilized in many areas of social sciences and engineering.

Case Study: The 2G and 3G mobile phone international standard change cycle.

(3) Standards-related Organizations

This teaching unit introduces domestic and international standardization bodies to students. The domestic standard bodies are the Standardization Administration of China (SAC), the Certification and Accreditation Administration of China (CNCA), the China National Institution for Standardization (CNIS), and local government bureaus for standardization. The international standardization bodies, such as ISO, IEC, ITU, BIPM, CAC and OIML, are described in detail. Some famous regional standardization bodies are also introduced, including IEEE, ASTM, CEN, and UL.

The homework asks students to surf these standardization bodies on their webs, and report on web contents and their features in the next class.

(4) Standards Development Procedure

This teaching unit has three parts: (1) help the student master the range--- extended method of product or products serialization based on priority number series or geometric series; (2) make the student obtain technical methods to determine the parameters for product standards. These methods include quality function deployment (QFD), orthogonal design, and design of experiments (DOE); (3) help students understand the making of standard procedures, and learn the ISO/IEC Directive Part 2---Rules for the structure and drafting of International Standards: 2011, designing standard procedures and standard drafting organizations.

This teaching unit is the key chapter for the course. The homework on products serialization is assigned to the students. There is practice to determine product parameters with proper technical methods for the groups. There is also practice assigned for the groups to draft standards based on ISO/IEC Directive Part 2 :2011.

The students visited Zhejiang Institution for Standardization (ZIS) for a half day on April 12 (year) Mr. Lu Jianxiang (email: [lujx@zjj.hz.gov.cn](mailto:lujx@zjj.hz.gov.cn), phone number:+86-571-87152556),

the Vice President of ZIS guided the student visit and introduced the procedures for drafting a standard.

(5) Conformity Assessment

In this teaching unit, the students learned the following: Introduction of conformity assessment with contents including definitions and purposes, conformity assessment activities, types of certifications and types of accreditations. Management system certification is described with the main content including quality management system certification, environment management system certification, and other management system certification. Product certification and testing are introduced briefly. Accreditation activities and laboratory accreditation based on ISO/IEC 17025 are illustrated for the students. Homework is assigned to every student. The topics for homework are the difference between accreditation and certification, how to set up a quality management system based on ISO 9001:2008, and the difference between system certification and product certification.

(6) Multilateral / Mutual Recognition Arrangements and Agreements

First, this teaching unit helps students understand basic knowledge of technical barriers to trade (TBT), including a WTO TBT Agreement, the features of TBT, and how to use standardization to cope with TBT. Secondly, the teaching unit lets students understand important multilateral/mutual recognition arrangements and agreements and famous international recognition organizations, such as IAF, ILAC, and APLAC. Third, the teaching unit lets student learn how recognition systems play an important role in weakening the impact of TBT.

After this unit, the students will write a survey report about the impact of TBT on a company or regional economy.

Mr. Chen Zili, the President of the Zhejiang Institute for Standardization (ZIS), was invited to lecture for 3 hours' his lecture topic as "Empirical Research on the Impact of TBT on Zhejiang Province, and How to Overcome TBT".

(7) Standardization and Innovation

This teaching unit includes g content that students must understand.

First, students should understand technological innovation and its characteristics and IPR classification. Second, students should learn about patents and know-how in standardization, which means what kind of standards can adopt patents, and know-how. Third, the mechanism of transferring patents and know-how through standardization should be discussed in class; anti-monopoly polices and measures against unfair competition using standards should be illustrated.

Homework: Complete a survey report and analysis after completing this unit to explain the relationship between standards and innovation. When there are standards battles in technological innovation, what strategic options can be available for the company to win that standards battle?

(8) Competitive Strategy

In this teaching unit, the relationship between market, strategy, and standardization are discussed in class. How to use standardization as a strategy for an expanding market is illustrated for students. The main content of the unit includes network externalities, interface standards and market expansion, and the relationship between standardization, cost reduction, and differentiation.

After this unit, Mr. Yang Yi (email: yy@zjbts.gov.cn, phone number:+86-571-85026655), Vice director of the Zhejiang Administration of Standardization, gave a lecture on the afternoon of 13 Jun 2011 to the students. The topic was the role of standardization in an expanded market.

(9) Presentations of the practices

Students made presentations on the practices that they completed. As part of the presentation, a discussion as well as Q&A were included.

(10) Pictures of students and the professor in this course



Mr. Yang Yi giving his lecture to the students



This student, Ms. Yuan Jinxiu, is giving the presentation at the ICES Workshop 2011 and WSC Academic Day 2011 in Hangzhou

### 3.3 SUMMARY OF KEY REFERENCES

Two supplementary textbooks were distributed to the students along with the APEC textbook.

#### ***3.3.1 Foundation of Standardization (in Chinese). 2008. Li Chengtian, China Standardization Publishing House.***

This book is used as the textbook for the standardization course for undergraduates for an introduction of standards and standardization issues. The book covers many aspects of standards and standardization, such as standardization principles, how to classify product serialization based on the priority number series or geometric series, technical method to determine the parameters of technical standards, ICT standardization, agriculture standardization, metrological management, quality management certification and environment management system certification, and standardization issues at the international, national, and company level. The content is very important for undergraduate students to access because they are not described in any detail in the APEC textbook.



### **3.3.2 Technical Barriers to Trade, Agreement, Practice and Strategy (in Chinese), 2003. Song Mingshun, China Metrology Publishing House.**

This book is as reference book given to the students. In it are many interesting subjects, including the introduction to the agreement by WTO Technical Barriers to Trade, the relationship between TBT and technical regulation, the relationship between voluntary standardization and TBT, the relationship between the conformity assessment procedure and TBT, how to survey the impact of TBT for a company or a regional economy through questionnaires, and the relationship between standardization, IPR, and strategy. Case studies also are offered for companies, company unions, and economies that utilize standardization as a strategy in their business or the marketplace, including GSM, TD-SCDMA, and many others. This book helps the students to understand how standardization impacts business, the market and the economy.

## **4. STUDENT ACTIVITIES AND FEEDBACK**

### **4.1 STUDENT FEEDBACK**

After finishing the course, the educational affairs division of CJLU organized all the students to fill in the questionnaires for course satisfaction. The satisfaction index was 93.5%, ranking as top excellent the performance of all teachers in CJLU for the semester. The following are the summary tables for the class evaluation.

1) Overall, I am satisfied with this course:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
0	0	2	13	55

2) I recognized the importance of standards in business strategies throughout this course.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
0	3	7	25	35

3) How pleased were you with the guest speakers and their topics?

Topics	Very Unsatisfactory	Unsatisfactory	Neutral	Satisfactory	Very satisfactory
Drafting standard procedures	0	4	8	28	30
Empirical research on the impact of TBT to Zhejiang Province, and how to overcome TBT	0	1	5	25	39
The role of standardization in the expanded market	0	0	10	27	33

4) I gained many benefits from this course in the following respects.

Aspects	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Knowledge of standards related to my major	0	0	5	15	50
Standards development procedures	0	0	2	20	48
Conformity assessment	0	0	0	18	52
MLAs/MRAs		6	3	22	39
Standardization and innovation	2	3	12	18	35
Competitive strategy	0	0	6	25	39

We can see from these tables that all students were very interested in the basic knowledge and technical methods regarding standardization, and very satisfied with the course.

## 4.2 STUDENT ACTIVITIES

### 4.2.1 Homework, Practices, and Presentations

Students were asked to complete homework after finishing each teaching unit. The students were divided into 16 groups. Each group had 4 or 5 students. The groups were asked to do the practices, complete the practices, and make presentations to the class. The following are the abstracts of their homework, practices, and presentations.

#### 1) Explain the relationship between standards and innovation. When there are standards battles in technological innovation, what strategic options are available for the firm to win the standards battle?

In some cases, standards can be a major platform for innovation but then become a strong constraint for innovation in other cases. In other words, standards may have either positive or negative impacts on technological innovation processes.

The following are the positive impacts of standards on innovation:

Economies of scale, shorter time to market and reduced R&D costs, network effects, indirect network effects, fast technology adoption, learning effects, focusing on other competencies, minimum quality and safety, increased variety, lowering entry barriers.

The following are the negative impacts of standards on innovation:

Narrowing technological choices, diminishing innovativeness, compromises with low quality, decrease in profits from innovation, restricted diffusion of technology, monopoly effects, consumer wait-and-see stance, switching costs.

Innovation standards are the consequence of a precious innovation as well as the groundwork for the next. The early standardization of products may encourage innovation in complementary technology and organization and also promote subsequent incremental innovation designed to perfect the original technology.

There are several strategic options a firm can take to entitle a dominant design: Using path dependency, changing the future technology trajectory, diversifying strategy, utilizing modular and interface strategy, collaborating with partners, licensing (and OEM) agreements with competitors, enhancing complementary partners, following the dominant design by surrendering one's own innovation, contracts, alliances, and joint ventures. (Student: Ms. Ding Rongrong)

## **2) The Practice of Drafting an Apple Juice Standard**

Each group drafted an apple juice standard based on the ISO/IEC Directive Part2: 2011, and the GB/T1.1--2010 Standard. The leader of each group organized their team members to read references and to perform an experiment with apples and other substances. One of the practices regarding standards is found in Appendix 1.

### **4.2.2 Workshop Participation**

Two students attended the "ICES Workshop and WSC Academics Day 2011", organized by ISO, IEC, ITU, ICES (The International Cooperation on Education on Standardization), and CJLU (China Jiliang University) on 27 -29 Jun 2011 in Hangzhou. They gave presentations at this international conference. The presentation topics were: "The Best Ingredient for Apple Juice -- Orthogonal Design"(see 6.1), and "Analysis on Laptops Using QFD---A Case Study on Improving the Lenovo ThinkPad X201i 3249J4C" (see 6.2). The former presentation illustrated how to use Design of Experiments (DOE) to determine the best ingredient of apple juice and then to draft the apple juice standard based on the national standard literature format, the later presentation described how to use Quality Function Deployment (QFD) to improve the key technical parameters of Lenovo ThinkPad laptop. These two presentations are based on the surveys and experiments which are the homework and practices after class. The home work and practices are only team projects for students to practice the technical method for standard making.

### **4.2.3 Field Trip**

A one- day field trip was made to ZIS (the Zhejiang Institution for Standardization), and HIS (the Hangzhou Institute for Standardization) to observe what is really going on these standard bodies. ZIS and HIS are standard bodies for designing standards, management systems and product certifications for various areas, and undertaking standardization scientific researches on TBT, standardization strategies, and innovation policies. Students and staff at ZIS and HIS had a very productive Q&A session during this field trip.



The students visiting the ZIS



Mr. Lu Jianxiang giving an introduction of ZIS

## 5. LESSONS LEARNED

### 5.1 COURSE DESIGN

The content of this course were followed the syllabus designed by the course team. The course focused on standards development procedure, conformity assessment, technical barriers to trade, standardization and innovation, and competitive strategy. The students expressed strong satisfaction about the contents; they want to have much more time for internship or practice, if possible, for the next class.

### 5.2 COURSE OPERATION

All contents of the course took place in the classroom. The course took 34 hours to complete. The 5 homework efforts were assigned to students and reviewed by the teachers. Two practices were made by class groups composed of 4 or 5 students; the leaders of these groups reported their results at the presentations. It will be much helpful in the future if videos about standardization can be played in the classroom.

### 5.3 STUDENT PARTICIPATION

There were 70 students in this class. All participated in the class, completed the homework, made the practices, took part in the discussions, and gave their presentations. They listened also to the lectures given by the guests. Many students are interested in this class; thus my university is considering teaching this course to other majors or disciplines.

## 5.4 STUDENT CLASS EVALUATION

Grading was based on a final examination (50%), homework and practices (30%), presentations (10%), and class participation (10%). All of the students passed the final examination and received the designated 2 credits for the course.

## 5.5 TEXTBOOK UTILIZATION

Lectures were based on the textbook and some literature was used as complementary material. As mentioned in Section 3.3 Key Reference Summary, two supplementary textbooks were also used. The students and the teachers liked reading the APEC book, and they suggested that APEC should organize professors to write a series of books about standardization and especially publish a book of case studies on standardization

## 5.6 REFERENCES

- ① Azim Essaj, Technical Regulations and Specialization in International Trade, *Journal of International Economics*, Volume 76, Issue 2, December 2008, Pages 166-176.
- ② David I. Levine, Michael W. Toffel, Quality Management and Job Quality: How the ISO 9001 Standard for Quality Management Systems Affects Employees and Employers, *Management Science*, Vol. 56, No. 6, June 2010, pp. 978-996.
- ③ Lo, Chris K.Y., Yeung, Andy C.L., Cheng, T.C.E., ISO 9000 and Supply Chain Efficiency: Empirical Evidence on Inventory and Account Receivable days, *International Journal of Production Economics*, Volume (Year): 118 (2009), Pages: 367-374.
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- ⑤ Robert J. Kauffman, Juliana Y. Tsai, With or without You: The Countervailing Forces and Effects of Process Standardization, *Electronic Commerce Research and Applications*, 9(2010)305---322.
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## 6. APPENDIX – STUDENTS’ CASE STUDY

### 6.1 STUDENT TEAM PROJECT 1 (EXTRACTED SLIDES)

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# The best ingredient for apple juice

-- Orthogonal design  
(extracted version from 33 slides)


Team members:  
Xudi, Wuguiyan, Yuzhiping, Chenke,  
Yuanjinxiu



中國計量學院  
CHINA JILIANG UNIVERSITY

## Contents

- Introduction
- Test plan
- Test Process
- Results analysis
- Summary




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## Introduction

**Test purpose** : determine the best ingredient for apple juice .

**Why we chose DOE**: we can obtain what we want with a fewer number of tests.




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## Test plan

Flowchart illustrating the test plan process:

```


    graph TD
      A[Clear purpose and index] --> B[Set factor level table]
      B --> C[Choose orthogonal table]
  
```



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## Factor level table



factor level \	apple (↑) A	sugar (spoon) B	vinegar (spoon) C
1	0.5	2	1
2	1	3	2
3	1.5	4	3
4		5	4



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- 16 tests
- 5 tasters

1	Very bad
2	Bad
3	Neutral
4	Good
5	Perfect

ICS 77.040.01

H 01



中华人民共和国国家标准

GB/T 19xxx. 1—2011

## 苹果汁制造标准

Apple juice manufacturing standards

(ISO xxx:2000, Apple juice manufacturing standards, MOD)

**\*Note: Student's Sample Work \***

2011-05-20 发布

2011-05-20 实施

中华人民共和国国家质量监督检验检疫总局  
中国国家标准化管理委员会 发布

6.2 STUDENT TEAM PROJECT 2 (EXTRACTED SLIDES)

**6.3 Appendix 3**

## ANALYSIS of A LAPTOP USING QFD

—A case Study on Improving the Lenovo ThinkPad X201i 3249J4C.

### 1. INTRODUCTION

**The purpose:**  
 —Improve Lenovo ThinkPad X201i 3249J4C laptop.

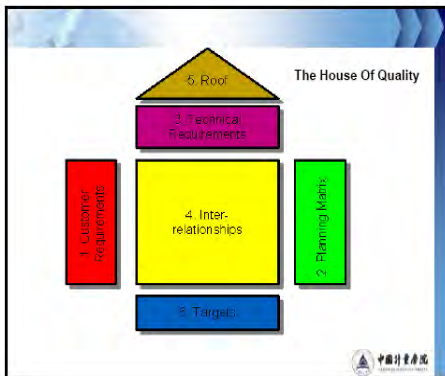
**Method:**  
 —Quality function deployment (QFD)  
 —Comparing Lenovo and Sony

❖ The congruent relationship between the indexes customers care and technique index

The customer care indices	The Technique index
Speed (attractive quality)	Frequency
	Memory
Weight (attractive quality)	Material
	Size
	Thickness
Capacity	Hard disk

❖ A parameter comparison between Lenovo ThinkPad X201i 3249J4 and Sony X138JC/P(pink)

	Frequency	Memory	Material	Weight	Size	Thickness	Hard disk
Lenovo	2.13GHz	2GB	Magnalium	1.44kg	12.1 inch	17.9mm	250G
Sony	1.86GHz	2GB	Mixed mode carbon fiber	780g	11.1 inch	13.9mm	128G



### House of quality

Technical requirements	Technical requirements					Planning Matrix						
	Frequency	Material	Size	Weight	Hard disk	Weight	Material	Size	Weight	Hard disk		
Speed	⊗	⊗				5	4	3	5	1.25	⊙	31.9
Weight			⊗	⊙	⊙	5	3	5	5	1.67	⊙	42.6
Capacity					⊗	5	4	3	5	1.25	⊙	25.5
Importance (w <sub>i</sub> )	17.9	11.9	23.9	15.0	15.0	14.3						
Compare the matrix	⊗	⊗	⊗	⊗	⊗	⊗						
Target	↑	↑	↓	↓	↓	↑						
Quality characteristic	↑	↑	↓	↓	↓	↑						
Setting												



## Ch.2 IT Management and Standardization

**Economy** : Republic of Korea  
**University** : Chung-Ang University  
**Department** : Graduate School of Business Administration  
**Students** : Doctor (13) + Master (5) \*mostly part-time students

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### 1. EXECUTIVE SUMMARY

This course was designed to be offered to Doctoral students in the Graduate School of Business Administration at Chung-Ang University. A standardization textbook has been adopted as a secondary textbook.

The title of the course is “IT Management and Standardization”. Eighteen students have enrolled in this course: Thirteen Doctoral students and five Master’s students. Ten doctoral students are majoring in IS and the remaining three are majoring in Strategy. One Master’s student came from China. Of the five Master’s students, four majored in Business Administration, and one student is specializing in Sports Management.

Standardization issues are introduced to the students as a part of a potential research domain they can explore. Four lecture sessions are given. Three guest lecturers are invited to present sessions, while the instructor presents one session. Four out of the fourteen total lectures are devoted to standardization issues.

Guest lecturers presented three chapters of the APEC Standardization textbook: Chapter 7: Standardization and Innovation (Mr. Choi, Donggeun); Chapter 9: Collaborative Strategy (Professor Yang, Heedong); and Chapter 10: Two Case Studies of ICT Standards (Professor Lee, Heejin).

I chose guest lecturers who have been very active in their own research to excite the doctoral students and also encourage them to explore standardization issues as a possible research topic during the semester and possibly continue to explore that topic as their thesis.

Each student was asked to provide a research proposal from the topics in IT management we explored throughout the semester, which included standards and standardization. Students gave presentations and submitted term papers. Final grades are given based on student participation, attendance, milestones, and a final report.

Overall, the guest lectures were well received. Students showed interest in the lectures and actively participated in the discussion. I encouraged students to write a research paper on these topics. However, no student wrote a final report on standards and standardization. The major reason was that students were not familiar with standardization and felt it was too difficult to write a research paper on the topic. Students preferred to use survey research methods for their final reports and found it difficult to apply the same methodology to the standardization area. Retrospectively, I think a better strategy would be to introduce standardization at the beginning of the course and provide a methodology then that students can apply for their final reports.

## **2. COURSE OVERVIEW**

### **2.1 SYLLABUS**

#### ***2.1.1 Course Objectives***

The course delivers four topics for doctoral students to explore regarding IT management: (1) Strategic Use of IT, (2) Digital Content and Its Protection Technologies, (3) Strategic IT investment and Its Evaluation, and (4) Standardization of IT. More specifically, for the standardization of IT, we explore topics related to the strategic impact of standardization and cases of IT standardization since the two topics are closely related to the overall objectives of the course.

#### ***2.1.2 Course Time Period and Characteristics***

- ◆ Start: 08/03/2011 ~ End: 17/06/2011
- ◆ Times of Class: 3 credits (each class is 3 hours long)
  - Standardization Topics: 4 classes
    - Chapter 7: Standardization and Innovation
    - Chapter 9: Collaboration Strategy
    - Chapter 10: Two Case Studies on the ICT Standard
    - Overview of Standardization As a Potential Research Topic

### **2.1.3 Syllabus – Class Planning for the Standardization Topic**

(1) Chapter 7: Standardization and Innovation

Guest Speaker: Donggeun Choi (Chief Manager, KSA; its2win@kisi.or.kr; 02-6009-4846)

(2) Chapter 9: Collaboration Strategy

Guest Speaker: Heedong Yang (Professor/EWha University; hdyang@ewha.ac.kr; 010-7163-0483)

(3) Chapter 10: Two Case Studies on the ICT Standards

Guest Speaker: Heejin Lee (Professor/Yonsei University; heejinmelb@yonsei.ac.kr; 02-2123-3288)

(4) Overview of Standardization As a Research Topic (Instructor)

## **2.2 STUDENT CHARACTERISTICS**

Eighteen students have formally attended this course: Thirteen doctoral students and five master students. Although the course is offered to doctoral students in Information Systems and Operations Management, more diverse students enrolled than before when the course was offered two years ago. Of the thirteen doctoral students, ten students majored in IS, and the rest three majored in Strategy. Of the five Master's students, four majored in Business Administration, and one student majored in Sports Management. One Master's student came from China.

## **3. OPERATIONS STRATEGY AND CLASS SUMMARY**

### **3.1 OPERATIONS STRATEGY**

Including standardization lectures, each class has two modules: (1) Lecture by the Instructor or Guest Speaker and (2) Discussions on the Research Topic based on the assigned reading material. Students may offer their own opinions based on the reading material and their own experience, which helps them in setting up research topics and implement them using a methodology they adopt to complete the research paper during the semester. Contributions to the discussion (presentations, comments, questions and answers) are considered for up to 20% of their total final grade.

I asked students to pick a topic they preferred and submit four milestones throughout the semester. Each milestone was briefly discussed in the class gather comments from the instructor and the class. Students were invited to the instructor's office for more comments and to get directions on the research topic.

Four milestones are required to be submitted as follows:

**Milestone #1:**

a. One- page topic analysis that includes the following components.

- (a) Possible Topic of Interest, (b) One- paragraph Introduction, (c) Research Questions, (d) Most closely related articles, (e) Possible contributions, etc.
- b. Finding 30+ closely related articles and save them in digital format (PDF or Word files). You may start with the major MIS journals in Korea and then check Worldwide.

**Milestone #2:**

a. For each article, provide the following information in less than 1 page (a half page is perfect):

- (1) Complete Reference, (b) Major Research Question, (c) Major Findings or Contributions,
- (2) Methodology (Survey, Experiment, Economic Analysis, and the like)
- (3) Find a model paper in the journal where you may submit your paper.

**Milestone #3:** Classify the articles you compiled in Milestone #2. You may find a conflicting or common argument from the articles. Your project report should have the following components:

- (1) Cover Page: Title of the Report and your contact information. 1 page.
- (2) Abstract: One- page Summary of your report. Conciseness is a virtue.
- (3) Introduction: Please communicate your overall understanding of the topic. You may think this segment is an expansion of the Executive Summary. Explain why you chose this topic; you may need to explain the basic concepts for a general audience. To stress the importance of the topic, provide overall economic statistics. By doing so, you should relate these topics/concepts to the real world of business. However, this Introduction should not exceed 3 pages in length.
- (4) Literature Review: Provide a general summary of the articles you compiled in Milestone #2. This review should not exceed 5 pages.
- (5) Research Questions and Methodology: Please produce the major Research Question. Explain why it is an important topic and what kind of methodology would be the best to answer your Research Question. 2 pages is the maximum length.
- (6) Conclusion: Summarize your ideas, suggestions, and/or findings in one page and include list the limitations of the work and also the future work still needed. The maximum length is 2 pages.

**Final Report:** Complete the entire paper in a journal format.

Grading is based on a Final Report (30%), Milestones (50%), and Class Participation (20%).

### 3.2 CLASS SUMMARY

The following are the details for the four classes on the standardization topic.

(1) Standardization and Innovation (Chapter 7)

Guest Speaker: Donggeun Choi (Chief Manager; KSA; its2win@kisi.or.kr; 02-6009-4846)

The relationship between standards and innovation is presented. Students will explore various possible research topics for standardization and innovation. Students may discuss how innovative technology could fulfill market standards by illustrating cases from the articles. Through both lecture and discussion, students will identify the strategic options for a standards battle on technological innovation. Mr. Choi also presents methodologies that he applied to complete his recent publication in the standardization field.

(2) Collaborative Strategy (Chapter 9)

Guest Speaker: Heedong Yang (Professor; Ewha University; hdyang@ewha.ac.kr; 010-7163-0483)

Various types of collaborations are introduced: Complementary vs. supplemental collaborations for respective cases with examples. Building a platform on which collaborations can be facilitated and the considerations to be addressed when creating alliances are discussed. Professor Yang also presents his recent papers about standards and innovation and encourages students to study this topic.

(3) Two Case Studies on IT Standards (Chapter 10)

Guest Speaker: Heejin Lee (Professor/Yonsei University; heejinmelb@yonsei.ac.kr; 02-2123-3288)

Two interesting cases for students are presented. One is AVS regarding Chinese digital compression technology, and the other is WIPI for the Korean mobile platform. Professor Lee shows how students can apply case study methodology when extracting and examining research questions on standardization.

(4) Overview of Standardization

After three guest lecture series, I provide an overview of standardization as a research domain for students to explore for their term papers. Students also discuss possible research topics and applicable research methodologies.

### 3.3 KEY REFERENCE SUMMARY

With regard to the standardization topic, we used only the APEC textbook.

## 4. STUDENT ACTIVITIES AND FEEDBACK

### 4.1 STUDENT FEEDBACK

The following is a summary table of the class evaluations.

1) Overall, I am satisfied with this course:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
0	0	0	6	5

2) I now recognize the importance of standards in business strategies after taking this course.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
0	0	2	4	5

3) Were you satisfied with the guest speakers?

Topic	Very Unsatisfactory	Unsatisfactory	Neutral	Satisfactory	Very Satisfactory
Standardization and Innovation	0	0	3	4	4
Collaborative Strategy	0	0	1	7	3
Two Case Studies on IT Standards	0	0	3	4	4

4. I gained many benefits from this course in the following areas.

Arease	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Knowledge of standards related to my major	0	0	3	6	2
Strategic importance of standards utilizing business cases	0	0	1	8	2
Improvement of research capacity related to standards	0	0	3	7	1
Diversity of research areas	0	0	3	5	3

Eleven survey questionnaires were returned. It is hard to generalize of course with only 11 out of 18 students. However, students did consistently mark “average” or “above average” for all dimensions of the standard lectures.

## **4.2 STUDENT ACTIVITIES**

Students were asked to complete a term project and make a presentation in class. None of the students chose standardization as their research projects.

## **5. LESSONS LEARNED**

### **5.1 COURSE DESIGN**

If students were given reading material before the lectures and asked to submit a one-page summary, students would better understand the lecture and possibly write better research papers.

### **5.2 COURSE OPERATION**

The textbook does not provide a research dimension on standardization for doctoral students. For advanced courses, lectures from active researchers have been effective in delivering a possible research domain, but not enough so to encourage them to take on a research project. One possible better way to encourage students further would be to deliver the standardization lectures at the beginning of the semester.

### **5.3 STUDENT PARTICIPATION**

One of the doctoral students commented that it would be better to access a doctoral-dissertation on standardization research, so that they could better understand how to elicit research questions and determine the relevant methodologies.

### **5.4 STUDENT EVALUATIONS**

Too much weight was given to the project throughout the semester. Each project was handled by 1-3 students. Besides the project, which required four milestones throughout the semester, a standardization term paper could be required as an extra group project.

### **5.5 TEXTBOOK UTILIZATION**

As mentioned above in Section 5.2, the textbook alone is not enough for doctoral students. The textbook should be accompanied by research papers and sample dissertations on standardization.

## 5.6 REFERENCES

- (1) Katz, M. L. and C. Shapiro, "Network Externality, Competition, and Compatibility," *The American Economic Review*, 75(3), 1985, pp. 424-440.
- (2) Conner, K., & R. Rummelt, "Software Piracy: An Analysis of Protection Strategies," *Management Science*, Vol. 37. No. 2, 1991, pp 125-139.
- (3) Farrell, J., Klemperer, P., May 2006. Coordination and Lock-In: Competition with Switching Costs and Network Effects. Working Document.
- (4) Schilling, M. A., 2002. Technology Success and Failure in Winner-Take-All Markets: The Impact of Learning Orientation, Timing, and Network Externalities. *Academy of Management*, 45(2), 387-398.
- (5) Shapiro, C., Varian, H. R., 1999. The Art of Standards Wars. *California Management Review*, 41(2), 8-32.

## 5.7 OTHER PRACTICAL COMMENTS TO APPLY POSITIVELY TO FUTURE COURSES

A complete list of references classified into specific standardization topics should be provided to instructors.



## Ch.3 Standardization

**Economy** : **Indonesia**  
**University** : **Diponegoro University**  
**Department** : **Industrial Engineering**  
**Students** : **Bachelor (32)**

**Written by** : **Prof. Bambang PURWANGGONO**  
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### 1. EXECUTIVE SUMMARY

This course is a compulsory-elective subject in the Quality Management Concentration within the Industrial Engineering Department of the Faculty of Engineering Diponegoro University Indonesia at the undergraduate level. Students who choose Quality Management as their concentration must select at least three courses from the elective course list. This standardization course is one of the three subjects students must take in the seventh of a total of eight semesters to finish the undergraduate program. As one of the concentrations within the department, the approximate number of participants in this course ranges from 30 to 40 students.

This Standardization course has been put into the Department's curriculum with the implementation of the new curriculum in September of 2007.

A course on Standardization in general consists of the Introduction to Standardization, Standards relate to the economy, international standard activities, national standard activities, and standards implementation in industries. This subject delivers 2 credit units and requires 14 weeks of meeting in one semester.

(Course summary) One main objective for offering this course at the undergraduate level is that there will be a t relatively larger number of available participants compared to the Master's or Doctoral levels. The number matters because in Indonesia awareness of the implementation and benefit of standards is not fully found among the community and most of the population. By educating students who are eventually going to join the society, the

promotion of standards will be enhanced. As their mindsets are formed through the learning of standards throughout the semester, including the evaluation, the memory of what is learned will last longer than just offering seminars and guest lectures. Once on the job, this mindset will make them fully aware of the value of positive implementation of standards.

(Overall feedback from students) Since the standardization class is for undergraduate students, the strategy is different than if it were offered only to graduate students. The approach of the learning is to instill the benefit of standards and give students hands-on experience regarding the practice of standards and its use in daily life and relate it to product standards found in one's surroundings. Based on this approach, materials from the book issued by APEC is considered not practical enough for the knowledge and understanding students need. Students believe the text should offer more practical examples, especially local and national cases. It is kind of complex material and very international texts. Details of the students' comments and feedback, especially on the APEC textbook are attached.

(Professors' Observations) The learning process must take into account a student-centered approach. That means that students must be encouraged to be more active in class. Lecturers must act more as facilitators rather than merely straightforward instructors. What has been observed in the class is that students should be involved in the learning process, so that learning is not simply a one-way communication from instructor to students, but rather interaction. Plant visits are another method of learning which is very effective for students, so they can see for themselves actual practice and implementation of standards in the real world.

### Lessons and Conclusions

Education on standards is undoubtedly important at every level of education. Different approaches to different levels of education are necessary to deliver the optimum learning output. The best learning at the undergraduate level is one that is able to develop a good attitude and mindset toward standards. Within such development of attitude and mindset regarding standards, graduating students will remember the learning much longer and carry with them the benefit and advantages of standards implementation. They will practice the standards in any activity they are dealing with in the future both as customers and producers.

Awareness of standards is raised among the students when they finish the class. They respect the standards as the foundation of better competitiveness for national products. Yet again, to get better results, the content of teaching and learning should be made more interesting and involve the students. Interactive learning is important to guarantee a longer and better memory of the value of standards.

## 2. COURSE OVERVIEW

### Syllabus:

#### Course objectives:

#### Students will understand:

1. Benefits of standards and standardization
2. Process of standard formulation
3. Implementation of standards

#### Period:

March 9-June 22, 2011

#### Class Operation:

This class is operated through a variety mode of learning. Besides the conventional way of teaching that just gives materials in class via an instructor, the self- learning approach is also used. Students visit exhibitions, for example, and there are assignments for both individuals and groups, presentation of student ideas, and suggestions for national standards improvement. In principle, students are encouraged to be active in the class and have their own experience. Assessment is done on all elements of the learning, including a midterm exam, final exam, all assignments and presentations.

#### Student Characteristics

Students that participate in this class are undergraduate level students from the Industrial Engineering Department. The number of students in the class is 32, and they are at the seventh semester of the eight semesters needed to graduate.

#### Reference List (used in your class)

*Pengantar Standardisasi*, 2<sup>nd</sup> ed.,2009, Published by the National Standardization Body of Indonesia (BSN)

### 2.1 SYLLABUS

#### Course Objectives

#### Participants in the class will understand:

- a. Benefits of standards and standardization
- b. Process of standard formulation
- c. Implementation of standards

## 2.1.2 COURSE PERIOD AND CHARACTERISTICS

March 9-June 22, 2011

### 2.1.3 Syllabus – Class Planning

#### (1) Introduction

- Understanding Standardization and Standards
- Standardization Space
  - Subject (Engineering, Management, etc)
  - Aspect
  - Level
- Purposes and benefits of standardization

#### (2) The Economics of Standards

- Standardization and the economy
  - *Four categories of standards to resolve economic problems*
    - *Compatibility/Interface Standards*
    - *Minimum Quality/Safety Standards*
    - *Variety Reduction/Focusing Device*
    - *Information Measurement*
  - *WTO Agreement*
  - *Regional FTA: EFTA, AFTA, NAFTA*
- Participation in International Standardization programmes

#### (3) Standards and Innovation

The class will show that standards do not hamper the innovation process and its results. On the contrary, standards have been shown as supportive and the foundation of innovation in many companies. Standards can also ease and accelerate the process of innovation. Examples are given to show the success story of innovation, supported by and based on the implementation of standards.

#### (4) Standard Coverage

In this class meeting, knowledge about standard coverage is given to include levels of standard, dimensions of standards, and standardization space. Also, the national, regional, and international scope of standards is discussed.

#### (5) Standardization Systems

The national infrastructure of standard and standardization is presented

#### (6) Standard Anatomy and Development

The national standard (SNI) anatomy and structure, SNI development procedure, ISO Standard development and procedures, principles and stages, structure of standard documents are offered

### **(7) Standard Application**

Technical regulation framework and mandatory and voluntary implementation of national standards and the Mutual Recognition agreement: bilateral and regional and international are all discussed.

### **(8) Midterm exam**

Scheduled for 27<sup>th</sup> April 2011

### **(9) Metrology and Conformity Assessment**

Accreditation and certification concepts are examined

### **(10) Plant Visit**

The Standardization class visited an exhibition of Standards and Standardization conducted by the National Standardization Body of Indonesia (BSN) in Semarang City. Every student was instructed to create a two-page report on the exhibition.

### **(11) Group Presentation (First)**

Every group consisted of 3-4 students for presenting their chosen SNI (Indonesia National Standard) and offering their suggestions for improving the standard content and getting input from the rest of the class. Three groups presented in each class meeting.

### **(12) Group Presentation (Second)**

Every group consisted 3-4 students for presenting their chosen SNI (Indonesia National Standard) and their suggestions for improvement of the standard content and receiving input from the rest of the class. Three groups presented in each class meeting.

### **(13) Group Presentation (Third)**

Every group consisted 3-4 students for presenting their chosen SNI (Indonesia National Standard) and their suggestions for improving the standard content and gaining input from the rest of the class. Three groups presented in each class meeting.

### **(14) Guest Lecture**

On June 11, 2011 a lecture in Standardization was given by Mr. Teuku Abdurrahman Hanafiah, Deputy Chairman of Research and Cooperation, the National Standardization Body of Indonesia (BSN).

**(15) National Standards of Indonesia (SNI)**

- Background of National Standardization System Policy
- Implementation of SNI Policy:
  - Voluntarily ( what?) unclear
  - Adoptable to technical regulatory conformance assessment policy:
    - Competency based
    - International recognition

*In this meeting, a group assignment was given to identify necessary standards for certain purposes using SNI and especially those standards useful for small and medium companies. The assignment was to be collected during the final exam.*

**(16) Final Exam**

**Scheduled for July 7, 2011**

**2.2 STUDENT CHARACTERISTICS**

- Number of students: 32
- Student levels (undergraduate, Master's, PhD): undergraduate
- Student majors (OO engineering, business, trade, law.): Engineering
- Work experiences of the students (full time/part time): Full-time students

**3. OPERATION STRATEGY AND CLASS SUMMARY****3.1 OPERATION STRATEGY**

Teaching methods used are the basic student-centered learning approach to encourage students to be active in the class. Communication must be done in a two-way direction. Teachers will act more as facilitators than as instructors.

Participation of students is important as during discussion, the facilitator will take notes on points made by active students. This contribution will give them additional points when grading is done. To make this happen, group presentation is compulsory, and the rest of the class should show attention and give comments and input to each presenting group.

Evaluation criteria will include several elements for marking or grading. This class will take a mid-term test and also a final semester exam. These two elements will be combined with evaluation on the assignments, report on the plant visit, also evaluation of how the presentations are performed.

### **3.2 CLASS SUMMARY**

The class begins with an introduction on how the course will be organized, including the outline of the course, the grading system, and the group presentations. Students will know what to do from the beginning and will have a clear understanding of how to get the best results from the course. Later in that meeting, the philosophy and scope of standards is given to bring the students to the level they need to continue with more technical issues dealing with standard and standardization in the coming weeks..

Then, in the next class meeting, the relationship between standards and the economic development of an economy or an enterprise is discussed. Examples from many economies are presented regarding the positive impact of standard implementation on the economy. Regional and international cooperation and agreements are also brought to class to be familiarized then, especially any that involve the economy.

Examples of innovation supported by the implementation of standards are the next points of discussion. As innovation is now becoming more and more important for producers to stay constantly competitive, standards must positively contribute to this effort. Students are asked to give an example of innovative products found in their surrounding and elaborate on how standards plays a role. In principle, the standard must support the innovation process, product development and its realization.

For the next several meetings, the class mainly discusses standards' coverage, that is the scope and level of standards used in the world and their national application. Then the systems of standards is connected to the infrastructure of national standard in terms of implementation and application and how the standards' systems work in the economies. Following is a class about the anatomy and development of standards practiced in the economy. Students will learn how a standard is formulated and whether it is a new or a revised standard. In this course, the development process of standard is simulated by giving students a direct experience with the process.

The eighth week is scheduled for the midterm. This test covers the materials delivered in the previous weeks. It is an individual test and done in open-book mode.

Metrology and conformity assesment is the next material undertaken after the midterm test. We think that teaching standards should be supported with a knowledge of metrology. Also conformity assesment is an integral part of standards knowledge.

As an exhibition was presented on campus by the National Body of Standardization (BSN) students are expected to visit it and observe the programs organized by BSN and the materials in relation to the National Campaign of Standard Application.

For the next three weeks, the class offers their presentations by groups formed earlier. Topics are related to the improvement of National Standards in Indonesia. Each group will present their findings about an exsting standard and review the possibilities for its improvement. Presentations will be graded based on the quality of the paper and how interactive the discussion was afterwards in the class.

The last week before the final exam a delivery of knowledge occurs on the details of the National Standard of Indonesia (SNI). One of the most important issues here is the implementation and practice of SNI throughout the economy and knowing which are voluntary and which are compulsory. The enforcement of compulsory standards is offered, including the laws and regulations underlying that process.

The last week is the final exam, which covers the materials from the ninth week until the final week before the exam.

### **3.3 KEY REFERENCE SUMMARY**

One of the key references used in the class is the National Standard of Indonesia (SNI) catalogue which contains all the SNIs ever published by BSN. Students will utilize this reference when they are asked to find SNIs that are useful and supportive for SMEs/

Another reference is periodical journal published by BSN. *Valuasi*. This journal reports on the implementation of standards, especially SNI in Indonesian companies. Reports presented in this journal are in more popular mode and updated so that they are easily understood and giving practical information.

## **4. STUDENT ACTIVITIES AND FEEDBACK**

### **4.1 STUDENT FEEDBACK**

In our University student feedback is not applied to all courses every semester, especially when the courses are electives. Courses take turn being evaluated by students. This semester the Standardization course was not assigned for student feedback or review. From the process of delivering the subject and materials throughout the semester, many discussions took place between instructor and students regarding the relevance of the course content and the appropriateness of the course delivery method. Student groups were assigned to read respective chapters from the APEC textbook and give reviews of these chapters. These reviews mainly focused on students' understanding of the chapter from their point of view. As undergraduate students, they then gave feedback on whether the each chapter's content was appropriate for their level in school.

### **4.2 STUDENT ACTIVITY**

Students have assignments, and one of these is as a team to develop or revise an existing National Standard. Each group picked one Indonesia National Standard especially one that is quite old and then discussed among themselves their suggestions for improvement of it.



They also went to visit an exhibition on campus held by National Standard Body as part of the National Movement of Standard Application. Each student was asked to make a report regarding what they saw and give comments on the exhibition.

Students also participated in organizing the campaign of National Standard Movement on campus. They helped the organizer to have a campus tour and conduct an open exhibition to show what programs and materials have been set up by the National Body of Standardization for the national campaign of standard awareness and application launched by the Vice President of the Republic of Indonesia at the end of 2010.

As mentioned before, students gave t group presentations which were also termed as case study assignments. They chose one specific SNI to analyze its appropriateness in the present and the future time. They had to be able to identify areas improvement for those SNIs.

## **5. LESSONS LEARNED**

### **5.1 LESSONS LEARNED**

Teaching students to increase their awareness, the importance and benefits of standardization is not an easy process. That is the case for undergraduate students who are still young enough to understand the future of standards and standardization. This better than just lecturing them. They can be involved in every phase of the learning process hopefully remember what they learn long after the class is finished and they already have their grades .

The method of teaching this material must take into account all proposals for making the lessons interesting. The lecturers must position themselves as facilitators rather than instructors. Classes should be both an interactive process and activity oriented. The group presentations are one good example of making students more active in exploring the knowledge contained within the context of standards and standardization.

The teaching materials must as much as possible be connected to the examples formdaily life that relate to standards and standardization. Students must find clear examples for how standards and standardization give benefits to consumers and producers. If not, then the students will not consider a lesson as interesting and will not remember for longer time as intended .

The textbook should have different versions for different levels of students. Materials for undergraduate students should not be the same as for higher levels of education. This is the case especially for the APEC textbook which seems to be a general textbook. It is a good book to use to complement the textbooks or references that are more specifically related to the case and context of respective economies. This aspect is important when the economy where standardization is taught has developed standards of their own and has implemented those standards.

The key to success when delivering this course is the participation of the students. The more they participate making the class active and interactive, the more we can expect to gain maximum understanding of the issue and have the ability to keep that understanding as long as

possible after they graduate. We can expect these students later to be promoters and applicators of the standards they have studied both in their daily lives or their work.

## 5.2 PRACTICAL COMMENTS

For the undergraduate learning process, the point of view for the organization of the class should be more focused in the interest of the students. We must find ways to make the class and the subject more interesting to them. Secondly, we must find ways to get the student involved and active, indeed have an interactive class. First-hand experiences must be given to the students by organizing as much practical knowledge and exposure as possible for real-world application of standards both in daily life and in industry. More plant visits would be better to let students see how more real standards are actually applied.

Case studies are also a good way to let students explore more knowledge by themselves. Presentations and class discussions of case studies can make the class more interactive and interesting. Exercises on the development and formulation of a standard can be assigned to students, so they can take full advantage of the student-centered learning approach of teaching. This approach is believed to give longer retention of knowledge. The longer students remember knowledge, the better the expectations that they will promote and implement that knowledge for better standards long after they graduate.

As far as possible, students should be involved in any programs or events related to standards, such as seminars, workshops, and conferences. These extra-curricular activities always have good points to them and also allow student to practice organizing an event. They can help the organizing committee to hold these events, especially on campus or in the city. They can also be encouraged to participate in a competition among students on the topic of standards or standardization offered both nationally and internationally. The University should allocate a budget to support these kinds of activities.

## 5.3 COMMENTS FOR TEXTBOOK DEVELOPMENT

Before the final exam, students by groups are requested to give comments on their APEC textbooks according to their own perspectives and points of view. Here is the summary of the comments that were collected:

- PowerPoint slides that come with the textbook are very useful and quite thorough to communicate the full content. The English language used is made easy for non-native readers. The size of the textbook is just right to be handy.
- This textbook gives more insights and knowledge to the students, especially undergraduate students, about what is happening outside the economy regarding to the implementation of standards.

- Chapter # on the innovation related to standards was attractive and encouraging and helped students realize the supportive role of standards as innovation is actually the soul of a company's competitiveness.
- The textbook is seen as a very international version that still needs to be complemented by national or local readings or books especially designed to give knowledge of national issues and examples of more local standards and standardization. This is very relevant when the participants are undergraduate students who need practical knowledge and issue discussion rather than just a theoretical or macro perspective.
- As ISO is known and familiar to students, the explanation should be more direct than it is in the textbook. More stories on the organization and elaboration of its economy contributions to the world would be interesting and raise both awareness and respect.
- Many examples in this textbook are not clearly understandable, especially those related to innovation or technological products. More interesting illustrations would be good ways to deliver the materials to their fullest understanding.

If there are any high quality essays/papers/case studies you would like to include in your report, you may include them in either an abridged or full format. You should get written agreement from the authoring students first to avoid any copyright issues.

# Ch.4 Technology Innovation, Intellectual Property Management, and Technology Standards

**Economy** : Republic of Korea  
**University** : Ewha Woman's University  
**Department** : MBA  
**Students** : Master (MBA) (10) *\*part-time*

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## 1. EXECUTIVE SUMMARY

This course was offered for MBA students at Ewha School of Management in the winter session of 2011. The main theme of this course is the management of technology with a couple of special lecturers speaking on technology standard policies and strategies. The two guest lecturers were chosen for their relevancy to the topics assigned in the syllabus.

The lecturer for technology standard policy was Mr. Dong-Geun Choi, the manager of the International Standard Division of KSA (Korean Standard Association). He has been working for KSA for ten years and has been active in promoting an academic relationship from both domestic and global perspectives. He is involved with evaluating the economic value of technical standards across various levels (global, national, industrial, and company levels).

Another lecturer assigned to discuss technology standard strategy was Mr. Sung-Wook Hong, a patent lawyer. He is now working for KAERI (the Korean Atomic Energy Research Institute) and provides consulting for intellectual property issues related to R&D activities at KAERI. He has had considerable experience in this consulting and was expected to share well-known cases on patent and standard strategies.

These two lectures lasted for two hours and thirty minutes in total.

Students were required to organize teams and submit a team report regarding the recent technology standard competition or strategies. Three teams were organized, and each team came up with different topics. The three team project topics were as follows:

- Platform competition between iPhone and Android phones
- Technology standard competition in media devices: Blue Ray disc vs. HD DVD
- Competition in wireless communication: GSM vs. CDMA

## 2. COURSE OVERVIEW

### 2.1 SCHEDULE:

No.	Dates	Topic	Description
1	1/4	Introduction of the course 10 gadgets that changed the world 1. Introduction 2. Sources of innovation 2-1. User innovation	
2	1/6	3. Types and patterns of innovation 3-1. Disruptive innovation 4. Dominant design 5. Timing of entry 5-1. Lock-in	
3	1/11	6. Defining and organization's strategic direction 6-1. Product strategy 7. Choosing innovation projects 8. Collaboration strategies 8-1. Business Eco-system 8-2. Catalyst/Platform strategy <b>iPhone</b> (case discussion)	
4	1/13	*Invited: Technology standard practices	Dong-Geun Choi (KSA)
5	1/14 (金)	10. Organizing for innovation 11. Managing the new product development process - Exercise of QFD (HoQ): Ideo products 12. Managing new product development teams	
6	1/18	9. Protecting innovation 9-1. Standard and IPR 9-2. IP Strategy <b>*Invited: Intellectual property management</b> (case discussion)	Sung-Wook Hong (Patent lawyer)
7	1/20	13. Crafting a deployment strategy 13-1. Pricing Strategy Summary and Review and Q&A	
8	1/28 (金)	<b>Team presentation</b> <b>Final examination</b>	

## 2.2 CREDITS AND GRADING: (TWO CREDITS)

- 1) Team Project (Case analysis): 30%
  - Students will write a report on a technological standard, such as international standard organization, economic impacts on economies, or a strategy for individual companies. Students need the approval of the instructor regarding the relevancy of their case before their presentation.
  - Possible resource reservoir: Harvard Business School cases, [http://www.hbsp.harvard.edu/b02/en/cases/cases\\_home.jhtml](http://www.hbsp.harvard.edu/b02/en/cases/cases_home.jhtml)
  - PPT 10-15 pages, presentation of 25 minutes, Q&A for 5-10 minutes
- 2) Examination: 60%: Closed book
- 3) Participation and attendance: 10%

## 2.3 TEXTBOOKS AND SUPPLEMENTS

- 1) Textbooks
  - Schilling, M.A. 2008. Strategic Management of Technological Innovation (2<sup>nd</sup> edition). McGrawHill.
  - Choi, D., B. Kang & T. Kim (eds.), Standardization: Fundamentals, Impact, and Business Strategy, APEC (Asia-Pacific Economic Cooperation).
- 2) Supplements
  - Anthony, S.D., M.W. Johnson, J. V. Sinfield & E. J. Altman. 2008. The Innovator's Guide to Growth. Boston, MA: Harvard Business Press.
  - Chesbrough, H. 2006. Open Business Models. Boston, MA: Harvard Business School Press.
  - Christensen, C.M. 1997. The Innovator's Dilemma. New York, NY: Harper Business Essentials.
  - Christensen, C.M., S.A. Anthony & E.A. Roth. 2004. Seeing What's Next. Boston, MA: Harvard Business School Press.
  - Evans, D.S. & R. Schmalensee. 2007. Catalyst Code. Boston, MA: Harvard Business School Press
  - Evans, D. S., A. Haigu & R. Schmalensee. 2006. Invisible Engines. Cambridge, MA: The MIT Press
  - McGrath, M.E. 2001. Product Strategy for High Technology Companies (2<sup>nd</sup> ed.). New York, NY: McGraw-Hill
  - Moore, G.A. 2002. Crossing the Chasm. New York, NY: Harper Business Essentials.
  - Shapiro, C. & H.R. Varian. 1999. Information Rules. Chapters 8 & 9. Harvard Business School Press, Boston: MA.
  - Thomke, S. H. 2003. Experimentation Matters. Boston, MA: Harvard Business School Press.
  - Von Hippel, E. 2005. Democratizing Innovation. Cambridge, MA: MIT Press.

### 3.0 INSTRUCTOR'S COURSE STRATEGY

This course is mainly focused on the management of technology with technology standards and standardization as a partial module. Technology standards and standardization is covered through three separate methods: The lecture is based on the textbook; two guest lectures on practical issues; and case studies. The first component, a lecture, covers the academic fundamentals for value and strategy of standards and standardization. Chapter Four of Schilling (2008) is the major source of this lecture.

The second component of instructional strategy, industry professionals' special lectures, covers the professional career development in technology standards development organization delivered Dong-Geun Choi who works for Korean Standard Association (KSA) and intellectual property management delivered by Sung-Wook Hong, the patent lawyer working for the Korean Atomic Energy Research Institute (KAERI). The detailed contents of these two guest lectures are as follows:

- 2011. January 13th (Dong-Geun Choi) 7:00PM-9:30PM

Mr. Dong-Geun Choi works for KSA (Korean Standard Association) as a Manager in the Department of International Standard Division. He delivered his lecture on two major issues: Standard policy as a economy's growth engine and standard policy cases. The first issue (i.e., standards policy as a economy's growth engine) includes topics on Korea's economic growth, economic growth with Korean standards, changing global environments, and the future agenda. The second issue (i.e., standard policy cases) included the following cases: Video, Blue-ray, PC-OS, Web browser, color TV, and electricity. For the lecture materials, please refer to Appendix 1.

- 2011. January 18<sup>th</sup> (Sung-Wook Hong) 7:00-9:30PM

Mr. Hong is a patent lawyer, and delivered a lecture titled "R&D, IP and Standards." His lecture agenda included the issues of standard and patent, strategies to acquire a standard patent, cases of acquiring standard patents, and strategies for utilizing standard patents. For the lecture materials, please refer to Appendix 2.

The third strategy, namely case studies, was also involved with student's participation. I asked students to pick their own cases from the Harvard Business School's case archive from their web site (<http://hbsp.harvard.edu/product/cases>). Students had free choice for the selection of cases, but had to follow the format and structure of case analysis suggested by the lecturer. Students were required to introduce the case story and propose the problems to resolve. Students could use as many of the disciplines and techniques learned during class to resolving the case problems. Students delivered their cases and analyses to other students in the last class section and exchanged opinions and comments about the analysis with the presenting teams.

## 4. STUDENT ACTIVITIES AND FEEDBACK

Three teams were asked to deliver a brief introduction of technologies in their interest area and explain their analysis regarding the technology standard competition between the competitors in their technology area. All three teams presented their analysis on the relative advantages and the possible (or realized) result of a standards battle. The detailed presentation content and the agenda are elaborated on below.

### 4.1 TEAM I: PLATFORM COMPETITION BETWEEN IPHONE AND THE ANDROID PHONES

- **Students: Mi Jin PARK, Hye Eun OH, Sun Ok YOO, and Hea Kyung CHOI**

This team chose the recent hot topic, the competition between iPhone and the Android smartphone. They started their presentation with a brief introduction of the two major sponsor companies for this competition: Apple and Google. Then, they compared the strategies and marketing efforts between the two instead of simple a technical debate about their technology features. The team finished with a discussion of the future challenges for both technology camps referencing Gartner's report. Their presentation agenda was the following::

- Introduction of Apple and Google
- Strategies and marketing efforts of iPhone and Android phones
- Recent market trends
- Gartner's report on this competition
- Conclusion: What should both/each do to win this standards battle?

The abstract for this work read as follows:

It is clear that ubiquitous mobile computing platform is a disruptive technology today.

Convergence has become a part of the fast growing mobile media industry. Whether we like it or not, the mobile phone has become a vehicle used for multimedia par excellence. Contemporary convergence by way of its combination of applications and multimedia possibilities makes it seem almost impossible to buy/develop such a device just for voice calling without including all the 'extras'.

Two major contenders are Apple's I Phone and the Android platform developed by Google.

In addition to their internal technical differences, Android and the I Phone platform also differ in many other significant respects that will more directly impact their users. More than technical specifics alone, users will be most impacted by such platform factors as user restrictions and the freedom accorded by the platform's business model.



Interestingly, industry sources say the operating system has emerged as the key deciding factor when customers purchase new smart phones. Operating systems for smart phones can be divided into two different types: Open source and closed source.

Google's Android operating system has the most important open-source phone architecture, while Apple's I phone OS is the flag bearer of the closed-source concept.

Most industry observers say the smart phone ecosystem so far has two major camps-Apple and Android. They say the company that manages to make its ecosystem more populous will likely succeed in the war between technologies .

We attempt to answer the question, "Which one of these two platforms will build a widely adopted mobile platform?" This research employs an interpretive research approach to examine specific reasons that can explain platform adoption. We researched the customers' choice of Apple's I Phone vs. Google's Android platform, and use our findings to postulate a theoretical approach based on Gartner's perspective.

#### **4.2 TEAM 2: TECHNOLOGY STANDARD COMPETITION IN MEDIA DEVICES: BLUE RAY DISC VS. HD DVD**

- Students: Youngjung KWAK, Sunjoo PARK, and Yoonhee SONG

This team presented the standards competition between Blue-ray and HD DVD. They started with a brief introduction of the two technologies with their histories and evolutions. Then, they explained the relative advantages of Blue-ray technology compared to HD DVD and argued why Blue-ray could win a de facto standard status. Their presentation agenda was the following:

- Technology introduction: Blue-ray and HD DVD
- History of standards completion between these two technologies
- Advantages of Blue-ray: Strategic alliance, security technology, and external support (especially SONY)
- Prospects and future challenges of Blue-ray

#### **4.3 TEAM 3: COMPETITION IN WIRELESS COMMUNICATION - GSM VS. CDMA**

- Students: Ahryoung KIM and Jooyoung OH

This team compared the technological features of these two wireless telecommunication standards and preceded their presentation with the following agenda:

- Technology features and evolutions of GSM and CDMA
- Global market trends, including subscribers and service offerings
- Chinese wireless telecommunication market: Standards, devices, and services
- Dealing with Chinese standards and preparing for 4G

## **5. LESSONS LEARNED**

From my experience both teaching and coordinating lectures on technical standards and standardization, I developed a framework regarding critical success factors for the teaching of standards at the university level: i.e., STANDARDS. Below is a detailed explanation for each component of this framework. STANDARDS should represent the School, Teacher, Administrative Support, a Network of Disciplines, Degree, and Association.

### **5.1 SCHOOL: MANAGEMENT VS. ENGINEERING**

This issue examines which school is better at offering this course. Management School offers similar disciplines, whereas Engineering School has more demands and students who will definitely appreciate this course offering. Engineering School has more students than does Business School on average. Management students perceive similar disciplines in other courses, whereas Engineering students feel it is a fresh subject. Possible synergy effects are expected with delivery of other MOT (Management of Technology) courses

### **5.2 TEACHER: ACADEMIA VS. BUSINESS PRACTITIONERS**

Who is the appropriate or main instructor for this course? Academic professors likely are better in delivering the objective and theoretical fundamentals to students. However, students may prefer to learn real practices from company cases, international standards and organization's procedures, and episodes better covered by industry practitioners. All Korean universities have major concentration instructors on their faculties. Some universities have invited practitioners as special guests whom students have appreciated for sharing their experiences. A combination of academic disciplines and practical experience is desirable

### **5.3 ADMINISTRATIVE SUPPORT:**

Financial, infrastructure, human resources, etc. ... The topic of technology standards and standardization is not yet in the main stream of the management discipline. Faculties may need more incentives to prepare this course for students. Indeed, what kinds of resources and incentives are necessary for university faculties to offer and prepare this course? Standardization is neither a major discipline nor a major topic in Korea. Unless professors and students get sufficient support to prepare and offer this subject, a class will not get enough registrations (?). Support for teaching materials (e.g., textbook, case studies) and for new preparation are needed and necessary.

## 5.4 NETWORK OF DISCIPLINES

Unique discipline vs. Case study of standardization examined from multiple perspectives ... Can technology standards and standardization be a unique discipline or course for students and compare well to other management courses? If not, is this topic strong enough to be covered by case analysis that focuses on technology standard and standardization? Do we have enough cases on this issue? Is this subject sufficient enough to be an independent discipline? Which subjects can use this subject as a sub-module? Is case-based teaching a more appropriate approach to teaching? Do we have enough incentives to encourage scholars to develop and publish new cases for classes? If not, what kind of systems do we need to develop these important incentives?

## 5.5 DEGREE

Undergraduate vs. Master's: Is this course appropriate for undergraduate students or just Master's students? If this course is fine for undergraduates, in what school year students does this course fit best? If this course is better for Master's students can universities issue a separate degree for the specialty in technology standards and standardization? Is this course appropriate for undergrad students? If yes, what school year would students take this course? If the case-based approach is more desirable for teaching this course, is this approach still valid for undergraduate students?

## 5.6 ASSOCIATION OPPORTUNITIES

How can we collaborate better to offer students better courses on technology standards and standardization? How can students learn from each other at other universities and share their knowledge and experiences? How can the faculties continue to enhance their skills and knowledge with each other? Events for students might include a case development contest and other incentives to encourage students to specialize in this major (e.g., internship, scholarship, degree programs, etc.). Events for faculties can include academic gatherings (e.g., conferences, seminars, and workshops) and academic journal special issues on standards and standardization. In common, who could be the strongest sponsors of these events?

## 5.7 REALITY:

Class Lecture vs. Experience: Class lecture may not be the only way to deliver the knowledge for technology standards and standardization. We need complementary offerings of industry practices and experiences to offer students for more practical understanding of this area. Students need to experience real practices and observe real operations of standard organizations. How can we induce students to become involved with real practices for the sake of their experience with standardization? There are many different ways to provide direct or indirect experiences of standardization to students, such as visiting the standard development organization and encouraging students to participate in submitting standard proposals, etc.

**5.8 DREAM:**

Career path vision for students: Can this course provide enough vision for students to develop a career in technology standards and standardization? How can we nurture a professional vision for students in this area of endeavor? What kind of job can students get if they want to develop their careers in standardization? Can they find enough internship opportunities during coursework? Do we have enough education and training programs and systems to support their continuous pursuit of this career? Can students establish a strong vision of having a lifetime career in standardization?

From this eight- component framework, I developed the following propositions and conclusions for the better teaching of technology standards and standardization in the university. First, standards for standard education are needed: STANDARDS could be one of the possible frameworks for this objective. Second, we need diverse collaboration programs for major participants in this initiative, i.e., faculties, students, and practitioners. Examples would be an international exchange program for students, an international faculty exchange program, and an international practitioner exchange program. Third, global sponsorship for a positive loop for standards education is necessary: Research → Case development → Teaching materials → Lecturer exchange → Sharing career experiences and new research proposals at annual meetings (conferences).

# Ch.5 Management Strategy for Industrial Systems, with a case study of Standardization

**Economy** : Republic of Korea  
**University** : Hankuk University of Foreign Studies  
**Department** : Department of Industrial & Management Engineering  
**Students** : Master (1) + Bachelor (6)

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## 1. EXECUTIVE SUMMARY

This course lets students, regardless of their background, majors, and levels, understand technological innovation dynamics and the importance of product and process standards. Further, the course enhances their capabilities to design, construct, and implement technological innovation strategies at the corporate and industrial level. The target for the course is candidates for Master's degrees and the PhD, who needs to undertake the course mandatory work, i.e., taking the final exam, discussing in class, and doing the term paper project work, etc, during the spring semester that ran from March to June in 2011. This class is also open to undergraduate students who want to understand this subject matter. However, they are not charged with all the class work or earn the credits except for contributing discussion in class.

The class has three steps, namely, the opening case, lecturing to learn the main content, closing case and concluding remarks. Although this class focuses mainly on strategy themes that concern technological innovation, because these standards issues are deeply related to innovation themes, many topics and cases about these issues are examined and discussed in class during the semester. The theme of the class can be expressed as three areas: The fundamental concepts and theories concerning innovation; formulation strategy for innovation; and implementing methodologies for innovation strategy. Similarly, the topics related to standards and standardization issues are distinguished by addressing the fundamental concept and related

theories, including unique terminologies, standardization strategies at the corporate and industrial levels, and the processes for implementing measures at each level. Especially, the strategic perspectives of these two sides, innovation strategy and standard issue are linked. Also many practical cases and empirical examples for both sides are evaluated and analyzed by the students and the lecturer during class. Further, during this semester, an expert is invited to lecture on issues related to IT standardization. His topics this semester addressed two aspects, standardization of ITU-T and technological innovation strategy with related cases from the IT industry.

Most of the students were very satisfied with the course and especially felt that the standards topic is very necessary for the original course. Albeit the high satisfaction with this lecture, the degree of improvement in the knowledge capacity of standards was relatively weaker than other elements, thus offering important teaching implications for revising the course plan for the next course.

In order to attract interest from many students, it is important to address and consider this issue and also students' lecture satisfaction. This course is one that is necessary to keep open to undergraduate students and thus it's good to provide basic references and information to them in advance. Further, practical study, such as a field visit to standard bodies or standard-related departments of private companies, and a standard conference can be another meaningful tool to use to attract student interest and help all students understand standardization concretely.

## **2. COURSE OVERVIEW**

### **2.1 SYLLABUS**

#### ***2.1.1 Course Objectives***

The objective for this class is to enable students, regardless of their backgrounds, majors, and levels to understand technological innovation dynamics, including the importance of product and process standards, and further, to enhance their capabilities to design, construct, and implement technological innovation strategies at both the corporate and the industrial level. Therefore, this course includes several themes, including innovation theories, industrial dynamics, standardization concepts and their industrial applications and strategic operations, and strategic planning, organizational strategy, and implementation methodologies for technological innovation, and more.

#### ***2.1.2 Course Length and Characteristics***

This course is for candidates for the Master's degree and the PhD, who need to take mandatory work, such as a final exam, adding discussion in class, and carrying out term paper projects, etc, during spring semester, i.e., from March to June of 2011. The course is also open

to those undergraduate students who want to learn and understand this subject; however, they are not necessary to do homework of the class and don't get the credits for this class.

### **2.1.3 Syllabus – Class Planning**

This class runs for 16 weeks, including the final examination period and the presentation week. Although the class plan focuses on the theory, dynamics, and strategic measures of technological innovation, the class also emphasizes and utilizes the importance and strategic applications of standardization to industry, especially the IT industry from the perspective of the technology strategy of corporate and policy-makers. To help these trainees easily understand practical situations regarding standardization, an external expert is invited to visit and lecture on various subjects regarding standardization, while the professor manages the rest of the course. Because of the mixed topics regarding the strategy and standardization of innovation, this course uses two textbooks, *Strategic Management of Technological Innovation* by M. Schilling as the main text and *Standardization: Fundamentals, Impacts and Business Strategy* edited by APEC as a subordinate or sub-text.

- (1) Introduction to Class: Syllabus & Lecture Plan – 3 March 2011
- (2) The Concept of Innovation – 7 March 2011
- (3) Types and Patterns of Innovation – 14 March 2011
- (4) Standardization and Innovation: Definitions and Functions – 21 March 2011
- (5) Lifecycle, Organizations, and Development Procedures – 28 March 2011 [Lecture by an external expert on standardization]
- (6) Conformity Assessment – 4 April 2011
- (7) Economic Effects of Standards and IPR – 11 April 2011
- (8) Timing of Entry, Organizational Strategic Direction, Collaboration Strategies and IPR Impacts– 18 April 2011
- (9) Opening and Selection of Term Paper Topics – 25 April 2011
- (10) Protecting Innovation: Standards and IPR – 2 May 2011 [Lecture by an external expert regarding standardization]
- (11) Organizing for Innovation – 9 May 2011
- (12) Managing the New Product Development Process and the Role of Standards & IPRs– 16 May 2011
- (13) Managing New Product Development Teams & Standards Teams–23 May 2011
- (14) Crafting Deployment Strategy – 30 May 2011
- (15) Presentation of Term Paper – 13 June 2011
- (16) Final Exam – 20 June 2011

## **2.2 STUDENT CHARACTERISTICS**

Although the target students for this class are graduate students with an engineering background, the class is not subject only to their backgrounds, levels and majors because the objective of this course is to disseminate an innovation strategy mindset and the importance of standards to young students who are preparing to enter industry. However due to the small size of the targeted department and the insufficient sharing of the information in this course with other departments, it remains a small class with one regular graduate student. Mr. Shin Joonchul, Student Number 201030355, belongs to our department, and his major was management information systems in undergraduate school. There were also six undergraduate students who didn't become regular members of the class due to the exclusiveness of this course, i.e., being directed toward graduate students.

Especially, he is now working at a company that is consulting on the process and internal operation improvement of R&D institutes and small and medium-sized enterprises. His experience helps the class and especially other undergraduate students to understand and utilize standardization using the perspective of innovation strategy in a practical field. Further, his term paper addressed a development and management framework for standardizing R&D, a topic very suitable for the class overall objective. Those undergraduate students who are planning to enter graduate school received a good opportunity here to learn more theoretical knowledge and indirectly gain practical experience about innovation strategy as well as standardization in the class.

## **3. OPERATION STRATEGY AND CLASS SUMMARY**

### **3.1 OPERATION STRATEGY**

This class was carried out based on the planned syllabus to include the external expert's lecture. The class operation every week except for the examination period and presentation week for the final term paper consisted of three segments. The first step was to introduce the opening case and its discussion to the participants under the moderating assistance from the professor. The second step was lectures by either the professor or external lecturer on the main topic of the week, including brief cases explaining these theories. The last step is a closing case or concluding remarks that reviews the main points of that class session.

In detail, every class starts by presenting an opening case on the week's topic, for example, a MS company case on the topic of standards battles and dominant design, and then discussion among class members, moderated by the professor. Then the opening case concludes with lessons offered after the discussion, which then becomes the basis for understanding the main theories of that week's topic. After the lecture on this main subject the professor, the participants in class will understand the main themes by examining a closed case and examples related to it

The students taking this class were evaluated through several methods with different weights, i.e., attendance at 20%, case presentation and discussion at 30%, the term paper at 20% and the final examination at 30% in value



### **3.2 CLASS SUMMARY**

As mentioned above, the class proceeds in three steps-- the opening case, lectures on the main content, and closing case studies and concluding remarks. Although this class focuses mainly on strategy themes related to technological innovation, because standard issues are deeply related to innovation themes, many discussions and cases on standards issues were examined and analyzed during this past semester.

Actually, the theme of this class can be divided into three areas of focus: The fundamental concept and theories concerning innovation; formulation strategy for innovation; and implementing the methodologies for innovation strategy. Similarly, the topics related to standard and standardization issues are distinguished as fundamental concepts and related theories and include terminology, standardization strategies at the corporate and industrial levels, and implementing measures at each level. While our class deals with all three areas, as they relate to technology innovation, due to time constraints and the main objective of this course, two areas of standard issues, namely fundamental concepts related to economic theories, and strategies for standards are included. Especially, the strategic perspectives of both sides are linked. Also, many practical cases and empirical examples from both sides are examined and analyzed by both students and the professor in class.

The first area focuses mainly on definitions, terminologies, and fundamental concepts, i.e., economic and managerial models, practical and historical findings, etc. From the perspective of technology strategy, students learn about the different features of innovation, such as sources, types, patterns, and industry dynamics. The first area involves many cases in the industry field as discussed by class participants, such as GIVEN Imaging's Camera Pill that broadcasts images of the human small intestine, Honda's HEV (Hybrid Electric Vehicles), the rise of Microsoft through use of the de facto standard, and the PDA (Personal Digital Assistant). Similarly, the fundamental definitions, terminologies, and procedures of standards and standardization, including the economic effects of micro and macro levels are delivered and discussed by the students for several cases. In particular, the relationship between innovation and standards from the industrial perspective of dominant design as a de facto standard is thoroughly discussed in class.

The second area deals with the formulation strategy for innovation and standards or standardization. Formulating a technological innovation strategy determines a firm's strategic direction, choice of methodologies for innovation projects, collaboration strategies, and protecting the tools of innovation through several industry cases studies. In the standards or standardization area, the students should understand the relationship between standardization and innovation and those dynamics, such as the standards for technological innovation, technological innovation that uses standards, and standards battles to decide on technological innovations, etc.

The final area of the class covers several practical methodologies that can be used to implement a technological innovation strategy. The concluding topic in this course examines the organizing of the focus or subject for innovation, managing the method for a new product development process, such as QFD (Quality Function Deployment), the stage-gate process, organizing and managing the skills of a NPD team, etc.

Especially, during this semester, an expert was invited to lecture on several issues related to IT standardization. His topics covered two aspects – the standardization of ITU-T and the technological innovation strategy for cases in the IT industry. In particular, the standardization process, such as TAP (Traditional Approval Process), AAP (Alternative Approval Process), the construction process for a contribution paper and its examples in Study Group 3, ITU-T which focused on “Tariff and accounting principles including related telecommunication economic and policy issues” were very helpful and constructive for communicating an understanding of international standards activity and its practical implications for these students.

### 3.3 KEY REFERENCE SUMMARY

As mentioned, this class uses as the main text, *Strategic Management of Technological Innovation*, for studying technological innovation strategy and as a sub-text, *Standardization: Fundamentals, Impacts and Business Strategy* for related standards issues.

## 4. STUDENT ACTIVITIES AND FEEDBACK

### 4.1 STUDENT FEEDBACK

The lecture evaluation by students from this class was accomplished online, using the Internet just after the final examination. To examine overall student feedback, an offline survey of the 6 unregistered undergraduate students was obtained before the final examination. The following tables show the summaries of these 7 student responses including one graduated student and six undergraduate students.

Are you satisfied with this course, especially its standards theme?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
0	0	0	3	4

Did you recognize the importance of standards in technology innovation and strategy aspect by taking this class?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
0	0	0	2	5

How much were you satisfied with the external speaker and the topics?

Topics	Very Unsatisfied	Unsatisfied	Neutral	Satisfied	Very Satisfied
Innovation & Standards	0	0	1	3	3
ITU-T Standard Process & Case Study	0	0	0	3	4

Do you believe you received lot of benefit and greater interest in the topics from this course and its discussions?

Aspects	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Understanding the concept and importance of standards & standardization	0	0	0	1	6
Strategic implications for industry of standards by utilizing innovation in related cases	0	0	0	3	4
Improvement of knowledge capacity regarding standards	0	0	4	2	1
Necessity of standards as the main topic of this class	0	0	0	1	6

As shown in the above tables, most students were very satisfied with the course and felt that the subject of standards is necessary to address in the original course. Albeit their satisfaction with this course was high, the degree of improvement in their increased knowledge of standards seemed to be relatively weaker than the other elements and provides new teaching implications for the next session of the course and its planning.

## 4.2 CLASS SUMMARY OF STUDENT ACTIVITIES

Following the direction of the syllabus and the operation strategy for this class, the professor teaches the main subject and theoretical content to the student participants, and they carry out discussion on the main topic issues, especially, going over cases related to these issue. In the case of the one registered student, the final term paper was a mandatory project that involved a paper proposal, presentation to the class, and submission of a final manuscript.

This student submitted a proposal entitled “Toward Improvement of the Process for R&D Standardization” in mid-May. The plan was to propose a standardization process of research and development based on a real case of government- funded research at an institute in Korea. However, due to time and data constraints and internal problems at the chosen institute, the term paper was downsized to a simple survey paper with the revised title of “Research & Development and Standardization”. It covered the standardization trend of governmental and public agencies, the benchmarking of advanced economies’ standardization strategies, and the implications needed to accomplish a standardization process for enhancing R& DB. Although he was sidetracked from his original objective and the project needed further study, his work did deal with various standard issues concerning public agencies, especially, and was meaningful when considering standardization from the perspective of R&D. (See the Appendix)

## **5. LESSONS LEARNED (SUMMARY AND CONCLUSION)**

### **5.1 LESSONS LEARNED**

- Course Design: This semester course had two themes-- technological innovation strategy and standards. There were too many subjects to lecture on and discuss in just 16 weeks. If a course to cover both strategy and standards is necessary, the main concept and the course methodologies as well as interrelated practice cases would be preferable to include covering the majority of both topics.

- Course Operation: Our course operation had three steps:-Opening cases, main lecture, and closing case or concluding summary. It seemed to be a good method to encourage participants to focus on the class closely and was very helpful for the students. It let them understand the full content of the lectures and the class.

- Student Participation: Based on course operation, every student had to participate in presenting a case and discussing that case and the important topic that needed previewing for related knowledge and relevant information on the issue. Still, better incentives are necessary to encourage students to preview each topic effectively and obtain the relevant and needed information.

- Student Evaluation: Grading was based on several evaluation criteria, including attendance, case presentation, term paper, and final examination, all productive from my experience. But if there are more students enrolling in this class, the term paper can be carried out as a team project that is the most important criteria for evaluation.

- Textbook Utilization: Lecture and the case studies were based on both the main and the sub-textbook. Practical cases from industries regarding standards and standardization strategy are greatly helpful to students and help them understand all the issues discussed during the semester.

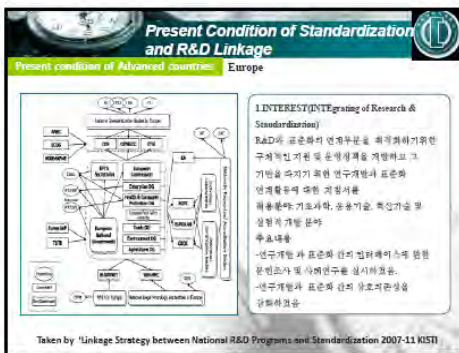
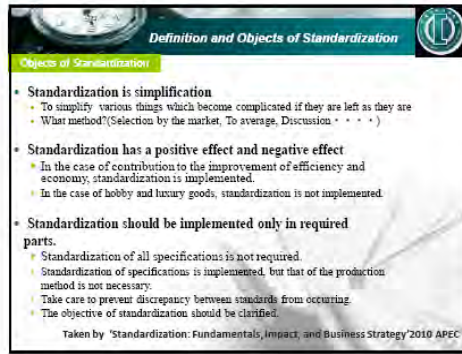
### **5.2 PRACTICAL COMMENTS AND SUGGESTIONS**

To attract more interest from many students for this class, it is crucial to consider the importance of this course and student satisfaction of the lecture. It is also necessary to open this course to undergraduate students, in particular senior level students. However, since the course topic can be somewhat difficult for undergraduate students to understand and able to discuss, providing basic references and information about the material in advance will be helpful to latent students. Furthermore, practical study, such as a field visit to domestic or international standard bodies or standards-related departments of private companies or standards conferences like the ITU-T SG meeting, can be a very meaningful tool, as these additions will create greater student interest as well as deliver greater understanding of standardization in truly concrete terms.

## 6. APPENDIX – STUDENT’S PRESENTATION

The presentation format for the final term paper titled, “R&D and Standardization”, and approved by the author, Mr. Shin, is attached here.

With the expansion of the WTO/FTA system in International trade, Standardization is now an important action in technological trade. Especially, Standardization is a critical action in the IT technological area. Many of the developed economies try to take on global industrial and technological competitiveness because IT has a special capability to fuse with other technologies, such as Biology, Environment, and others in R&BD. How are our efforts in this respect? In this paper, I show domestic conditions and comparison with the condition of developed economies. Finally, I suggest how to make standardization competitiveness stronger in terms of R&BD reinforcement.



# Ch.6 Strategies of Technology Innovation and Standardization

**Economy** : Republic of Korea  
**University** : Hanyang University  
**Department** : Division of Business Administration  
**Students** : Doctor (6) + Master (4)

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## 1. EXECUTIVE SUMMARY

This course was created for the spring semester 2011 at Hanyang University for students in the graduate schools of the Department of Strategic Management and the Department of Management Consulting. The course consists of four parts that focus on corporate strategy and policy issues related to technology standardization.

In the first part, students learn the basic concepts related to technology management as an initial step in understanding standardization. The second part presents an overall introduction to standardization, with the third part concentrating on the effects of market entry strategy on standardization strategy, inter-corporate cooperation strategy and intellectual property strategy. Finally, the last part of the course addressed the importance of standardization in the service sector as an additional topic.

During the course, two guest lecturers gave presentations to the class. Dr. Chang Yong June is a research fellow at the Korea Institute for International Economic Policy, and he shared with the class how technology standardization affects trade in his lecture entitled “Recent Technology-Related Regulations and Their Economic Effects“. The second guest lecturer was Dr. Kim Tae Hwang, Professor at Myong Ji University. Using the paper “Competing Technologies: An Overview“ by W. Brian Arthur, Dr. Kim explained the mechanisms for *de facto* standards.

The students also organized into teams and completed projects based on the standardization information they learned in class. At the end of the course, three teams gave presentations on the benefits of standardization, a comparison of standardization strategies for smart phones and Smart TVs and the economic effects of a delay in standards formation.

## **2. COURSE OVERVIEW**

### **2.1 INTRODUCTION**

The overall objective of this course is instructing graduate students majoring in management and engineering on the strategic importance of technology standardization. Specific objectives include teaching the strategic importance of standardization, the mechanisms for choosing standards, and the inter-relationships between various technology innovation strategies from the viewpoint of corporate-level technology innovation strategy.

As illustrated using the case of Microsoft, we are living an era of winner-take-all where the company that first gains control of a market standard acquires the power to control the technology development. In contrast, we can also find many cases where companies that lose in the competition to gain control of a standard are then unable to recover their invested costs and even face threats to their continued existence.

Currently, companies around the world are competing to be the first to control standards. Korean companies are also gradually reaching a point where they no longer simply follow the leaders. Indeed, they have started to recognize the importance of standards strategy and are now approaching the technology frontier with a view toward being the leader in technology development.

By teaching the strategic importance of standards, the mechanisms for establishing standards and the strategic effects of standards establishment, this course aimed to develop the human expertise that can take the lead when drawing up a government and corporate standards strategy. Thus, this “Strategies of Technology Innovation and Standardization” course was created within the graduate school program to achieve this end goal.

This three-credit, sixteen-week course included two tests and twelve lectures, along with team project presentations. Of the ten students registered for the class, three were enrolled in the Graduate School of the Department of Strategic Management, six were enrolled in the Graduate School of the Department of Management Consulting and one student was in the graduate school of the Department of Applied Economics. Of these students, six were doctoral students, and four were studying for their Master’s degrees. Five of the students were attending graduate school full time, while the other five were employed and attending classes on a part-time basis. Further, of those students with jobs, three were researchers in government agencies, and the other two were working at private companies. The majority of the students was majoring in Human Resources Management, Marketing, Production Management, Accounting, and Strategic Management and wanted to learn more general knowledge related to technology management. Therefore, efforts were made in the course to focus the teaching appropriately on overall clear explanations of technology management and standardization.

Grading was determined as follows: 30% on the mid-term exam, 40% on the final exam, and 30% on the team project. For the team project, students were told to prepare an individual company case study related to the strategic aspects of standardization. They were guided in their topic selection and development of content by individual consultations with the professor.

## 2.2 SYLLABUS

The course syllabus was as follows :

Course Title	<b>Strategies of Technology Innovation and Standardization</b>
Course Objectives	Main areas covered: <ul style="list-style-type: none"> <li>• Strategic Importance of Standards</li> <li>• Selection Mechanisms for Standards</li> <li>• Interaction of Standards Strategies and Other Strategies</li> </ul>
Course Period and Classroom	March 1 – June 20, 2011 Credits: 3 Classroom: #13-531
Targeted Students	Level: Master’s and Doctoral students Major: Business Administration
Textbooks	Primary Textbook: <i>Standardization: Fundamentals, Impact, and Business Strategy</i> , (APEC, 2010) Secondary Textbook: Melissa A. Schilling, <i>Strategic Management of Technological Innovation</i> , (McGraw-Hill, 3 <sup>rd</sup> ed, 2010)
Lecturers	Lead professor : 80% Guest lecturers: 20%
Grading	Mid-term examination (30%) Final examination (40%) Team project (30%)
Sequence of Classes	<ol style="list-style-type: none"> <li>1. “Strategic Understanding of Innovation”</li> <li>2. “General Introduction to Standards”</li> <li>3. “Technology Lifecycle and Standards”</li> <li>2) “<i>De facto</i> Standards and Positive Feedback”</li> <li>3) “Revolutionary Strategies and New Standards”</li> <li>4) “Policy Implications of Standards”</li> <li>5) “Building of Innovation Strategies”</li> <li>6) Mid-term exam (April 20, 2011)</li> <li>7) “Market Entry Timing and Standards”</li> <li>8) “Collaboration Strategies and Standards”</li> <li>9) “IPR and Standards”</li> <li>10) “Service Innovation and Standards”</li> <li>11) “From Start to Finish: The Role of Standards”</li> <li>12) Presentation of Team Project 1</li> <li>13) Presentation of Team Project 2</li> <li>14) Final Exam (June 15, 2011)</li> </ol>



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## 3. INSTRUCTOR COURSE DESIGN

### 3.1 COURSE DESIGN

In the first of the four parts of the course, students learned the basic concepts that related to technology management as an initial step in understanding standardization. The strategic importance of

and the sources and patterns of technology innovation were introduced with papers by Schilling (2010), Choi *et. al.*, (2010) and Dosi (1988) used as references.

The second part of the course presented an overall introduction to standardization, including the definition and strategic importance of standardization, the lifecycle and standardization of technology, *de facto* standards and positive feedback, standards transfer strategy and the policy implications of standardization. The technology life cycle was explained as well, using Abernathy and Utterback (1978). The lesson on technology proliferation and the S-curve was based on Christensen (1992), along with the technology paradigms and technology trajectories from Dosi (1988). Professor Tae-Hwang Kim lectured on the importance of positive feedback mechanisms for the formation of *de facto* standards as presented by Arthur (1988). In this lesson, students learned that network externalities and self-reinforcement are both positive feedback mechanisms. They also learned about the role of government policy in forming *de facto* standards.

Next, trade and policy were covered by Dr. Chang Yong June, who compared the transfer strategy of one standard to another – in other words, revolutionary strategy and evolutionary strategy – using Shapiro and Varian (1999). Dr. Chang taught about the effects of standardization on economic welfare as well as the effects of standardization on trade from a standardization policy viewpoint. Thus, the class learned about the issues of losses for economic welfare and technological barriers that arise from standardization-induced monopolies and also the effects of standardization on trade.

The third part of the course focused on the effects of market entry, cooperation strategies between companies, and the strategies of intellectual property rights on standardization strategy. Teece (1986) and Schilling (2010) were used as the basis for explaining the effects of the existence or the nonexistence of standardization on market entry timing, as well as the effects of standardization on the appropriateness of technology innovation. This third part also examined just how cooperation between companies helps achieve standardization and how an open intellectual property rights strategy can influence the setting of standards.

In the fourth part, a variety of additional topics were selected and presented, including the importance of standardization in the service sector and the relationship between open innovation strategy and standardization. Specifically, through Castellacci (2008), the students learned that whether or not standards established can be a decisive factor that influences technology innovation and appropriability in the telecommunications, finance, transport, and wholesale industries of the service sector. These lessons also looked experimentally for relationships for and with standardization for an open innovation strategy.

## 3.2 GUEST LECTURES

1) Dr. Chang Yong June

May 18, 2011, 7-9pm

Dr. Chang Yong June is a research fellow at the Korea Institute for International Economic Policy. He lectured on the effects of technology standards on trade under the title, “Recent Technology-Related Regulations and Their Economic Effects“.

The main topics of this lecture were:

- What does “Technical Barriers to Trade (TBT)” mean?
- Recent Trends in Technology-Related Regulations I: WTO/TBT Notifications
- Recent Trends in Technology-Related Regulations II: Specific Pending Trade Issues
- Specific Pending Trade Issues for Korea
- Factors Influencing the Introduction of Technology-Related Regulations
- Economic Effects of TBT: Prior Research

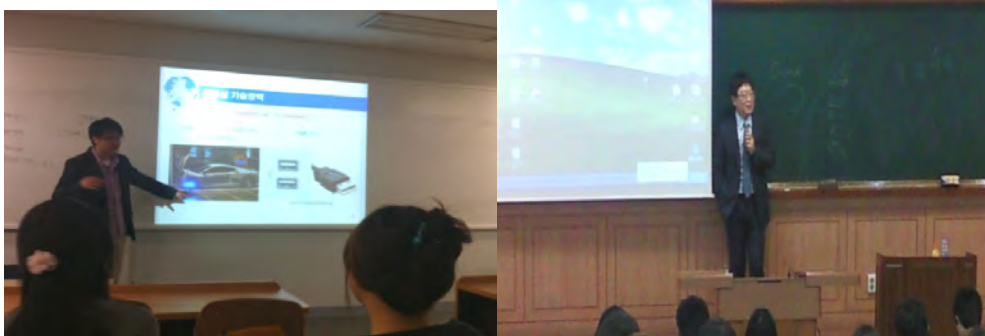
## 2) Professor Kim Tae Hwang

May 25, 2011, 7-9pm

Professor Kim Tae Hwang of Myong Ji University in his lecture explained the selection mechanisms for *de facto* standards, using the essay, “Competing Technologies: An Overview” by W. Brian Arthur.

The main topics of this lecture were:

- What are Positive Feedback Mechanisms?
- Network Externalities: Direct and Indirect
- Lock-in By Small Events and Returns to Adoption
- Path Dependence
- Competing Standards and the Role of Expectations
- Policy Recommendations



## 4. STUDENT ACTIVITIES AND STUDENT FEEDBACK

### 4.1 PRESENTATIONS

Based on information learned during the class, three teams presented case studies related to technology standardization. Their presentations discussed the benefits of standardization, a comparison of standardization strategies for Smart phones and Smart TVs, and the economic

effects of a delay in standards formation. The following outline summarizes these topics in more detail.

**1) *The Benefits of Standardization at Each Stage of the Value Chain and Case Studies (By Hyungwook, Kim and Donghee, Shin)***

This team identified the benefits of standardization in connection with the Value Chain Model proposed by M. Porter. Standardization gives obvious benefits to companies at each stage of the value chain, and the concept of standardization is commonly used as a synonym for compatibility.

The team reclassified primary activities (inbound logistics, operations, outbound logistics, marketing and sales, and service) into two categories based on their major benefits.

- The first category consisted of inbound logistics, operations, and outbound logistics, the results of which are mainly tangible and measurable. Standardization within this group of activities can bring about cost reductions.
- The second category included marketing and sales as well as service. These activities are often intangible and immeasurable. Standardization in this group may create additional value.

Standardization can be a solution to the friction problem. As complexity in the market increases, standardization is becoming more important, especially so since we live in the global era. In this study, the team looked into standardization efforts related to the Value Chain Model of Porter. Through this discussion, they identified the benefits of standardization from a firm's point of view.

**2) *The Economic Effects of a Delay in Standards Formation : A Case Study of the LED Industry (by Ji-Hoon Lee and Jin-Soo Roh)***

This team presented on the negative effects of a delay in standards formation in the LED industry. They emphasized the importance of creating demand quickly and the role of government in the formation of standards.

The vicious circle caused by a delay in standards in the LED industry was described as:

- The delay in establishing standards increased the number of LED light firms operating under heterogeneous standards.
- In an environment of high uncertainty, these companies were distracted from their core business and pursued short-term profits through packaging rather than long-term profits through investing in the future.
- This low commitment and investment led to inferior profit structures, which further caused low re-investment, preventing the firms from achieving learning curve effects, and ultimately leading to high licensing costs for the leading companies, i.e., Nichia and Cree.
- Big firms desiring to lower their transaction costs through vertical integration were unable to select from the available technologies, further delaying their own decision-making

process.

- These obstacles blocked the route to a consumer market because of high prices (3-10 times more than necessary), leading to more and more firms in the Korean LED industry losing competitiveness.

### ***3) A Comparative Study on Standardization Strategies Between Smart Phones and Smart TVs (by Min Jeong Park and Eunbi Kim)***

Smart media is best represented by Smart phones and Smart TVs. This technology meets specific human needs and can be customized to individual tastes through applications that are bi-directional, life-relevant, and open-ended. Using a comparison approach, this presentation discussed the similarities and differences in standardization strategy between Smart phones, which established a new business ecosystem, and Smart TVs, which have become a global conversation topic recently on the following topics:

- The strategic importance of integrated AMP (Application Marketplace): Application Programming Interface (API)
- The formation of standards in the Smart TV industry
- Comparison of Smart phones and Smart TVs for standards formation

## **4.2 SURVEY**

The following survey was given to the students.

### ***Standards Course Survey and Results***

1. What is your occupation?
 

<input type="checkbox"/> Student	6
<input type="checkbox"/> Researcher	2
<input type="checkbox"/> Businessperson	2
2. Did you receive standards training or standards education before this class?
 

<input type="checkbox"/> Yes	3
<input type="checkbox"/> No	7
3. If you received standards training or education before, how lengthy an education? and what type did you receive?
 

<input type="checkbox"/> One semester in university	3
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4. If this is the first standards education course you've taken, did this course help you recognize the importance of standards?
 

<input type="checkbox"/> Very much	8
<input type="checkbox"/> Much	2
5. Do you think a multidisciplinary standards course is valuable? If you answered yes, please list the issues you think should be covered.
 

<input type="checkbox"/> Standardization process	6
<input type="checkbox"/> Legal issues	3
<input type="checkbox"/> Global standard issues	1
6. What do you think the single most important issue is for the development of standards?
 

<input type="checkbox"/> Technology	4
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- Fairness 3
- Economic utility 3
- 7. Do you have any suggestions for improving this course?
  - I think more research is needed, not only into the positive aspects of standardization, but also into the negative effects.
  - It is necessary to look further into the positive and negative aspects of standardization, both from the perspective of advanced economies and those of developing economies.

## 5. SUMMARY AND CONCLUSIONS

We were clearly motivated to create this class for graduate students (“Strategies of Technology Innovation and Standardization”) due to the emergence of standards competition in the new technologies, i.e., for hybrid automobiles, electric automobiles, and Smart phones and smart TVs. In particular, how Nokia has recently fallen behind Apple in the Smart phone market delivered a poignant reminder to the students about the strategic importance of standards. When the GSM system came out on top in terms of market share, Nokia pushed past Motorola to take the lead in the global mobile phone market. However, in Smart phones, Nokia has fallen behind Apple in the standards war, to such a degree that even the survival of the company is in doubt.

Therefore, this class emphasized to the students that Korean companies must not focus on technology development and technology innovation alone, but must also draw up technology development strategies that take into account today’s competition for standards. In other words, students were particularly advised to take a strategic approach to technology development. The primary objective of this course then was to explain the inter-relationships between the strategic aspects of standardization and other technology development strategies. Based on the results of the two class tests and the team projects and presentations, the lead professor determined that the primary course objective was achieved. However, to develop standards-related education further in the future, the professor suggests that the following improvements be made to the course.

First, to move beyond theoretical learning, it is necessary to teach more specifically how actual standardization is carried out in companies and within governments. Outside researchers and professors were invited to lecture on theoretical learning, but in the future, public servants and company employees working in standardization should also be invited, so students can understand standardization work in the marketplace more concretely.

Second, additional learning resources that go beyond just lecturing should be utilized, such as having students attend international conferences and seminars related to standards and visiting Korea-based standards-related organizations to absorb a wider range of knowledge related to standardization.

Finally, a program website should be set up for the weekly lectures and project presentations materials at other schools that are offering this course, so they can be uploaded and the dates and times of lectures by outside experts can be posted publicly and ahead of time.

This action will encourage students from other schools to attend these unique learning opportunities.

## **6. APPENDIX - STUDENT WORK**

### **6.1 STUDENT CASE STUDY 1:**

#### *The Benefits of Standardization at Each Stage of the Value Chain and the Case Studies*

By Hyungn-wook KIM, Dong-hee SHIN

Standardization can be a solution to the friction problem. As complexity in the market is increasing, standardization is becoming more important, especially so since we live in a global era. In this study, the team looked into standardization efforts related to the Value Chain Model of Porter, and through this effort, identified the benefits of standardization from a firm's point of view. The Value Chain Model consists of five main activities: Inbound logistics, operations, outbound logistics, marketing and sales, and service. Each activity has different characteristics, but in this study, the team reclassified these into three groups based on their major benefits.

The first group or category consisted of inbound logistics, operations, and outbound logistics, the performance of which is mostly tangible and measurable. Standardization within this group of activities can produce cost reductions. For instance, purchasing standardized materials can allow for rapid input into the operations processes. Operating standardized processes can shorten processing time and maximize learning effects. Using standardized containers can bring down labor and distribution costs. Emart, the biggest discount store chain in Korea, has a Retail Engineering Team. The team developed the "Retail Ready Packaging" method and a working tool called a "Merchandise Unit". Through these innovations, Emart now saves up to 10% on its packaging and logistics costs.

The second group included marketing and sales and also service. These activities are often intangible and immeasurable. Standardization in this group can create additional value since supplying standardized products helps customers make choices and build trust. In other words, individual customers can choose the products that suit them best and in so doing customer satisfaction is enhanced and repurchasing encouraged. Further, adopting standardized service processes can reinforce service quality since these will help employers serve customers better. Showrooms at KIA Motors have a unique concept of space design marketing, called 'Red Cube', which reflects the "space identity" of Kia Motors. Even though the effects of standardization at the showroom level cannot be measured, it is obvious that this design creates a certain level of increased value.

The team also identified the benefits of standardization in connection with the Value Chain Model proposed by M. Porter. Standardization delivers obvious benefits to companies at each stage of the value chain and the concept of standardization is commonly used as a synonym for compatibility, also a key product success factor, thus making standardization an important factor in a company's overall success.

## 6.2 STUDENT CASE STUDY 2:

### *The Economic Effects of a Delay in Standards Formation: A Case Study on the LED Industry*

By Ji-Hoon LEE, Jin-Soo ROH

In accordance with the UNFCCC (United Nations Framework Convention on Climate Change) in 1992 and the Kyoto Protocol in 1997, the LED (Light Emitting Diode) industry is now recognized as a new driving force due to three technical advantages: High energy efficiency, no mercury, and long life. Keeping pace with this trend, Korea announced the 15/30 project (i.e. by 2015, 30% of domestic lights will be LEDs) in 2006, anticipating both the creation of a new US\$1.6 billion market and the nurturing of a new competitive advantage for Korean firms.

However, the Korean LED light industry is facing a crisis because the Korean Government has not properly carried out its role in the national system of innovation (Freeman, 1991; Lundval, 1992; Nelson, 1993). LED standards are classified into three types. One shows incremental characteristics (compatible-type), and two have radical characteristics (converter-types). In April 2007, the Korea Government tried to establish LED light standards through consortium discussions with experts in the field, but this democratic and competitive approach resulted in a three-year delay in determining an LED light standard. Until the Converter G13Base LED was established as the *de jure* standard in November of 2010, “a vicious circle of delay” hampered the growth of the Korean LED industry in the following ways:

- The delay in establishing standards increased the number of LED light firms operating in Korea under heterogeneous standards.
- In an environment of high uncertainty, these companies were distracted from their core business and thus pursued short-term profits through packaging rather than long-term profits through investing in the future.
- Such low commitment and investment led to inferior profit structures, which further caused low re-investment, thus preventing firms from achieving learning curve effects, and ultimately leading to high licensing costs for the leading companies, such as Nichia and Cree.
- Large firms wishing to lower their transaction costs through vertical integration were unable to select from the available technologies, thus delaying their decision-making process still further.
- These above obstacles blocked the route to the consumer market because of high prices (3-10 times more than necessary), leading to more and more firms in the Korean LED industry losing competitiveness.

In the early stages of industry development, it is always important not only to create demand, but also to establish standards in a timely manner. This process depends on judicious government policy.



### 6.3 STUDENT CASE STUDY 3:

#### **A Comparative Study on the Standardization Strategies of Smart Phones and Smart TVs with a Focus on Standardization of the Application Marketplace**

By Minjeong PARK, Eunbi KIM

Smart media today is best represented by Smart phones and Smart TVs. This technology meets a range of human needs and can be customized to individual tastes through applications that are bi-directional, life-relevant and open. Through using a comparison approach, this presentation discussed similarities and differences in standardization strategies for Smart phones, which established a new business ecosystem, and Smart TVs, which have become a global conversation topic lately.

It is not an exaggeration to say that the success of Smart phones has come about primarily as a result of the development of an application marketplace (AMP). The Apple iPhone and its ecosystem, with the App Store at the center, have produced an explosion of development activity around the world.

However, with more than ten types of mobile platforms and the AMP for each platform existing independently, an integrated AMP established through mutual cooperation of all the non-Apple players was recognized as the best way to meet the threat from Apple. Such cooperation would alleviate the weaknesses caused by over-competition and the inefficiencies brought about by the need to support multiple mobile phone platform environments. As a result, the leading global telecommunications firms, except for Apple, and its manufacturers established an integrated AMP, or WAC(Wholesale Application Community) in February of 2010 to share the existing distribution market for mobile applications. This cooperation is part of an effort to develop an improved profit model for Smart phones that can go face-to-face with the Apple App Store.

To build such a global integrated AMP, the core task is to standardize the Application Programming Interface (API) to support various platform environments, with OMTP BONDI, JIL, and W3C DAP being typical mobile interface standards. The WAC 1.0 web platform standard was established in September of 2010, with one for WAC 2.0 then released in January 2011. In Korea, an integrated AMP (or K-WAC) was agreed upon by three telecommunications firms, and commercialization was scheduled for June 2011.

What form might standardization for the Smart TV market take? Similar to Smartphones at their early stage, the present platforms for Smart TVs are just *de facto* standards established by companies and the market; they are not standards reached through formal standardization efforts. As a result, because Smart TVs can be produced in individualized formats without a standardization mechanism, it is difficult to ensure any interoperability of applications. In addition, Smart TVs differ widely from Smart phones in that the core content of TVs is video programming. As the market for video programming is huge, the distribution structure is also very complicated, and a number of individual content aggregators already exist (Comcast, Netflix, ABC, and others).

Therefore, for Smart TVs to be competitive and build a new ecosystem, this complicated distribution structure must be simplified and open like the AMP for smart phones. Further, building a globally integrated AMP like WAC must also progress quickly. As part of these efforts, discussions on the standardization of Smart TVs are already underway internationally. In Korea, the government is supporting efforts to build a core infrastructure for Smart TVs.

In a similar way to the Smart phone market, it is expected that the success of Smart TVs will depend on competitiveness in content rather than just the medium. However, unlike the Smart phone market, the Smart TV market must achieve standardization through responsiveness, not prevention, so as to improve on the currently fragmented platform environment. Let's hope that a new Smart media ecosystem is built through the development of popular applications that can meet user needs and also have robust intercompatibility with other devices.

# Ch.7 Future Society and Standardization

**Economy** : Republic of Korea  
**University** : Kookmin University  
**Department** : Open course for all majors  
**Students** : Bachelor (39)

**Written by** : Prof. Hyoung Jin KIM  
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## 1. EXECUTIVE SUMMARY

This course was designed to introduce the concept and importance of standards and standardization to undergraduate students at the university level and then eventually targeted to improve the understanding of the tangible/intangible value of standardization, the necessity of standardization in different industrial worlds, and finally the trends of global standardization. This course was opened to every student at Kookmin University who wants to take this class as a general education course under the title, the “Future Society of Standards”.

There were a total of 39 students that joined in class from different departments within Kookmin University. The ratios of junior and senior students in the class were as high as 41% and 39%, and those for freshman and sophomore students were as low as 5% and 15%. The distribution of student registration according to major was comparatively high at 23% in Business/ Economics and the Natural Science Division, as well as for Engineering, Design/Art, Humanities, and the Sport/Sport Business Division.

The class topic, “Future Society and Standards”, is currently set to be given as a lecture through team teaching. A total of 15 weeks of lecture were delivered by a professor in charge of each topic and several guest speakers. The responsible professor for this course supervised the overall course operation, including a field trip and term project presentation. Eight guest speakers delivered lectures on specific fields of standards and standardization, like organization and standards development, measurement and reference standards, standardization and innovation,

conformity assessment, competitive strategy, collaborative strategy, and case studies on standards. According to the topics for each week, guest speakers who were professional in specific standards areas were invited from other university, standards organization and industrial company to offer additional material and emphasis on the subjects of the lectures.

A one-day field trip was held to gain experience on standards and standardization in a practical institute, KTL (Korea Testing Laboratory). Students visited several laboratories at KTL, including Standards and Measurement Center, Electrotechnical Center, and Machinery & Material Center where the measuring principles of length, angle, force, torque, time, electricity, electromagnetic wave, mass/weight, volume, density, color, reliability assessment, and others are studied. Students also had beneficial discussions about future careers in the fields of standards and standardization after graduation as well as the standardization principles for SI units.

Students were asked to submit a special term project report written by the individual or a team with a maximum of two students. The objective of the term project report was to allow students to determine their fields of interest in standardization. The special format for the report was suggested as follows: I. Summary, II. Introduction, III. Necessity and Process of Standardization, IV. Analysis of Primary Issue in Processing Standardization, V. Suggestion of SWOT Analysis, VI. Conclusion, and VII. References. Term project reports were presented using PowerPoint and then discussed with all the other students.

Grading of the class for credit was evaluated using five criteria; Mid-term and final examinations, attendance, and the term project report and its presentation.

## **2. COURSE OVERVIEW**

### **2.1 SYLLABUS**

#### ***2.1.1 Course Objectives***

In this course, students learn the concepts and frameworks for understanding standards and standardization, procedures of standardization, organizations and standards development, measurement and reference standards, standardization and innovation, comparative strategy, and conformity assessment. The goal for this course is to allow students to understand the overall aspects of standards and build the fundamentals for further study of standardization in both academic and industrial fields.

In addition, students will learn the need for standards and standardization in all of society, and gain a strong understanding of systematic standardization through a field trip and term project and presentation.

#### ***2.1.2 Course Timeframe and Course Characteristics***

This course started on 2 March, 2011 and ended on 13 June, 2011 and included 15 class meetings. Each class was held for three hours once a week.

### 2.13 Syllabus – Class Planning

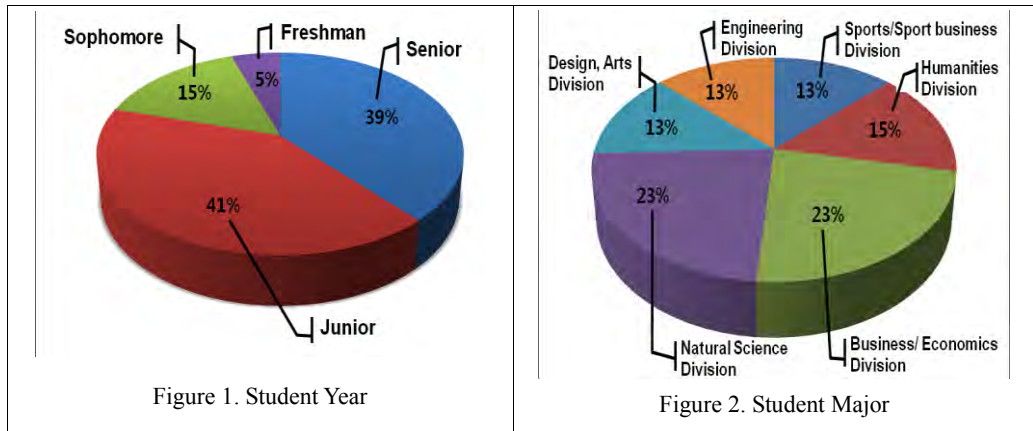
- (1) Orientation of Class and Introduction to Standardization  
Kim, Hyoung Jin (Professor/ Kookmin University; hjjikim@kookmin.ac.kr)
- (2) Definitions and Functions of Standards  
Han, Kyung Hee (Senior Researcher/ KSA; khhan@ksa.or.kr)
- (3) Organizations and Standards Development  
Lee, Joo Ran (Senior Researcher/ KSA; jooran@ksa.or.kr)
- (4) Measurement and Reference Standards  
Yoo, Sung Ho (Senior Researcher/ KTL; shyoo@ktl.re.kr)
- (5) Standardization and Innovation  
Choi, Dong Geun (Senior Researcher/ KSA; dgchoi@ksa.or.kr)
- (6) Mid-term Examination  
Kim, Hyoung Jin (Professor/ Kookmin University; hjjikim@kookmin.ac.kr)
- (7) Competitive Strategy  
Kang, Byung Goo (Professor/ Korea University; bgkang@korea.ac.kr)
- (8) Case Studies of Standards  
Park, Joon Ho (Chief Research Engineer/ LG Electronics; joonho.park@lge.com)
- (9) Collaborative strategy  
Yang, Hee Dong (Professor/ Ewha University; hdyang@ewha.ac.kr)
- (10) Field Trip on Standards and Standardization  
Kim, Hyoung Jin (Professor/ Kookmin University; hjjikim@kookmin.ac.kr)
- (11) Conformity Assessment  
Jung, Young Bok (Senior Researcher/ KTL; ybjung@ktl.re.kr)
- (12) Term Project Presentation & Discussion I  
Kim, Hyoung Jin (Professor/ Kookmin University; hjjikim@kookmin.ac.kr)
- (13) Term Project Presentation & Discussion II  
Kim, Hyoung Jin (Professor/ Kookmin University; hjjikim@kookmin.ac.kr)
- (14) Term Project Presentation & Discussion III  
Kim, Hyoung Jin (Professor/ Kookmin University; hjjikim@kookmin.ac.kr)
- (15) Final Examination  
Kim, Hyoung Jin (Professor/ Kookmin University; hjjikim@kookmin.ac.kr)

## 2.2 STUDENT CHARACTERISTICS

A total of 39 students joined this class from different departments at Kookmin University. The characteristics for student distribution are classified as shown in Figure 1 and Figure 2. The ratio of junior and senior students in the class was relatively high at 41% and 39%, and that of freshman and sophomore students was relatively low at 5% and 15%. As these results indicate, the standardization course would be much more appropriate for upper levels of student than lower levels because of the preference points for the lectures, such as the understanding of standards and standardization terms and the logical and scientific background knowledge needed for standards and standardization.

Student distribution of course registration, according to majors was comparatively high for the Business/Economics Divisions and the Natural Science Division, and showed also

(evenly?) in Engineering, Design/Art, Humanities, and the Sport/ Sport Business Division. (was the distribution then “even” between all these divisions proportionately? Clarify OR was student distribution just from these divisions in various proportions?)



### 3. DELIVERY STRATEGY AND CLASS SUMMARY

#### 3.1 DELIVERY STRATEGY

Because about half of this class was delivered by team teaching, it is important to have close contact with the students. Irregular meetings were carried on before and after lecture hours with 4 students per week. During the meetings, students were guided using discussions related to the preparation of the term project report and its presentation. Photo-copied lecture notes were distributed every week before the lecture hour, and uploaded as a PDF file to the online computer system. To obtain fairness for the examination results, score results were opened to students just after the mid-term and final examinations.

#### 3.2 CLASS SUMMARY

Following are the details of each class session.

##### (1) Orientation of Class and Introduction to Standardization

This lecture was given by the professor in charge, H.J. KIM, on 02 March, 2011, and that class is summarized below.

- As orientation, the overall lecture plan was plainly introduced.
- This APEC standardization course at university level was defined.
- The objects and operating methods of this course were communicated.
- The lecture syllabus, plan of lecturing time, evaluation methods for final credit were distributed.

- The main textbook and other supporting materials in this course were identified.
- Current examples of standards and standardization already known were discussed.

(2) Definitions and Functions of Standards

This lecture was offered by a guest speaker, K.H. HAN (Senior Researcher) from KSA, on 09 March 2011, and a brief summary of this class follows here:

- A basic introduction to standards and standardization.
- What standards and standardization are.
- The history and functions of standardization.
- Different types of standards and who authorizes them, what they are about, how they are developed.

(3) Organizations and Standards Development

This lecture was given by the guest speaker, J.L. Lee (Junior Researcher) from KSA, on 16 March 2011, and a brief summary of this class follows here:

- Introduction to the lifecycle of a standard.
- Identification of various standardization organizations.
- How to establish standards.
- An explanation of standardization procedures: PWI (Preliminary Work Item), NP (New Proposed), WD (Working Draft), CD (Committee Draft), DIS (Draft International Standard), FDIS (Final Draft International Standard), and IS (International Standard).

(4) Measurement and Reference Standards

This lecture was given by the guest speaker, S.H. Yoo (Senior Researcher) from KTL, on 23 March 2011, and a brief summary of this class follows here:

- Definition and concept of measurement standards and reference standards.
- The basic SI unit and derived unit.
- The objective and importance of measurement.
- The concept of documentary standards.
- The document procedure for ISO 9000 and KS.

(5) Standards and Innovation

This lecture was given by the guest speaker, D.K. Choi (Junior Researcher) from KSA, on 30 March 2011, and a brief summary of this class follows here:

- The relationship between standards and innovation.
- What circumstances of innovation and standards affect each other.
- How technological innovation is encouraged.
- When firms use standards efficiently.
- How standardized designs are selected through market competition.
- The strategic options for a standards battle for a technological innovation.

(6) Conformity Assessment

This lecture was given by the guest speaker, Y.B. Jung (Senior Researcher) from KTL, on 06 April 2011, and a brief summary of this class follows here:

- An introduction to management system certifications.
- The concept of production certifications.
- Important international organizations: ISO, IEC, IAF, and ILAC.
- The definition of conformity assessment and conformity assessment parties.
- An explanation of conformity assessment activities.
- Types of certification.

#### (7) Competitive Strategy

This lecture was given by the guest speaker, Professor B.K. Kang from Korea University, on 13 April 2011, and a brief summary of this class follows here:

- The concept of competitive strategy.
- How standards play a key role in competitive strategy.
- How standardization affects market expansion.
- How a different strategy can be pursued during a standardization process.
- The relationship between the area of standardization and strategy.
- Standardization of a leading firm's strategy
- Understanding the follower strategy in standardization areas.

#### (8) Mid-term Examination

This exam was given by the responsible professor, H.J. KIM, on 20 April, 2011 and the brief summary follows here:

- Mid-term examination given.
- Explanation of test items.
- Q & A on the examination.

#### (9) Collaborative Strategy

This lecture was given by the guest speaker, Professor H.D. Yang from Ewha University, on 27 April 2011, and a brief summary of this class follows here:

- Collaboration strategies of companies used to earn a dominant design status.
- Advantages of collaboration on technological standards.
- Recent cross-licensing trends to avoid intellectual infringement.
- The benefits of cross licensing and strategic alliance.
- The definition and objectives of a consortium.
- The principles for choosing the right partners when creating an alliance.

#### (10) Case Studies on Standards

This lecture was given by the guest speaker, J.H. Park, from LG Electronics, on 04 May 2011, and a brief summary of this class follows here:

These case studies of standardization in the company.

- Understanding the standards strategy for the company.
- Objective of the standards strategy for the company.
- Considerations of standards strategy in the company.
- Definition of 3S standardization in the company.
- Importance of standardization in the company.



## (11) Field Trip

This trip was undertaken with the responsible professor, H.J. KIM, on 11 May, 2011, and a brief summary of the trip follows here:

- Introduction of KTL.
- Principle and understanding of measurement standards.
- Explanation of conformity assessment.
- Field trip to several laboratories.
- Q & A discussion on standardization and KTL.

## (12) First Student Activity for Term Project Presentation and Discussion

This class was given by the responsible professor, H.J. KIM, on 18 May 2011, and a brief summary of student activity on the term project presentations follows;

- The objective of the term project and its presentation.
- Presentation 1: Standardization of M-payment.
- Presentation 2: Standardization of Symbols and Pictograms.
- Presentation 3: Standardization of Earphone Plugs.
- Presentation 4: Standardization of Clothing Sizes.
- Presentation 5: Harmony & Scale Standardization.
- Q & A on the presentations.

## (13) Second Student Activity for Term Project Presentation and Discussion

This class was given by the professor in charge, H.J. KIM, on 25 May 2011, and a brief summary of student activity on the term project presentations follows;

- Presentation 1: Standardization of the size system for shoes.
- Presentation 2: Standardization of the railway electric current system.
- Presentation 3: Standardization of wood pellets.
- Presentation 4: Standardization of Orion's Choco Pie.
- Presentation 5: Standardization of nail clippers.
- Presentation 6: Standardization of Nano technology.
- Presentation 7: Standardization of walking side. (clarify)
- Presentation 8: (Standardization of ? or a demonstration?) Blu ray disk Vs HD DVD.
- Q & A on the presentations.

## (14) Third Student Activity for Term Project Presentation and Discussion

This class was given by the professor in charge, H.J. KIM, on 01 June 2011, and a brief summary of student activity for the term project presentation follows:

- Presentation 1: The current trends of 3D TV and Standardization.
- Presentation 2: Environment management standard, ISO 14001.
- Presentation 3: The war of currents. (elaborate)
- Presentation 4: Standardization of schoolyards and soccer fields.
- Presentation 5: Standardization of Fluorescent Whitening Agents.
- Presentation 6: Standardization of eyeglass frames and the future of domestic firms.
- Presentation 7: Standardization of the food service industry in Korea.
- Q & A on the presentations.

## (15) Final Examination

The exam was given by the professor in charge, H.J. KIM, on 08 June 2011, and a brief summary of this class activity follows:

- Final examination.
- Explanation of test items.
- Q & A discussion on the examination of students and grading for this course

### 3.3 SUMMARY OF KEY REFERENCES

Two textbooks were distributed to students for their use in the standards and standardization course.

#### ***3.3.1 Standardization: Fundamentals, Impact, and Business Strategy (in English). 2010. Korea Standards Association***

This book was the main textbook for this course. The book is appropriate for an intensified understanding of standards and standardization in this undergraduate course.

#### ***3.3.2 Future Society and Standards (in Korean). 2008. Korea Standards Association***

This book is used as the subsidiary textbook for this course, an introduction to standards and standardization issues. The professor recommended reading this book before coming to class.

## 4. STUDENT ACTIVITIES AND FEEDBACK

### 4.1 STUDENT FEEDBACK

During the mid-term and final examination classes, student feedback on this course was gathered to investigate the level of student satisfaction. A total of 39 students returned the satisfaction questionnaire. The course evaluation by students follows here:

The results in the tables below indicate that students generally had a high sense of satisfaction for this course, the field trip, and the term project presentation. Students also had a lot of interest in the field of standards and standardization for their future jobs.

[About this course]

(1) Generally considered my own options when registering for the course (duplicate answers)

Title of Course	Syllabus	Lectures	Importance of Subject	Recommendation from Other Students
13	23	14	26	15

(2) Sign-up motivation for this course, “Future Society and Standardization” (duplicate answers)

Title of Course	Syllabus	Lectures	Importance of Standardization in the Future	Recommendation from Other Students
16	12	8	17	25

(3) Positive level of satisfaction regarding professor and guest speakers for this course

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-	-	5	22	12

(4) Positive level of Understanding of “Standards and Standardization” after this course

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-	-	2	27	10

(5) Positive overall satisfaction for this course

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-	-	6	21	12

[Reviews of the field trip]

1) Overall understanding of this course gained from the field trip

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-	-	3	22	14

2) Field trip will benefit other students who consider enrolling in this course

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-	-	3	24	12

3) Good level of “Standards and Standardization” understanding gained in field trip

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-	-	4	25	10

4) Most interesting “Standards and Standardization” learned from field trip (duplicate answers)

Procedure of Standardization	Measurement Standards	Reference Standards	Conformity Assessment	Standardization and Innovation
7	32	13	25	24

[Reviews of term project report and presentation]

1) Good integration of term project topic to student majors

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16	7	7	4	5

2) Positive level of understanding of “Standards and Standardization” for term project

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-	-	2	20	17

3) Areas that benefited from term project(duplicate answers)

Experience of Standardization	Recent Technical Information	General Knowledge	Decision of Future Career	Importance of Standardization
17	19	10	5	27

## 4.2 STUDENT ACTIVITIES

### 4.2.1 Term Project Report

Students were also asked to submit a special term project report by individual or team with a maximum of two students. The objective was to have students determine their fields of interest in standardization. The special format for the report was suggested as follows: I. Summary, II. Introduction, III. Necessity and Process of Standardization, IV. Analysis of Primary Issue for Processing Standardization, V. Suggestion of SWOT Analysis, VI. Conclusion, and VII. References. Term project reports were presented using PowerPoint and discussed with the other students. The following are examples of term project report summaries:

- 1) The Current Trends in 3D TV and Standardization  
(Department of E-Business, by Wan Kyu, KANG and Jin Soo, LEE)

3D TV is the next generation of TV that viewers want so as to be immersed in three-dimensional content that offers a more vivid experience through a realistic interface. Today there are lots of ongoing researches and investments in the developed economies regarding 3D contents, while in America and Japan relevant content already has been commercialized.

This report discusses the various types of technology and their differences and also determines the leading technology that will dominate the market. It will also define the SWOT analysis relevant to the respective technologies and research the market share of the dominant technology to foresee the future development of the 3D market.

- 2) Standardization of Fluorescent Whitening Agents  
(Department of Forest Products and Biotechnology, Yong Sung, PARK)

Fluorescent whitening agents are used to improve whiteness in areas of our lives, and also greatly influence every aspect of our lives. At the moment, there is no definite standardized

regulation system for the degree of hazard or tolerable limitation of amounts. Social interest in the standardization of fluorescent whitening agents is currently being magnified as a new controversy. So, in this report, the standardization of fluorescent whitening agents is discussed. For any standardization of fluorescent whitening agents, a quantitative determination method should first be studied. The indiscreet regulation of fluorescent whitening agents can do major damage to economic growth in related industries. A SWOT was suggested for the more effective standardization of fluorescent whitening agents.

### 3) Standardization of the Size System for Shoes

(Department of Forest Products and Biotechnology, by Gu Ho, CHO and Jong Nam, HAN)

Demand for on-line shopping has more and more increased. With on-line shopping, because the marked size of shoes is different for real sizing, customers can be confused. It has been determined that these marked sizes vary, according to economy, i.e., Korea, North America, Europe and England. The size of shoes imported from overseas is only marked using the economy's measurement system. For the reasons of inconvenience, a standardization system for size of shoes was investigated. To address the drawbacks, it would be better to have more detailed marking of size. Representing both new length and width of foot, a standardization of four types of marking system is suggested to solve the existing problems found with online shopping.

### 4) Standardization of the Food Service Industry in Korea

(Department of an International Normal Subject, by Chaogun, YANG and Xiaolin, XU)

On my first visit to a Korean restaurant, I was very surprised that all dishes were free of charge. In China, all side dishes, as there are tableware sterilization expenses, are charged without any exceptions or conditions. My first impression was positive to see no charge for the dishes. But then, I think a free system for food service is not good because of food waste and labor costs. This is why I chose the standardization of the food service industry in Korea as a subject of my term project report. In the report, I introduced a comparison of food service with the surrounding economies to Korea, and for various delicious South Korean dishes. For a standardization of food service industry in Korea, a case study on the abolition of free refills in Macdonald's, Korea, was suggested. If the standardization of the food service industry could be redesigned, there will be lots of benefits in terms of lower costs and the globalization of Korean food.

### 5) Standardization of Wood Pellets

(Department of Forest Products and Biotechnology, by Joo Yeon, PARK)

Wood pellets are a type of alternative energy resource which could compensate for the consumption of oil. Since the fuel properties of wood pellet are very different from oil or gas, the design of a wood pellet requires profound understanding in view of solid fuel combustion as well as gas flow mixing/ reactions. Due to the size limits of furnace height ( $\sim 1$ m) for domestic installation, a poor design of furnaces, air supply and heat exchangers may lead to excessive emission of CO or low energy efficiency. Therefore, standardization for the quality of wood pellets is urgently needed. This standardization would help solve the problems associated with climate change and improve green growth.

6) Standardization of Nail Clippers  
(Department of Business Administration, by Jong Hyo, LEE)

In the dictionary, a nail clipper is defined as a tool for handling nails. In the marketplace, there are many types of nail clipper. I have an interest in the standardization of nail clippers. The standardization of nail clippers is directly connected to consumer safety. Currently, 80% of nail clippers in the world market are made in Korea. In Korea market, the brand name '777' is the leading nail clippers maker, and 'BELL' is the leading US maker. Both companies are really a Korean company, however. the Korea Standard (KS) for nail clippers is thus almost a global standard. In this report, the standardization of nail clippers is introduced and discussed.

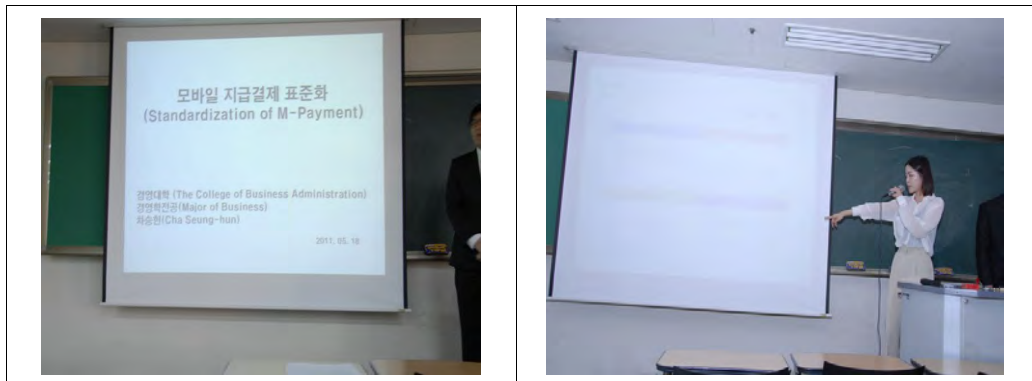
7) Standardization of Orion's Choco Pie  
(Department of Forest Products and Biotechnology, by Hye Youn, SHIN)

Orion is a global company that is a best seller in the baking industry for the overseas market. Choco Pie has sold more than 12 billion pieces since it was released in April of 1974. If this number was placed along a horizontal line, it would reach 89 million kilometers and circle the earth 25 times. I have looked into Choco Pie, which is recording steady growth, for its standardization. Orion Choco Pie has been the recognized product in the economy for a long time, but Orion's profits ran into trouble due to a decline in the domestic baking market in the early 1990s. In this report, the strategy of globalization and the standardization of Orion is investigated. The standardization of Choco Pie production was the basis for the company entering the overseas market for which Orion then implemented a global strategy. The wrapping of Orion Choco Pie was also standardized.

#### 4.2.2 The Term Project Presentation

After submitting their term project report, students were asked to present by Power-point. The group presentation was organized by individual or by team with a maximum of two students. The special format and order of the presentations was suggested as follows: Introduction on standardization, necessity and process of standardization, analysis of the primary issue in processing standardization, suggestion for SWOT analysis, conclusion, and references.

The full list of term project presentations is given in Section 3.2 (12)~(14) of this report.



### 4.2.3 Field Trip

A one-day field trip was undertaken to have an experience in standards and standardization in a practical institute, KTL(Korea Testing Laboratory). KTL is now one of the world's most elite testing laboratories, meeting all testing and standard industry needs with 40 years of history in the service Korean industries. Students visited several laboratories, including the Standards and Measurement Center, the Electrotechnical Center, and the Machinery & Material Center where the measuring principles of length, angle, force, torque, time, electricity, electromagnetic wave, mass/weight, volume, density, color, reliability assessment, and others have been studied. Students had beneficial discussions about their future careers after graduated in the field of standards and standardization as well as discussing the standardization principles for SI units.



Field Trip to KTL(Korea Testing Laboratory)

## **5. LESSONS LEARNED**

### **5.1 COURSE DESIGN**

This course was designed for the general education class of standards and standardization fields in the level of undergraduate student and delivered by team teaching for 15 weeks. Excluding the mid-term and the final examination and the field trip, a total of 12 lectures were given by the responsible professor and 8 guest speakers. The specific topics for these lectures on standards and standardization were gathered from the content of the main textbook, *Standardization Fundamentals, Impact, and Business Strategy*, as follows: Organizations and standards development, measurement and reference standards, standardization and innovation, conformity assessment, competitive strategy, collaborative strategy, and case studies of standards. The student responses of this class after course completed were greatly satisfied. So, it could be recommended to design other special courses based on business strategies, technologies or engineering, only not for general education, for undergraduate student level.

### **5.2 COURSE OPERATION**

Because this course is intended for the undergraduate student, students need first to study the fundamentals of standards and standardization. From the opening lecture on 02 March 2011, lectures on the basic concept for standards and standardization were required prior to the lecture on the application fields of standardization. After hearing the academic lectures by the professor and the guest speakers, the class focused on the student presentations prepared from the term project and their discussion. For more expansive course operation, it would be advisable to arrange the small grouped meetings or the face-to-face discussions with students and standardization specialists.

### **5.3 STUDENT PARTICIPATION**

In this class, the absence of lecture was strictly controlled, and grading for discussion counted for 10 % of the total score. About 80% of the students positively participated in the lecture format. During the term project presentations, students actively joined in discussions with each other. In order to attract more positive student's participation from students, it is recommended for students to join working practice in the institute, organization and industry for standards and standardization.

### **5.4 STUDENT COURSE EVALUATION**

Grading was based on a midterm and final examination (30% each), the term paper and its presentation (20%), the article field trip (10%), and attendance (10%). The total points were at the last converted into a percentage. As shown in Figure 4, 70% of the students scored over



80% . In considering the specialty of standardization course in university level, it could be better to give more weight in project reports.

## **5.5 TEXTBOOK UTILIZATION**

The book, *Standardization (Fundamentals, Impact, and Business Strategy)* was utilized in all the lectures as the primary textbook. Actually, undergraduate students were too hard to understand this book. For further understanding of standardization, the translated copy of main textbook which are written by Korean was strongly needed.

## **5.6 OTHER PRACTICAL COMMENTS TO APPLY TO FUTURE COURSES**

A class on standards and standardization at the university level is very important so as to have students understand the new trends in the management system as well as new technological advances. Students who attended this class registered for this course because of recommendations of other students who had already completed the course and wanted to take a more advanced standardization course. It is difficult to deliver this course with just one professor, because this class has to cover many areas of standardization and numerous standards. This course thus needs support from other funding to settle down and advance the process of standardization.

# Ch.8 Research on Instructional Materials for Technology Education: Hands-on activity of Standardization for Secondary School Students

**Economy** : Republic of Korea  
**University** : Korea National University of Education  
**Department** : Technology Education  
**Students** : Doctor (4) + Master (12) \*all working experience students

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## 1. EXECUTIVE SUMMARY

This course is very unique and different from other trial courses of this casebook in terms of its target and contents. First of all, the target group of the course was in- and/or pre-service technology teachers at the secondary level. In other words, attendees are secondary technology teachers who are graduate students as well and also graduate students who want to be technology teachers. They are assigned a term project for one semester of 15 weeks to develop a learning guidance plan that includes a hands-on activity of standardization related to technology for secondary students.

The purpose of the course was to help graduate students (1) understand and apply new instructional materials in technology education related to the standards for technological literacy, and (2) realize the importance of standardization for technological development and marketing.

The first part of the course delivers an understanding and analysis of the standards for technological literacy. These five parts are ‘the nature of technology’, ‘technology and society’,

‘design’, ‘abilities for a technological world’ and ‘the designed world’. Presentation, discussion, and comments are utilized in class.

The second part of the course involves the development of a learning activity for students and a lesson plan for teachers of standardization as a group project where students work with two or three others class members. The students have to focus on the standardization for various technological activities, such as information, saving energy, the environment, manufacturing and transportation when they develop the learning guidance. Comments on their draft learning guidance plan of standardization are offered by the instructor, and then students submit their modified and complemented learning guidance plans of standardization.

## **2. COURSE OVERVIEW**

### **2.1 LEARNING OBJECTIVES**

The purpose of the course is to help graduate students (1) understand and apply new instructional materials for technology education in relation to accepted standards for technological literacy, and (2) realize the importance of standardization in terms of technological development and marketing.

### **2.2. LEARNING STRUCTURE AND CONTENT**

The course presents six major topics for development of learning activities as follows:

The Nature of Technology: In this topic, both the characteristics and the scope of technology are introduced. In addition, the topic provides the core concepts of technology. Students will develop an understanding of the relationships between technologies and the connections between technology and other fields of study.

Technology and Society: Topics in this section include the influence of technology on both society and culture. Students will develop an understanding of the role of society in the development and use of technology.

Technology Design: This topic focuses on design and technology. Students will develop an understanding of the design process as it applies to technology.

Abilities for a Technological World: In this topic, students will develop the ability to apply the design process successfully.

A Designed World: The issues for this topic relate to the design world. Students will develop an understanding of and be able to select and use manufacturing, construction, communication, transportation, and bio-related technology.

Technology and Standardization: The final topic focuses on standardization and technology. Standardization is explained in terms of information, energy savings, the environment, and the future. Students will understand these concepts and the importance of standardization as it relates to technology.

Development of the Learning Activity and Guidance Plan: This topic relates to the development of a learning activity for students and a learning guidance plan for teachers of standardization as a group project with two or three other class members. The students focus on the standardization for various technological activities, such as information, energy savings, the environment, and the future.

### 2.3 COURSE CONTENT OUTLINED BY WEEK

Week	Session
1	Introduction
2	Understanding of Standards for Technological Literacy in the US
3	Instructional materials for the ‘Nature of Technology’: What Is technology?
4	Instructional materials for ‘Technology and Society’(1/2) :Technology and Human Needs
5	Instructional materials for ‘Technology and Society’(2/2): Technological Influences on History
6	Instructional materials for ‘Design’: Invention and Innovation
7	Instructional materials for ‘Abilities for a Technological World’: Models and Prototypes
8	Instructional materials for ‘Design World’(1/2): Energy Conversion
9	Instructional materials for ‘Design World’(2/2): Transportation System
10	Technology and Standardization (1/4): Information and Standardization
11	Technology and Standardization (2/4): Saving Energy and Standardization
12	Technology and Standardization (3/4) : The Environment and Standardization
13	Technology and Standardization (4/4): The Future and Standardization
14	Student Presentations of Team Project: Learning Activity and Guidance Plan for standardization
15	Final Exam

### 2.4 STUDENT CHARACTERISTICS

The attendees in this graduate school course were pre- and in-service technology teachers at the secondary level. In general, they have a very low level of knowledge and experience of standard and standardization and a background in education and/or engineering. Some of the students have teaching experience that ranges from 5 to 10 years. These students have a lot of knowledge and experience with technology. Therefore, it is expected that they will have an active attitude toward standardization as it applies to technology.

### **3. INSTRUCTOR DELIVERY STRATEGY**

#### **3.1 DELIVERY STRATEGY AND METHODS**

The first part of this course is delivering an understanding and analysis of the standards for technological literacy that include these five parts: ‘the nature of technology’, ‘technology and society’, ‘design’, ‘abilities for a technological world’ and ‘the designed world’. The course is mainly delivered through lectures and student presentations and/or discussions.

The second part of the course is the development of a learning activity and guidance plan of standardization as a group project with two or three other class members. The students have to focus standardization for various technological activities, such as information, energy savings, the environment, and the future when they have developed learning guidance. Comments on a draft learning guidance of standardization are given by the instructor after the presentations, and then students submit a modified and complementary learning guidance for standardization.

#### **3.2 REQUIRED TEXTBOOK**

International Technology Education Association (2000). *Standards for Technological Literacy: Content for the Study of Technology* Reston, VA: Author.

Korean Standards Association (2009). *Future Society and Standards* (4<sup>th</sup> ed.) Seoul, Korea: Author.

#### **3.3 ASSESSMENT**

The course will be assessed using four methods: Examinations (40%), assignments including team project (30%), presentations and/or class participation (30%)

### **4. STUDENT ACTIVITIES AND FEEDBACK**

The graduate students showed an active attitude toward the introduction of instructional materials for technology education in relation to the standards for technological literacy. They realized the importance of standardization for research and the development of technology, and marketing.

They have a deep understanding of the standards used for technological literacy for five areas including ‘the nature of technology’, ‘technology and society’, ‘design’, ‘abilities for a technological world’ and ‘designed world’ through presentations, discussion, and instructor comments.

Especially, graduate students will gain a meaningful experience in developing standardization learning activity for students and a learning guidance plan for teachers for a variety of technological activities through completing the group project for the course. They do want more specific case study on technological standardization in a real world situation.

The themes or titles of each standardization learning activity and guidance plan developed during the course are as follows:

- 4.1 Designing and making a safety water kettle to prevent children from burns
- 4.2 Constructing a bridge through using a standardized block
- 4.3 Standardization experience activity for 10<sup>th</sup> graders
- 4.4 Making an adjustable bookshelf with a standardized distance
- 4.5 Hands-on Activity for Standardization of Remote Controller

## **5. LESSONS LEARNED (SUMMARY AND CONCLUSION)**

The purpose of this course is to help graduate students (1) understand and apply new instructional materials to technology education in relation to the standards of technological literacy, and (2) understand the importance of standardization as related to technological development and marketing for both in-service and pre-service teachers. After completing the course, graduate students can explain the importance of standardization when developing technology and show an active attitude toward instructional materials for technology education in terms of the standards for technological literacy. Graduate students should be able to develop standardization learning activity for students, and learning guidance for teachers for a variety of technological activities. However, more general theory and specific case studies will be needed for deeper understanding of standardization as it relates to technological activity, management, and marketing in a real world situation

## **6. STUDENT PROJECT: DEVELOPING A ‘LEARNING ACTIVITY AND LESSON PLAN FOR TECHNOLOGICAL STANDARDIZATION’**

The graduate students in the course had been assigned the term project. This project is composed of two major parts, a ‘learning activity’ for students and a ‘learning guidance plan’ for technology teachers at the secondary level. This learning activity and lesson plan can serve as a guide for learning of technological standardization for both technology teachers and students. The attendees had to focus on standardization of various technologies, including production,

communication, and transportation in order to develop a learning activity and lesson plan in a situation in the students' everyday lives for one semester lasting 15 weeks. One of the best projects is attached in the following section 7. Appendix – Student's Best Work

## **7. Appendix – Student's Best Work: Learning Activity for Technological Standardization” for Secondary Students**

- Title: Designing **Standardized Remote Controller**
- Written by: **Jiwon JUNG, Jounggyo YUN, Joungwoong SON**

### **A.1 LEARNING GUIDANCE PLAN FOR THE TEACHERS**

#### **■ Learning objectives**

- ◆ Explain the concept and the necessity for standardization
- ◆ Design and create a model for a unified remote control, applying a concept of standardization available for use for four public devices

#### **■ Learning methods**

- ◆ Discussion with group members
- ◆ Cooperative learning in groups of three
- ◆ Project- based learning

#### **■ Activity process**

- (1) Organizing groups
- (2) Introduction
- (3) Problem situation
- (4) Exploration of concept and the necessity for standardization
- (5) Analysis of remote controls and exploration of idea
- (6) Design of a model for unified remote control
- (7) Creation of a model for unified remote control
- (8) Presentation and self-evaluation

#### **■ Precautionary Notices**

- ◆ Solve the problem in cooperation with group members.
- ◆ Be careful with the use of tools.
- ◆ Be careful about burns when you use the glue gun and hot wire cutter.

### ■ Criteria for Assessment

Criteria	Details	Ratio(%)
Functionality	Compatibility of the four kinds of devices	20
	Appropriateness of the number of buttons	15
	Convenience of use	15
	Creativity	15
	Design	15
	Portfolio	20
	Total	100

## A.2 STUDENT'S WORKSHEET

### ■ Problem Situation

Nick, a big fan of Yu-na Kim felt rushed in his after-school class because of the Olympic Games, which started at 6 pm. As soon as school was over, Nick ran home. However, there was no remote control for the TV. He found the remote control for the audio on the sofa, the remote control for the DVD player on the table, and the remote control for the air conditioner in the corner. However, he still couldn't find the remote control for the TV. Usually, Nick can't watch TV without the remote control. He spent numerous minutes poking around the TV. When he finally turned it on, the game was over. He muttered angrily with a long face.

"Why do I have the inconvenience of some many different remote controls?"

How many remote controls do you use normally? Why do we have to use a different remote control for each electronic product? Through this hands-on activity, we'll learn about **the concept and necessity for standardization**. Furthermore, we'll **design and create a model for a unified remote control**.

⇒ What is the problem with using many different remote controls?

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### ■ What is standardization?

Standardization, in the context of technologies and industries, is the process of establishing a technical standard for competing entities in a market, where doing so will bring benefits without hurting competition. It can also be viewed as a mechanism for optimizing the more economic use of scarce resources, such as the forests, which are threatened by paper manufacturing. As an example, all of Europe now uses 230 volt 50 Hz AC main grids and GSM cell phones, and (at least officially) measures lengths in meters.

In the context of social criticism and social sciences, standardization often means the process of establishing standards of various kinds and improving efficiency so as to handle people, their interactions, cases, etc., more efficiently. Examples include formalization of judicial procedures in courts and establishing uniform criteria for diagnosing mental disease. Standardization in this sense is often discussed along with (or synonymously) such large-scale social changes as modernization, bureaucratization, homogenization, and the centralization of society.

Standards can be *de facto*, which means they are followed for convenience, or *de jure*, which means they are used because of (more or less) established and legally binding contracts and documents. Government agencies often have to follow standards already issued by official standardization organizations. Following these standards can be a prerequisite for doing business in certain markets, with certain companies.

### ■ Need to standardize the remote control

How many remote controls does one family have normally? It is assumed that each family has at least 4 to 5 remote controls for using their television, digital audio, DVD player and air conditioner. However, one or two of these are virtually used most among the five. Therefore, if we design a unified remote control system that is standardized, we can achieve a higher level of economic results while gaining convenience and saving energy.

In order to invent a unified and standardized remote control, diverse companies need to design and combine different codes. It is necessary to identify the common features and differences among the variety of remote controls. It is true that this kind of standardization process can cause certain troublesome effects since it can make the structure more complex at the beginning of the standardization. These slight drawbacks, however, can be easily resolved by applying the technological progress.

### ■ Constraints of the Project



- ◆ Solve the problem by using only the given materials .
- ◆ Availability of devices, i.e., TV, audio, DVD, and air conditioning is limited.
- ◆ The number of buttons must be less than 40.

### ■ Materials and Tools

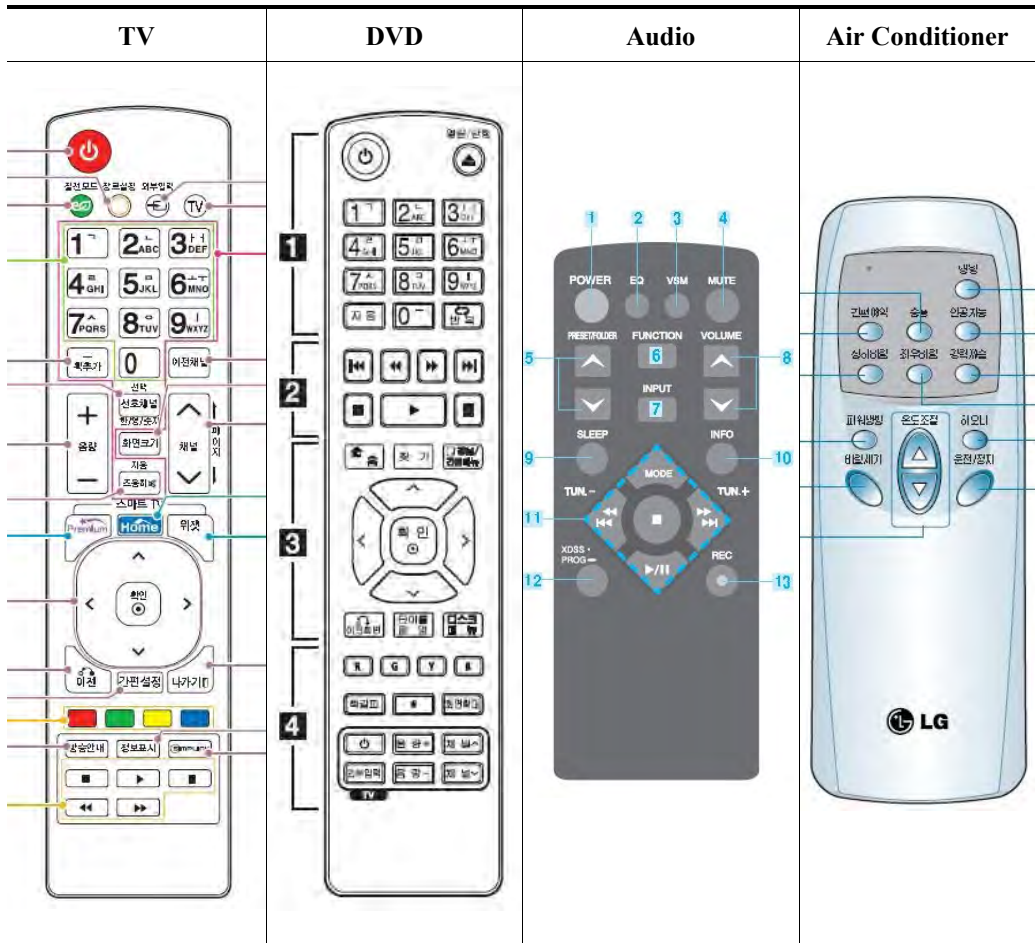
Classification	Variety	Standard	Numbers
Materials	Isopink (foamboard)	A4	1
	Sorghum straws	6 colors	1 each
	Pens	12 colors	1 each
Tools	Glue gun		1 each
	Utility knife		
	Ruler		
	Glue		
	Hot Wire Cutter		

### ■ Reading material – “The First Remote Control”

The first remote control intended to control a television was developed by Zenith Radio Corporation in 1950. This remote, called "Lazy Bones", was connected to the television set by a wire. A wireless remote control called the "Flashmatic" was developed in 1955; it worked by shining a beam of light onto a photoelectric cell, but the cell did not distinguish between light from the remote and light from other sources. The Flashmatic also had to be pointed very precisely at the receiver for it to work.  
 → [http://en.wikipedia.org/wiki/Remote\\_control#History](http://en.wikipedia.org/wiki/Remote_control#History)

■ Analysis of remote controller design

- Do you need any features on the button of the unified remote designed to be used for a TV, DVD, air conditioner, and audio?



Find Commonalities	Find Differences

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**The differences between the remote controls to standardize the design**

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■ **Design a model for a unified remote control**

- ⇒ Through several ideas generated, let's design a model for a unified remote and fill out the functions of the buttons.

(note: one page of space should be given for the real work)

■ **Create a model for a unified remote control**

- ⇒ **Keep records for how to use tools and what to notice**

Tool	How to use	Notices
Glue guns		
Hot-wire Cutters		

### ⇒ How to make

1. Create the body of the remote control by using a Hot-wire Cutter and Cutter and cutting out form-boards
2. Attach the unified remote control after making its buttons by using form-board pieces and sorghum straws.
3. Mark each function on the form-board pieces and use sorghum straws as markers.
4. Organize and prepare a group presentation on the functions of a unified remote control and its methods of use.

### ⇒ Changing parts of remote controller via trial and error and comparing and constructing the remote controller based on the original plan.

Changes	Reasons	Pros and Cons

### ■ Presentation Preparation

Content	Details
Characteristics of the produced unified remote	

control	
The most challenging part of the construction process	
Knowledge and functions acquired during the construction process	
Insights learned during the construction process	
Components to add	

# Ch.9 Special Issues in Conformity Testing and Standardization

**Economy** : Republic of Korea  
**University** : Korea University  
**Department** : Electronics and Information Engineering  
**Students** : Doctor(2) + Master(3) + Bachelor (3)

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## 1. EXECUTIVE SUMMARY

This course was offered to those Master's and Doctoral level students majoring in electronics and information engineering under the title, "Special Issues in Conformity Testing and Standardization". Eight students attended this course, of which five students were registered and three were auditors. The three auditors had already taken this course with the main goal of conformity testing. As this course is covering new topics, such as standards for various aspects other than conformity testing, these students decided to sit on this revised course. Five registered students were 2 Doctoral students and 3 Master's students, all majoring in Electronics and Information Engineering. One of these was from Mongolia pursuing her doctoral degree.

The main objective of this course was to have students understand the overall aspects of standards, including conformity assessment, and build a solid foundation for further study in the strategic implications of standardization in the business world. For this end, the course reviewed four topics: The general aspects of conformity assessment, economics of standards, strategic importance of standards, and innovation and standard strategies.

To enhance the quality of the lectures, 4 guest speakers were invited to present on each special topic: Metrology as a foundation of conformity assessment, economics of standards, collaboration strategies and standards, and IPR and standards. Each speaker offered extensive experience in their area of expertise.

Students also took a field trip to a testing laboratory, KTR(Korea Testing & Research Institute), to see what takes place in a testing laboratory. KTR is a leading testing laboratory in Korea and conducts tests, inspections, and product certifications for various areas of (add noun) including electronics and electrics, EMI, and IT. Students and the staff at KTR had a very productive Q&A session during this field trip.

Two students attended the “ICT Forum Korea 2011” on May3-4, 2011 I COEX, Seoul, Korea. where the main theme was smart ICT standardization. Because of their class scheduling, the other students were unable to attend this forum. Those who attended the forum did provide summary reports to the class regarding the sessions of the forum that they had attended. Research articles were provided to the students at the beginning of the course, and students were assigned to review the articles. Based on the topics of the class, students made presentations and undertook discussion regarding relevant articles.

Each student was also asked to pick a project that reviewed the current standardization movement in his/her interest area of technology. They then made presentations and submitted term papers on their topics.

Grading was based on a midterm and final examination, a term paper and presentation, the article review presentation, and class participation.

Overall evaluation of the class indicated that new aspects of standards and standardization were precisely introduced, and students showed strong interests in these standards and conformity assessment topics. The course is seen as providing a foundation for further research in the area of standards. However, within one semester of students’ having 16 classes, this course is supposed to deal with very many topics. For those who try to conduct this course, it is recommended that they work to narrow down the realm and number of topics to be covered. Nevertheless, students showed very satisfactory feedback on this course during the course- closing session and communicated they did learn of new issues in their research areas. They were all engineering students who have had no chance to discuss the managerial and business aspects of technologies and standards.

## **2. COURSE OVERVIEW**

### **2.1 SYLLABUS**

#### ***2.1.1 Course Objectives***

In this course, students will learn the general aspects of conformity assessment, economics of standards, strategic importance of standards and conformity assessment, innovation and standards strategies. The main objective is to have students understand the general aspects of standards, including conformity assessment, so as to build a foundation for further study on the strategic implications of standardization in the business world.



### 2.1.2 Course Timeframe and Course Characteristics

1 March -15 June 2011 Class Time: 3 credits (each class lasts 3 hours)

### 2.1.3 Syllabus – Class Planning

- (1) Definitions and Functions of Standards
- (2) Life cycle, Organizations, and Development Procedures for Standards  
Reading Material 1: Cusumano, M. A., Mylonadis Y., Rosenbloom, R. S.
- (3) Introduction to Innovation  
Reading Material 1: Farrell, J., Klemperer  
Reading Material 2: Mackie-Mason J. K., Nets, J. S.  
Reading Material 3: Dunphy, S.M., Herbig, P.R., Howes, M.E.
- (4) Understanding Conformity Assessment  
Guest Speaker: Kang, KiHoon(Head of Division/KRISS: [HYPERLINK "mailto:khkang@kriss.re.kr"](mailto:khkang@kriss.re.kr); 042-868-5040)
- (5) Economics of Standards  
Guest Speaker: Kim, BumWhan (Professor/PaeChae University;[borman@pcu.ac.kr](mailto:borman@pcu.ac.kr);010-3708-5701)
- (6) Field Trip to Conformity Assessment Body  
KTR(Jun, SungJoo; Head of Business Planning: [HYPERLINK "mailto:uncerty@ktr.re.kr"](mailto:uncerty@ktr.re.kr); 02-2164-0031)
- (7) Innovation and Standards  
Reading Material 1: Schilling, M. A.  
Reading Material 2: Shapiro, C., Varian, H. R.  
Reading Material 3: Allen. R.H., Sriram, R.D.
- (8) Midterm Exam
- (9) Competitive Strategy and Standards  
Reading Material 1: Yoo Y., Lyytinen, K., Yang H.  
Reading Material 2: Hill, C. W. L..
- (10) Collaborative Strategy and Standards  
Guest Speaker: Yang, HeeDong (Professor/EWha University; [HYPERLINK "mailto: hdyang@ewha.ac.kr"](mailto:hdyang@ewha.ac.kr); 010-7163-0483)
- (11) Meaning of “being standard”  
Reading Material 1: Kang, B.G
- (12) Strategic Approaches toStandards Competition  
Reading Material 1: Bekkers, R., Verspagen, B., Smits, J.
- (13) IPRs and Standards  
Guest Speaker: Lee, KangMin (Director/KIPO, [HYPERLINK "mailto:patent.korea@gmail.com"](mailto:patent.korea@gmail.com); 042-481-5950)

- (14) Presentations of Term Projects
- (15) Presentations of Term Projects
- (16) Final Exam

## 2.2 STUDENT CHARACTERISTICS

Five students formally enrolled in the class and three were auditing. Of the enrolled students, two were in a Doctoral program, and three were in a Master's program. Auditors were all enrolled in a Master's program. As this course was offered in the Department of **Electronics and Information Engineering**, all students all came from that department.

One of the doctoral students was a **part- time student** working at the Korea Clouding Computing Association. He could provide the class current issues in standardization issues regarding IT, especially clouding computing. This knowledge provoked very interesting discussion during class since the other students were studying related areas of IT. Three students were researching in the telecommunication network laboratory. One was a **foreign student from Mongolia** pursuing her Doctoral degree; the other two were pursuing Master's degree. The other student was researching parallel computation and VLSI architecture in the laboratory. As they were studying and researching in related areas, very active discussion occurred during their class presentations. It is sometimes recommended to have students from various backgrounds in a class so as to exchange different viewpoints of the issues discussed. This is true in some circumstances. However, for any class that wants in- depth discussion, it would be very useful to have students with similar backgrounds, especially in a graduate level class. Homogeneity of the participants in this course was, in that sense, useful as it invited very active discussion during class time.

Three auditors had already taken this course in a prior semester on the main subject of conformity testing. As this course covered new topics, such as standards in aspects other than conformity testing, these students decided to observe this course. They were also majoring in the same area, so they had no difficulty understanding the issues discussed during class even if they were not as actively as the enrolled students. As they were not asked to make presentations to take any examinations, they felt very comfortable and enjoyed the topics discussed in class. Very few participated in the class discussion. Thus, it is recommended to invite auditors into the class discussion when there are auditors in a future class.

## 3. OPERATION STRATEGY AND CLASS SUMMARY

### 3.1 OPERATION STRATEGY

Basic philosophy for the course operation strategy was to have students **make a presentation** in each class based on the syllabus and **discuss their issues presented**. Teaching was designed to address the topics to be discussed in the next class. Relevant articles were assigned to these students who were going to make a presentation.

### **Quality of presentation and class participation were considered for grading.**

Students were asked to pick a term paper issue and make an interim report so the professor could make appropriate comments. This process would help them not to proceed in the wrong direction. Consultations with students were made on an individual basis. **Each student visited the professor's office and discussed their the term paper issues and were given directions** for what the student wanted to do.

Grading was based on midterm and final examinations, the term paper and presentations, article review presentations, and class participation.

## **3.2 CLASS SUMMARY**

The following are the details of each class.

### (1) Definitions and Functions of Standards

As an introductory class, the main purpose of this class was to have students understand standards and standardization, the history of standardization, the function of standardization and its various functions, and the types of standards according to who authorized it, what it is about, and how it was developed.

In addition to the above, the course description includes the assignment for the presentation, reading materials, grading policy, field trip, etc. Any suggestions to improve the quality of the course are welcomed.

### (2) Life cycle, organization, and development procedures for standards

This class will help students understand standards and standardization activities in terms of the perspectives of the lifecycle utilized in many areas of social sciences and engineering. Once students understand the characteristics of the lifecycle, the standardization procedures of various international standardization bodies are presented.

Article regarding VCR de facto standard is a good example to give students clear insight into the importance of standards in the marketplace.

### (3) Introduction to Innovation

This class offers insight on how innovation and standards are interrelated and how standards do not hinder, but facilitate innovation. Main issues for the class are the relationship between standards and innovation, the circumstances in which innovation and standards affect each other, conditions of standards that encourage and promote technological innovation, dominant design through market competition, and strategic options for the standards battle related to technological innovation.

The articles needed are those discussing technologies and initiating innovations and the innovation mechanism.

### (4) Dd Understanding Conformity Assessment

Guest Speaker: Kang, KiHoon(Head of Division/KRISS: [HYPERLINK "mailto:khkang@kriss.re.kr"](mailto:khkang@kriss.re.kr)[khkang@kriss.re.kr](mailto:khkang@kriss.re.kr); 042-868-5040)

This class want students to understand conformity assessment, why it is so important, how conformity assessment procedures are done, and what is the role of metrology in

conformity assessment and standards. As KRISS (Korea Research Institute of Standards and Science) is a national metrology institute in Korea, a researcher from that organization was invited for this class.

(5) The Economics of Standards

Guest Speaker: Kim, BumWhan (Professor/PaeChae University; [borman@pcu.ac.kr](mailto:borman@pcu.ac.kr); 010-3708-5701)

This class introduces the economic impacts of standards for not only the national economy, but also business. Economic models and indexes were introduced to measure those impacts. The guest speaker was involved in many projects on the development of economic models on the impacts of standards.

(6) Field Trip to a Conformity Assessment Body

KTR(Jun, SungJoo; Head of Business Planning: [HYPERLINK "mailto: uncerty@ktr.re.kr"uncerty@ktr.re.kr](mailto:uncerty@ktr.re.kr); 02-2164-0031)

KTR (Korea Testing & Research Institute) is a leading testing laboratory in Korea and conducts testing, inspections, and products certifications in various areas including electronics and electrics, EMI and IT, so it is the best place to visit since class students' major is electronics and information engineering. KTR showed a warm welcome to the students and the personal relationship with the professor. By visiting the laboratory, students understand realistically what is going on with a standards and conformity assessment procedure. The Q&A session between students and staffs helped many students understand the role of standards and conformity assessment.

(7) Innovation and Standards

This helps students understand the relationship between standards and innovation. Students need to know under what circumstances innovation and standards affect each other. Students can discuss how innovative technology could market standards by illustrating cases in the referenced articles. Having this discussion, students could identify the strategic options for standards battles for technological innovation.

(8) Competitive Strategy and Standards

This session discussed how standards play a key role in any competitive strategy. Students need to understand the relationship between the area of standardization and the strategy a firm can take. Standardization that leads a firm's strategy is discussed vis-à-vis follow a firm's strategy. Cases in the articles are utilized to help students understand those strategies.

(9) Collaborative Strategy and Standards

Guest Speaker: Yang, HeeDong (Professor/EWha University; [HYPERLINK "mailto: hdyang@ewha.ac.kr" hdyang@ewha.ac.kr](mailto:hdyang@ewha.ac.kr); 010-7163-0483)

As collaboration is one of the emerging business strategies in today's business, the collaboration strategy was addressed to discuss how collaboration can occur technological standards. Various types of collaborations and considerations to be made when creating alliances are discussed. For this topic, one of the coauthors of the textbook, *Standardization: Fundamentals, Impact, and Business Strategy*, and from Chapter 9 was invited.

(10) Meaning of "being standard"

This session discusses strategic importance of standards in business. Students need to know

the kinds of benefits a firm might have if their products or technologies become the standard of the market and the reasons why we do need a strategic approach for standardization.

(11) Strategic Approaches in Standards Competition

After discussing the business implications of “being standard” in the market, cases were utilized to help students understand those issues. There are many cases that show competition to be a *de facto* standard. The cases provide insights for students in understanding standardization strategies that businesses utilize to be competitive in the marketplace.

(12) IPRs and Standards

Guest Speaker: Lee, KangMin (Director/KIPO, HYPERLINK "mailto: patent.korea@gmail.com" [patent.korea@gmail.com](mailto:patent.korea@gmail.com); 042-481-5950)

Businesses pay a lot of attention to IPR and standards. As standards are used to incorporate IPR, students need to know the relationship between standards and patents and the importance of standardized patents. This class explores firm strategy linking to standards and patents and how firms handle the conflicts between standards and patents. A guest speaker was invited from KIPO (the Korea Intellectual Property Office), a major governmental authority in charge of intellectual property matters in Korea.

(13) Presentations of Term Projects

Students make presentations on the projects they have completed. After the presentation, discussions and Q&A occur.

(14) Pictures of students and the professor for this course



(photo1)



(photo2)

### 3.3 KEY REFERENCE SUMMARY

Two supplementary textbooks were distributed to the students other than the main textbook.

### **3.3.1 Future Society and Standards (in Korean). 2007. Korea Standards Association**

This book is used as the textbook for the undergraduate standard class as an introduction to standards and standardization issues. As the graduate students did not take any prior course on standards, this book was recommended for read before coming into this class. As this book covers many aspects of standards and standardization, such as introduction of standardization, standardization issues in terms of international, national, and company levels, metrology, conformity assessment systems, and also IPR, it is a very useful reference for graduate students who are not familiar with standards and standardization. Even if this book is not directly referred to during class, provides basic knowledge to students taking this course.

### **3.3.2 Standards as Market Dominating Power (in Korean), 2009. Kang, B.G Samsung Economic Research Institute.**

This book stresses the strategic importance of standards in businesses by utilizing standardization such cases as DVD, VCR, GSM, PC, Color TV, HDTV, and others. The book provides students with holistic understanding of the importance of a strategic approach in standardization. After reviewing specific issues related to standardization strategy, this book can help students synthesize those individual issues.

## **4. STUDENT ACTIVITIES AND FEEDBACK**

### **4.1 STUDENT FEEDBACK**

As there were only 5 registered students in this class, the class feedback might be difficult to generalize. Even with this limitation, the feedback was really encouraging. Following is a summary table of the class evaluation.

1) In overall, I am satisfactory to this course:

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
0	0	0	1	1

2) I have recognized the importance of standards in business strategies through this course.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
0	0	0	0	5

3) How much are you satisfied with guest speakers?

topics	Very unsatisfactory	Unsatisfactory	Neutral	Satisfactor	Very satisfactor
Conformity Assessment	0	0			
Economics of Standards	0	0			
Collaborative Strategy	0	0			
IPR and standards	0	0	1	1	3

4. I have a lot of benefits from this course on the following aspects.

aspects	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Knowledge of standards related to my major	0	0	0	1	4
Strategic importance of standards by utilizing business cases	0	0	0	0	5
Improvement of research capacity related to standards	0	0	1	2	2
Diversity of research area	0	0	2	1	2

As can be seen above, students were very satisfactory about the course and more importantly they feel that their research capacity is improved. And it is expected that some of them may further study standards and standardization issues for their new research area.

As can be seen above, these students were very satisfied with the course and more importantly felt their research capacity improved. It is expected that some will further their study of standards and standardization issues for their new research areas.

## 4.2 STUDENT ACTIVITIES

### 4.2.1 Term Papers

Students were asked to complete a term project and make a presentation in class. T abstracts for their projects follow below.

#### (1) National Trend in Standardization of Semiconductor IP

Semiconductor intellectual property is mostly used in designing circuits. Semiconductor IP has two parts; Digital IP and analog IP. The current semiconductor IP market mostly deals with digital IP. There are several national and international organizations acting as the marketplace for trading digital semiconductor IP. KSIA and VSIA manage the standardization of

semiconductor IP on national and international level, respectively. SIPAC and KETI are the institutes where IP is exchanged. For transactions, each IP is registered according to its different characteristics. Each organization has its own criteria for assorted IPs. For instance TTA has 15 categories, i.e., IP name, IP version, application, etc. It is also important for buyers to understand the specifications for the registered semiconductor IP. Standardization of instruction format is part of the process for this reason. Instructional form provides professional information for the benefit of end users. The main reason why the semiconductor IP is used is its quality is then objectively evaluated. Products already evaluated have the advantage of being able to be used right away. For semiconductor IP usage, only partial information of an IP should be publicized. Full disclosure of that information can lead to reduced value in the capital market. Partial disclosure is achieved through coding and licensing.

## **(2) Research on Future Network Technology and Standardization Trends**

An Internet Protocol (IP) currently used is not enough to suffice the needs of those users nowadays. Research on any future network can be emphasized on the grounds of security, quality of service and mobility. There are two types of future networks that may replace the current IPv4: Incremental Design and Clean-Slate. The former supplements the needs of current users without disrupting the current system too much, whereas the latter disregards the current IP and suggests building a fresh system. The United States is focusing on research and development of future Internet technology in government, academia and industry. Europe is emphasizing a future network and service that is secure and ubiquitous. Japan is planning a network called the New Generation Network. Since 2006 Korea has also joined the game by forming Future Internet online forums based in universities to further the research.

## **(3) The Standardization of Zigbee**

Zigbee is a commercial name for a technology set up by Zigbee Alliance and IEEE. Its aim is to provide protocol stack that will ensure that consumers can buy products from different manufacturers with full confidence that the product will work. The technology also provides low power consumption capabilities at very low cost, thus enabling applications previously impractical. Zigbee applications benefit from the ability to quickly attach information, detach, and go to deep sleep resulting in low power consumption and extended battery life. Security and data integrity are also key benefits of the Zigbee technology. Zigbee provides four security services: Access control, data encryption, data protection, and sequential freshness. Zigbee specification provides support for coexistence on both the PHY layer and the MAC sub-layer.

## **(4) The Study of Trends and Strategy for Mobile RFID Standardization**

Radio Frequency Identification (RFID) is a recognition technology where an electronic device is tagged onto an object and its information is transmitted wirelessly. Benefits of RFID are simultaneous recognition and a wider recognition span compared to the barcode system. Mobile RFID service was initiated to provide combined service to cellular phone users based on increased usage of mobile networks. National mobile RFID standardization started in 2005 at various institutes, such as ERT and the Korea RFID/USN association. There are two types of mobile RFID technology: UFC replacement RFID and NFC replacement mobile RFID used in smart phones. The difference in these two technologies is the recognition distance between the



reader and the tag. The former requires 3m, and the latter needs a shorter distance, thus providing more secure service. Three major network companies, SK, KT and LG, aim to provide service via the ladder called NFC for security purposes. It is possible that the import of NFC will threaten the market for Korean mobile RFID.

#### **4.2.2 Forum Participation**

Two students participated in conferences held in Seoul May 3-4 2011 under the title of “ICT Forum Korea 2011 – Smart ICT Standardization, 2<sup>nd</sup> Phase”.

One student reported on the Session 11 under the title of “Infrastructure Technology on Smart ICT Convergence and Standardization” while the other reported on Session 4 under the title, “Technical Trends of Smart RFID/USN and its Perspectives”. Their reports acknowledged the current standardization issues related to those technical areas. It is highly recommended to encourage students to participate in such conferences to learn about emerging issues regarding standardization.

#### **4.2.3 Field Trips**

A one- day field trip was made to KTR (Korea Testing & Research Institute) to see what is really going on testing laboratories. KTR is a leading testing laboratory in Korea and conducts tests, inspections and product certifications for various areas of product lines including electronics and electrics, EMI, and IT. Students and staff at KTR had a very productive Q&A session during this field trip.

<Pictures of students, the professor, and KTR staff during the field trip>



(photo3)



(photo4)

## **5. LESSONS LEARNED**

### **5.1 COURSE DESIGN**

There were too many topics to cover in this course for a single semester. The course covered everything from the very fundamental of standards to sophisticated IPR issues as well as business strategies related to these standards. Thus, it is now recommended to narrow the number of topics so that more in-depth discussion is possible in this graduate level class during the time allotted for the class.

### **5.2 COURSE OPERATION**

Almost every class started with a student presentation on articles assigned to the students. As these articles related to the topics of the class, it is very helpful for the students to understand the lecture.

### **5.3 STUDENT PARTICIPATION**

If students do not have enough knowledge about the topics discussed during a class, they cannot participate in the discussion. As reading articles were pre-assigned to the students, and they were asked to read them before class, very active discussion was possible. (did it occur?) To have the discussion be more formal and thus more extensive, the recommendation is to assign discussant for each article presented.

### **5.4 STUDENT EVALUATION**

Grading was based on mid-term and final examinations (30% each), the term paper and its presentation (20%), article review presentations (10%), and class participation (10%). To receive a quality term paper, more grade weight needs to be placed on the term paper in lieu of the final examination. At the end of the course, students tended to suffer from lack of time when preparing both a final examination and a term paper.

### **5.5 TEXTBOOK UTILIZATION**

Lectures were based on the textbook, and these articles were used as a complementary source. If some materials show business cases for standards and standardization strategy, they should be utilized as supplementary materials. Doing so will greatly help students to understand the issues discussed during class.

## 5.6 REFERENCES USED

As mentioned in the 3.3 Key Reference Summary, two supplementary textbooks were used.

- ① Bekkers, R., Verspagen, B., Smits, J., 2002. Intellectual property rights and standardization: the case of GSM. *Telecommunications Policy*, 26, 171-188.
- ② Cusumano, M. A., Mylonadis Y., Rosenbloom, R. S., Mar. 25 1991. Strategic Maneuvering and Mass-Market Dynamics: The Triumph of VHS Over Beta. Working Paper# BPS-3266-91.
- ③ Farrell, J., Klemperer, P., May 2006. Coordination and Lock-In: Competition with Switching Costs and Network Effects. Working Document.
- ④ Hill, C. W. L., 1997. Establishing a standard: Competitive strategy and technological standards in winner-take-all industries. *Academy of Management Executive*, 11(2), 7-25.
- ⑤ Mackie-Mason J. K., Nets, J. S., 2006. Manipulating Interface Standards as an Anti-Competitive Strategy. in S. Greenstein and V. Stango, eds., *Standards and Public Policy*. Cambridge University Press, Cambridge.
- ⑥ Schilling, M. A., 2002. Technology Success and Failure in Winner-Take-All Markets: The Impact of Learning Orientation, Timing, and Network Externalities. *Academy of Management*, 45(2), 387-398.
- ⑦ Shapiro, C., Varian, H. R., 1999. The Art of Standards Wars. *California Management Review*, 41(2), 8-32.
- ⑧ Yoo Y., Lyytinen, K., Yang H. 2005. The role of Standards in Innovation and diffusion of broadband mobile service: The case of South Korea. *Journal of Strategic Information Systems*, 14. 323-353
- ⑨ Dunphy, S.M., Herbig, P.R., Howes, M.E. 1996. The innovation funnel. *Technological Forecasting and Social Change*. 53. 279-292
- ⑩ Allen. R.H., Sriram, R.D. 2000. The role of standards in innovation. *Technological Forecasting and Social Change*. 64. 171-181
- ⑪ Kang, B.G. 2009. Standards, Market Dominating Power (in Korean), Samsung Economic Research Institute.

## 5.7 OTHER PRACTICAL COMMENTS FOR FUTURE COURSES

A supplementary textbook (please see 3.3.1), *Future Society and Standards* (in Korean) was utilized for those who had no knowledge of standards. This book helped students understand the fundamentals of standards and standardization. With that knowledge, students could understand the sophisticated concepts of standards and standardization regarding business strategy. Thus, I recommend that any future professor provide students with such introductory references before they come to class particularly at the graduate school level

# Ch.10 Standardization

**Economy** : Vietnam  
**University** : National Economics University  
**Department** : Faculty of Business Administration  
**Students** : Bachelor (47)

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## 1. EXECUTIVE SUMMARY

At the NEU, 47 undergraduate students of the 50 intaked were mandated to take the course “Standardization” in the third year of their 4- year undergraduate program in Quality Management. The course was scheduled to run from January 2011 and to June 2011. In that time period, the students were offered t the course “Standardization”, whose designation mainly followed the scope of the APEC textbook, Standardization: Fundamentals, Impacts, and Business Strategy. Overall, the course covered four topics: (i) fundamental of standards, (ii) economics of standards, (iii) standards and innovation, and (iv) standards and conformance. These main topics were segmented into 15 sessions to produce three credits based on the teaching hours. The theoretical framework harmonized with short illustrated examples that related to the reality of the businesses in Vietnam, which made the lessons more interesting and attracted better participation by the students. To complete the course, students had to take two examinations (one mid-term and one final exam) and hand in their group assignments.

At the completion of the course, students felt that the textbook and teaching references were useful. However, they thought it would be much better if the teaching materials were provided in Vietnamese, so they could understand the course more thoroughly. During the teaching time- frame, many students said they would like to have more time in group discussions and would like further facilitation and input from experts in the field. Overall, students felt that they had gained valuable concepts and procedures regarding standardization. Despite lacking enough experience, students did learn the concepts much easier from small cases, which were illustrated both in the book and contributed by the lecturers.

With both new teaching materials and a new teaching approach, students worked hard in groups to understand the provided text. In spite of their limitations in terms of using English, they did study hard with the professor facilitation to understand the content and the text. At the completion of the 15 lectures, most students did gain fundamental knowledge in standardization and understood the linkage of the triads: Standardization, economics and innovation. Moreover, they also understood the importance of conformance and their needed knowledge for conformity assessment. Although, the passing percentage was not higher than other intakes, these students perceived that they had still learned more from these teaching materials.

Overall, the provided teaching materials covered many topics that can be taught at various levels (undergraduate, graduate, and doctor degrees). At the undergraduate level, students often lack working experience, so lecturers need to provide precise and clear examples to illustrate their teaching concepts. As a first trial, we experienced positive attitudes from both lecturers and students when teaching and learning using the provided textbook. Obviously, this text targeted graduate students, so to teach at an undergraduate level, where students lack work experiences, some of the content needs to be more localized and explored further in more detail.

## **2. COURSE OVERVIEW**

### **2.1 SYLLABUS**

#### ***2.1.1 Course Objectives***

Standardization is increasing with the increased level of globalization. Vietnam is integrating itself to be in the global market. So providing students with solid knowledge of standardization at the national, regional, and international level is important for the economy of Vietnam, so the economy can be competitive in the future. This course is designed to provide students with fundamental knowledge of standards and standardization. At the end of this course, students have the following concepts:

The development and fundamental of standards and standardization in the world and in Vietnam;

The impacts of standardization on the macro- economic level and vice versa;

The impacts of standardization on the micro- economic level and vice versa;

The relationship between standardization and innovation

Standardization and firm competitive advantage strategies

Conformity assessment, the systems, and their procedures

#### ***2.1.2 Course Time-frame and Characteristics***

- Start: January 2011 ~ End: June 2011
- Number of Sessions: 15 (including introduction, seminars and overview)
- Class Credits: 3 credits (each class is 3 teaching hours~150 minutes)

### 2.1.3 Syllabus – Class Planning

No.	Lecture & Brief Description	Activity
1	<p><u>Session 1:</u> Introduction to the Course Fundamental concepts of standardization. Historical aspects of standards. <u>Description:</u> This lecture provides a brief introduction to the development of standards around the world and in Vietnam. It also introduces how standardization emerged.</p>	Orientation and form working groups. Present the structure of the course and its outcome expectations. Assign tasks to each group.
2	<p><u>Session 2:</u> Introductory to the Vietnamese standards system. <u>Description:</u> This lecture explores the system of standards and standardization in Vietnam. How the STAMEQ works in Vietnam. How the ISO system works in Vietnam.</p>	Provide lecture, and read references. Students are divided into 4 groups, and each group selects 1 chapter from the textbook (Chapters 3, 4, 5, 7) and does the translation (needs to be done in 3 weeks).
3	<p><u>Session 3:</u> Chapter 2 – Lifecycle, Organizations, and Development Procedures. <u>Description:</u> This lecture provides general information on international organizations working on standardization, such as ISO, IEC, and ITU. The lecture provides a comparison across these organizations in terms of organizational structure, standard development procedure, and development lifecycle.</p>	Students need to find out the organizational structure, functionalities, and working scheme for the following international organizations: ISO, IEC, and ITU.
4	<p><u>Session 4:</u> Economic Impacts – The Macro Perspective (Part 1) <u>Description:</u> This lecture discusses the impacts of standardization on the economy at the macro-economic level.</p>	Students work in groups to debate the impacts of standardization on different aspects of a whole economy.
5	<p><u>Session 5:</u> Economic Impacts – The Macro perspective (Part 2) <u>Description:</u> This lecture discusses the impacts of different policies on standardization. A deep discussion focuses on the law for standards and standardization, enacted on the 1<sup>st</sup> of July, 2007.</p>	Students work in groups to discuss the law in Vietnam on standards and regulatory standards enacted on the 1 <sup>st</sup> of July, 2007. How does this law facilitate trade and economic growth?
6	<p><u>Session 6:</u> Discussion and Collection of Translations from Students. <u>Description:</u> Each group presents a selected assignment. After each presentation, questions and comments are delivered provided by lecturers and class members.</p>	Students present in groups the organizational structure, functionalities, and working methodologies for selected international standard organizations.
7	<p><u>Session 7:</u> Economic Impacts – The Micro Perspective (Part 1) <u>Description:</u> This lecture provides a fair understanding of the impacts of standards on business incomes and how switching costs might become a barrier for a company.</p>	Students discuss how standards affect business incomes, switching costs, and other issues.

No.	Lecture & Brief Description	Activity
8	<u>Session 8: Economic Impacts – The Micro Perspective (Part 2)</u> <u>Description:</u> This lecture delivers different knowledge on network externalities related to standards and standardization.	Students work in groups for further discussion.
9	<u>Session 9: Standardization and Innovation - (Part 1)</u> <u>Description:</u> This lecture provides different concepts on innovation and the linkages between standardization, entrepreneurship, and innovation.	Students discuss how standardization promotes or hinders innovation.
10	<u>Session 10: Standardization and Innovation - (Part 2)</u> <u>Description:</u> This lecture provides concepts for IPRs and their linkage to standardization.	Further discussions occur in groups
11	<u>Session 11: Competitive Strategy - (Part 1)</u> This lecture provides students with a brief introduction on building a business plan. Different business competitive strategies are presented and discussed.	Students are divided into 4 groups. Each group then selects a product from a company and then makes a plan to propose how to use standards to make this product (more?) competitive in the marketplace.
12	<u>Session 12: Competitive Strategy - (Part 2)</u> This lecture helps organized groups to present their own action plans, for which each group must emphasize how they going to use standards/ standardization to make their products/ services become competitive.	Each group presents its action plan
13	<u>Session 13: Conformity Assessment - (Part 1)</u> This lecture explains the concepts of conformity assessment and the different objectives of regional and international organizations to meet conformity assessment.	Student will be given reading materials to review to understand how conformity assessment works in Vietnam.
14	<u>Session 14: Conformity Assessment - (Part 2)</u> This lecture provides students with an overview of the conformity assessment system in Vietnam.	Students provide the class a summary of what they have learned from the provided reading materials
15	<u>Session 15: Wrap- up of class and content</u>	Questions and answers are undertaken

## 2.2 STUDENT CHARACTERISTICS

Number of students: 47

Student levels: Undergraduate and 3<sup>rd</sup> year students

Student majors: Business Administration with a specialization in Quality Management.

Work experience of students: No work experience (full time)

### **3. OPERATION STRATEGY AND CLASS SUMMARY**

#### **3.1 OPERATION STRATEGY**

The course combines 15 lectures. Lectures are organized for every week (except national holidays and other acceptable reasons), and each lecture lasts for 3 teaching hours. Student have one long break (15 minutes) in between class segments. At the beginning of each lecture, there is a brief summary (5 minutes) of keys points, which students have learned in the preceding lecture. A quick summary of what has been presented in the current lecture is given at the end of each lecture. Students are encouraged to raise questions or make comments on the teaching content and the teaching methods.

The course is evaluated based on the midterm exam, a final exam, and the group assignment. The distribution of the grade is calculated based on the following percentages:

- Midterm exam: 30%
- Group assignment: 20%
- Final exam: 50%

### **4. STUDENT ACTIVITIES AND FEEDBACK**

#### **4.1 STUD FEEDBACK**

The National Economics University (NEU) has not yet finished building a system for students and lecturer evaluation. It has been a weakness of the NEU, and this weakness will be overcome in the next couple of semesters.

Based on a few informal discussions inside and outside of this class, students indicated that they liked the new teaching materials and the new method of lecturing. However, they complained that the teaching materials were in English, so language was the barrier for the students. It was hard to fully understand the text and the material.

#### **4.2 STUDENT ACTIVITIES AND CLASS SUMMARY**

As mentioned above, students who were taking this course needed to complete three main components: A midterm exam, a final exam; and group assignment.

The midterm exam accounted for 30% of the total grade and it was scheduled for Lecture 8 of the class. The midterm exam was a quiz that lasting for 30 minutes. Students had to answer one short question related to the objectives, the operation of selected international organizations for standardization.



The group's assignments were assigned based on the topics, which were freely chosen by the groups. Each group had 3 weeks to complete its selected topic. On the scheduled date, each group has to present its assignment and share its findings with the whole class. Each presentation was to last for about 15 minutes, and after each presentation, the class had 5 to 10 minutes to question the group and add comments. There were a total of 7 groups that presented their assignments in accordingly.

The final examination was scheduled for the end of the semester by the faculty and the admissions office. The final examination contained 3 major parts: Multiple choice questions; Short answers; and Case study analysis. The examination was a closed book exam and lasted for 120 minutes.

## **5. LESSONS LEARNED (SUMMARY AND CONCLUSION)**

The APEC textbook and teaching materials were evaluated as good teaching resources. Concepts presented in the textbook are suitable and can be adopted for teaching students at the undergraduate level. Case studies and the theory for each case are meaningful to students and support the concepts presented. After each class, students were asked to provide examples to illustrate some of the concepts they learned. However, since most students have not been working professionally, they don't have any experiences to share about solving problems.

Through this pilot program, inexperienced lecturers were trained and fulfilled and practiced their teaching methodologies. This textbook provides lecturers with richer information on their teaching topic. Although, this textbook is a good source for teaching, it is written for higher education, and those who understand international perspectives. Therefore, lecturers need to provide more of their own examples and cases that specifically relate to the Vietnamese situation to make their lectures more meaningful to undergraduate students.

## **6. APPENDIX –OVERVIEW OF STANDARDIZATION AND EDUCATION IN VIETNAM**

### **6.1 Development of standardization and its role in Vietnam**

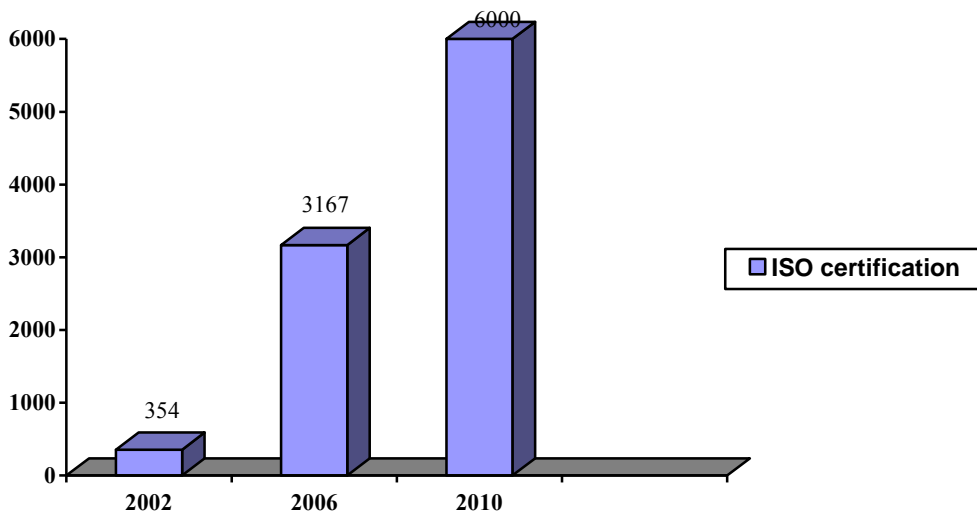
The Directorate for Standards, Metrology, and Quality (STAMEQ) established on 4 April 1962 has as its functionality the study, development, and managing of standards for Vietnam. The transformation from a central planned economy to market economy forced STAMEQ to change its concept for producing standards to match the new economic requirements. Prior to the accession of the WTO, most of the developed standards were mandated standards; the term voluntary standards was almost nonexistent. When Vietnam became a member of the WTO<sup>1</sup>,

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<sup>1</sup> On the 1st of January, 2007, Vietnam officially became the 150th member of the WTO.

many of the standards needed to be changed to voluntary standards, and some important standards were transformed into regulatory standards (mandated standards). This was done with a lot of effort by employees and the commitment of the board management of STAMEQ. Recent reports of STAMEQ show that by the 31<sup>st</sup> of March, 2011, there were 6024 voluntary standards and 119 national regulatory standards that were still valid.

Not only did STAMEQ transform and produce new voluntary standards, it also propagated its messages to organizations and firms in Vietnam effectively. Strategic propagation resulted in an increase of the number of organizations and firms that achieved certifications in ISO 9001; ISO 14000; HACCP, SA 8000...etc.. The number of ISO certifications issued shows that organizations and firms have acknowledged the importance of standards and standardization. Figure 1 below presents the number of ISO certifications issued in 4- year time intervals. Obviously, ISO certifications are rapidly recognized by firms and organizations in Vietnam.



Source: STAMEQ

Fig. 1. The Number of Issued ISO Certifications

Overall, STAMEQ has changed its concepts regarding producing standards, and methodology to make these standards aligned with international standards. As mentioned above, there are both voluntary standards and regulatory standards. Organizations and firms are free to apply voluntary standards to their products or services, or they have to publicly announce the usage of their own standards. Regulatory standards are mandated, and often those standards relate to safety, health, and the environment. Recent statistical data shows that STAMEQ put an enormous effort into making standards for Vietnam that were in harmonization with international standards. In 2005, about 25% of the Vietnamese standards were in line with international standards; this percentage increased to 34% in 2008 and to 37% in 2010.

Prior to their accession to the WTO, Vietnam produce a law for complete standardization. This law was enacted on the 1<sup>st</sup> of January, 2007. The law ensured that:

- Standardization is a tool to use to ensure the quality of products and services;
- Standardization stimulates trades and integration;
- Standardization enables innovation and technology transfer;
- Standardization increases efficiency and effectiveness; and
- Standardization ensures safety and health and protects the environment.

## **6.2 TRAINING IN STANDARDIZATION AT THE COLLEGE-UNIVERSITY LEVEL IN VIETNAM.**

Although, about 80% of Business Administration programs in universities and colleges in Vietnam offer courses on quality management, only about 10% offer a specialization in quality management. Some Standardization topics have been integrated into one or two courses of a whole program. NEU is the first university that has offered students a single course on standardization. The whole picture of teaching standardization courses in Vietnam is summarized below.

As mentioned earlier, there are a number of universities and colleges that offer a specialization in Quality Management in their Business Administration programs. The knowledge, which is provided in those programs, often focuses on Total Quality Management, ISO certifications, and HACCP standards. These programs have been organized and structured more often at leading universities in Economics and Management, such as the National Economics University, and HoChiMinh Economics University. Few years ago, the Solvay Brussels School, jointly collaborated with HoChiMinh Open University, to offer specialization training in Quality Management at the graduate level (see Appendix 1). However, the course in Standardization has only been implemented at National Economics University (NEU).

### **Educational Opportunities:**

Being the first University to implemented course standardization, NEU has foreseen the importance of standardization in the coming years. Especially, Vietnam is integrating itself to the global market. Providing students with knowledge of standardization at the national, regional, and international level has importance for the economy of Vietnam and will let it be competitive in the future. As more groups receive knowledge in the fields, these students will play important roles later in bringing the economy of Vietnam in alignment with global economy.

NEU's board of management and its employees also understand that NEU has been playing an important role in teaching, consulting, and researching new activities. Textbooks written by NEU have been mandated to be used for teaching as many universities and colleges throughout the entire economy. This is the reputation of NEU, and its employees need to both

enhance and leverage it. This situation means that students at NEU will have more of a competitive advantage than students at other universities and colleges.

### **Educational Challenges:**

Although, it has been taught at NEU for 3 intakes, the program still faces many challenges:

- Low demand from students
- Shortage of qualified and well- trained lecturers
- Lack of proper/best teaching materials
- Lack of reference materials

The biggest issue, which NEU is facing, is the perception of potential students. Most often, students and their families will consider applying to study fields that are perceived as “hot” and easier to use to get jobs after their studies. In a market economy, such perception naturally exists. However, the field of quality management has received inadequate attention from companies and organizations. This inadequacy and lack of attention relate to the fact that counterfeited goods and infringed trademarks are selling in almost every corner of the major cities in Vietnam. Almost 100% of small and medium firms do not have a quality control department integrated into their functional structure. Such departments have only existed in a few big companies and organizations. This issue means that there has been a low demand for individuals to join the field of quality management. However, since the government of Vietnam committed to the nation’s accession to the WTO, more advertising for jobs in quality control and standards’ experts has been posted.

In implementing the standardization course at NEU, the university has faced one critical issue, the shortage of qualified and well -trained lecturers. There are five full- time lecturers and one part-time lecturer assigned to teach courses related to quality management and standardization. Among them, there is but one Professor and one Associate Professor and the rest of the lecturers are only PhD candidates in various fields related to Business Administration. As the economy of Vietnam has gradually integrated into the global economy, the role of quality management has slowly caught the attention of a vast number of businesses and organizations. This is a good indication to the Board of management at NEU to have a plan for leveraging quality human resources in the field of quality management. In order to do so, the NEU should leverage the capacity of current lecturers and consider coordinating further with well -trained and experienced experts in the field who are working at various companies and organizations.

Another issue, which has critically impacted the quality of training is the shortage of teaching materials. These teaching materials include both textbooks and references. Since there is no text book precisely written for the standardization course, the course teaching content very much has depended on competent lecturers. Hence, there has been some inconsistency in the teaching content from one intake to another. Moreover, the lack of reference materials reduces the effectiveness of the self- learning process and thus decreases the quality of the program. Most of the reference materials have been individually collected and utilized by separate lecturers. So far, no systematic way of organizing these referential materials has occurred. In

addition, a financial shortfall has been the biggest barrier for NEU to be to provide these adequate reference materials.

The above analysis summarizes the opportunities and challenges of NEU for implementing the course on standardization in its teaching curricula. Facing and overcoming those challenges remain a big issue for the professors and the board management of NEU. However, with the help of regional and international organizations, these challenges can be overcome. Recent textbook<sup>2</sup> and teaching materials sent from APEC have created new opportunities for NEU professors to structure and design a textbook that will be used as a teaching vehicle for the course on standardization at NEU and possibly for other universities and colleges in Vietnam as well. The content of this new textbook will be based on the context provided by APEC. Therefore, the NEU has decided to use APEC's textbook as its teaching material for a few intakes to observe the pros and cons of that textbook for teaching. Up to date now, this text book has been implemented in the NEU undergraduate program for a semester. The following session will share these learned experiences.

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<sup>2</sup> *Standardization: Fundamentals, Impact, and Business Strategy*. APEC. 2010.

# Ch.11 National Infrastructure of Quality and International Trade : Business and Innovation Strategies

**Economy** : Peru  
**University** : Pontificia Universidad Católica del Perú  
**Department** : Institute for Quality  
**Students** : Doctor (1) + Master/Professional (19)  
*\*all working experienced*

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## 1. EXECUTIVE SUMMARY

In Peru, the economic policy of openness to international trade has generated a sizeable increase in the export and import of goods and services, which not only reflects on the economy's economic growth. This growth also implies the needing of those businesses to be more competitive in the marketplace, have standards, and comply with established requirements, as well as control these processes to make management more efficient. This program has allowed the participants to initiate a e study of Standardization and Conformance Assessment linked to international trade, review the different trends that exist between economies and understand both national and international regulations on the topic. As well, participants can learn the main key definitions for the adequate understanding of the issue, and gain new knowledge regarding the different components of a National Quality System. For this purpose, we used case studies and their analyses for two emerging products in Peru (Coffee and Information Technology).

The Program has featured 20 e Program has featured twentyohts. rentheses right after) - write\_participants associated with the sectors of agrochemicals, textiles, occupational health,

food, software and information technology, advice and consulting for small and medium-sized businesses, project analysts, and quality-management consultants.

The lecturers in charge of developing the program deem the book to be well structured. We consider it has a good approach, as these are issues on which the literature is not abundant. Perhaps that literature may be expanded by including some cases of Latin America economies, for the agro-industrial and services sectors since, for the most part, the examples are only related to Asia and Europe. It would be convenient to develop cases on each economy for Appendix A: “Brief Case: Standards Make a Real Difference”. Furthermore, the majority of the current examples are oriented toward industry and Information Technology (computing, the Internet and telecommunications).

The book includes current issues that are not often treated nationally (competitive strategy, collaborative strategy, innovation, etc.); hence, the information given constitutes an important contribution for operators in the market (businesses) to incorporate quality strategies in their businesses and, at the State level, foster new discussion, and from the public sector, to discuss over- designing strategies for a National Quality Policy.

## **2. COURSE OVERVIEW: “NATIONAL INFRASTRUCTURE OF QUALITY AND INTERNATIONAL TRADE: BUSINESS AND INNOVATION STRATEGIES”**

### **2.1 SYLLABUS**

#### ***2.1.1 Course Objectives***

Develop and strengthen the concepts of standardization, conformance assessment, and impact on the micro and macro economy, and legal impact and innovation as competitive tools to face the demanding international market.

Share successful experiences in the implementation of tools for planning business strategies that allow for expanding the market, to reduce costs and increment efficiency.

Illustrate how Peru faces issues of standardization and conformance assessment within the National Quality System.

#### ***2.1.2 Course Period and Characteristics***

Length of program: 2 months (60 lecture hours, 45 minutes each).

Number of class sessions: 13

Number of conferences: 5

Times: Wednesday and Friday, 06:30 PM to 10:00 PM.




Start Date: 06 May 2011.

End Date: 14 July 2011


Certification: Postgraduate continuing education

### 2.1.3 Syllabus – Class Planning

The program is divided into four courses that develop the chapters in the APEC book, plus five Master Conferences to reinforce the issues treated in each course.

CLASS PLANNING	APEC SCSC textbook
<b>COURSES</b>	
<b>Technical Requirements for International Trade</b>	<b>Introduction to the program</b>
<p>The introductory course delivers the technical requirements that foreign trade demands, and which a business must fulfill to venture into competitive markets.</p> <p><b>Lecturer: Edgar Vásquez Vela</b>            General Director of Bilateral Affairs with Asia and Oceania            Ministry of Foreign Trade and Tourism</p> <p><b>Sessions:</b> 1  <b>Lecture hours:</b> 4  <b>Date:</b> 06 May 2011</p>	
<p><b>Fundamentals of Standardization and Conformance Assessment</b></p> <p>The course identifies aspects related to Standardization, such as definition, function, classification, life cycle, the Standardization process and Conformance assessment.</p>	<p><b>Chapters 1, 2 and 3</b></p> 
<p><b>Lecturers: Rosario Uría Toro</b> (Chapters 1 and 2)            Technical Secretary of the Commission on Standardization and Oversight of Non-Tariff Trade Barriers            Indecopi</p> <p><b>Dr. José Carlos Flores Molina</b> (Chapter 3)            Director of the Institute for Quality            Pontificia Universidad Católica del Perú</p> <p><b>Sessions:</b> 4  <b>Lecture Hours:</b> 16  <b>Dates:</b> 11, 13, 19, and 20 May 2011</p>	



CLASS PLANNING	APEC SCSC textbook
<p><b>The impact on the micro and macro economy. The Legal Impact.</b></p> <p>This course analyzes the impact of Standardization and Conformance on businesses using a micro- and macroeconomic perspective.</p> <p><b>Lecturers:</b> <b>Santiago Dávila Philippton</b> (Chapters 4 and 5)  Economic Studies Manager  Indecopi  <b>Augusto Mello Romero</b> (Chapter 6)  Head of the National Accreditation Service (SNA)  Indecopi</p> <p><b>Sessions:</b> 3  <b>Lecture hours:</b> 12  <b>Dates:</b> 27 May, and , 01 and 03 June 2011</p>	<p><b>Chapters 4, 5 and 6</b></p> 
<p><b>Business and Innovation Strategies Needed to Undertake Trade</b></p> <p>This course identifies different business Standardization strategies, which allow the undertaking of technological innovation through the use of competitive and collaborative strategies.</p> <p><b>Lecturers:</b> <b>Mercedes Inés Carazo</b> (Chapter 7)  Director of the Technical Office of the Technological Innovation Center  Ministry of Production  <b>José Antonio Torres Turriate</b> (Chapters 8, 9 and 10)  Director of the Family Business Program  Lima Chamber of Commerce, BID/FOMIN</p> <p><b>Sessions:</b> 3  <b>Lecture hours:</b> 12  <b>Dates:</b> 10, 15, and 17 June 2011</p>	<p><b>Chapters 7, 8, 9 and 10</b></p> 
<p><b>Integrating Work: Carrying Out Practical Work (business strategy)</b></p> <p>Workshop for the presentation by tutoring lecturers on the orientation of integrating work and presentation of final work.</p> <p><b>Lecturers:</b> <b>Mercedes Inés Carazo</b>  Director of the Technical Office of the Technological Innovation Centers  Ministry of Production  <b>José Antonio Torres Turriate</b>  Director of the Family Business Program  Lima Chamber of Commerce, BID/FOMIN</p> <p><b>Sessions:</b> 3  <b>Lecture hours:</b> 16  <b>Dates:</b> 18 May, 12 July and 14 July 2011</p>	

CLASS PLANNING	APEC SCSC textbook
MASTER CONFERENCES	

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**Master Conference on the National Accreditation System**

A presentation on the characteristics of the National Accreditation System, through INDECOPI-SNA, the regulating body in Peru.

**Speaker:** Augusto Mello Romero

Head of the National Accreditation Service (SNA)

Indecopi

**Sessions:** 1

**Lecture hours:** 1

**Dates:** 25 May 2011

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**Master Conference on Consulting by the National Quality System – Project INCA, AENOR Consulting**

Overview of the National Quality System (SNC), trading openness and regulatory harmonization. Development of the national innovation system and the economic effects of standards on the market's inner workings. The Productivity and competitiveness improvement program.

**Speaker:** Javier Roca

General Director for International Economics, Competition and Private Investment

Ministry of Economy

**Sessions:** 1

**Lecture hours:** 2

**Dates:** 22 June 2011

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**Master Conference on Using Innovation for Tackling Trade**

A vision was presented regarding knowledge and innovation as key issues, Technological improvements, process improvements, product changes, new marketing approaches were addressed as well as the importance of innovation and the current situation on innovation in Peru.

**Speaker:** Eduardo Ismodes

Head of the Office of Research and Development

Research Vice Provost Office – Pontificia Universidad Católica del Perú

**Sessions:** 1

**Lecture hours:** 2

**Dates:** 24 June 2011

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## 2.2 STUDENT CHARACTERISTICS

A total of 20 full- time students participated in the special course. All have a variety of experience in quality, information systems, health, and business consulting. Their academic

backgrounds are all different and include business administration, law, psychology, as well as several engineering disciplines. Their specific characteristics are listed in **Appendix 2**.

### 3. OPERATION STRATEGY AND CLASS SUMMARY

#### 3.1 OPERATION STRATEGY

##### 3.1.1 Educational Modality

The modality of study is defined as in-person and participatory.

##### 3.1.2 Pedagogic Model: Adopted Methodology

- Expository classes: Knowledge is conveyed through the exposition of the topic by the lecturer and the use of slides and a board.
- Case study: Learning is achieved through the analysis of actual or simulated cases, some of which are organized into workshops.
- Integrating Work: For the development of practical work and Integrating Work, the participants formed work groups selecting a product (case) to develop the business strategies, then developing a project using the acquired knowledge; making partial delivery of their work under the monitoring of the lecturers and receiving feedback on their progress from the lecturers in charge of each course.

##### 3.1.3. Evaluation Criteria

- Ongoing Evaluation: Throughout the Program, the lecturers evaluate progress in the **Integrating Work** through the deliverables that pertain to each course.
- Integrating Work: Each group turns in the **Integrating Work** document observing the structure defined in the previous item. This final report is turned in either physically or electronically, according to the schedule.
- Presentation of the Integrating Work: The presentation isn made in groups with a maximum duration of 30 minutes per group, after which individual questions are asked of the group presentation members.

Components of the Evaluation	% of the final average
Average grade for Deliverables (D)	40%
Delivery of the Integrating Work (IW)	30%
Presentation of the Integrating Work (P)	30%

Fórmula de calificación :  $0.4D+0.3IW+0.30P$

## 3.2 CLASS SUMMARY

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### COURSES

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#### Technical Requirements for International Trade

- The Technical Requirements needed in the international trade context.
  - International Agreements and their tools for adequately fulfilling their requirements.
  - Main characteristics of the Quality Systems of Peru, US, China, and the European Union.
- 

#### Fundamentals of Standardization and Conformance Assessment

- Description of the different types of Standardization.
  - Importance of Standardization in international trade.
  - The life cycle of Standardization.
  - Standardization Process.
  - Entities related to certification.
  - Classification of conformance assessment.
  - Certification of Management Systems and their main characteristics.
  - Certification of products and their main characteristics.
  - Importance of the entities of mutual recognition in general and for international trade.
- 

#### The Impact of (add noun) on the Micro and Macro Economy: The Legal Impact.

- Role of Standardization and Conformance Assessment in a sustainable economy.
  - Impact on trade.
  - Strategies for resolving trade barriers.
  - Economic and social impact on the micro economy when introducing a standard or conformance measurement.
  - Benefits of Standardization on the micro economy.
  - Standardization Costs.
  - The relationship between Standardization and Conformance Assessment and the Legal Aspects.
  - Conformance Assessment as a tool for developing a regulatory strategy. SGC ISO 9001, SGC ISO 14001, SGC OHSAS 18000, Product Certification, MLAs/MRAs
- 

#### Business Strategies and Innovation for Tackling Trade

- The relationship between Innovation and Standardization.
  - Benefits of technology and innovation and their characteristics.
  - Standardization as a baseline for implementing innovation.
  - Strategies for Innovation technology and Standardization.
  - Standardization, cost reduction, and differentiation.
  - Standardization and market expansion.
  - Successful cases of positive business strategies.
  - Business models.
  - Benefits and effects of strategic alliances.
-

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### Carrying Out a Practical Work (business strategy)

#### Content of the Integrating Work

- I. Introduction (Executive Summary developed for final delivery )
- II. Minimum technical requirements
  - a. Minimum technical requirements for that product or service in the target market.
  - b. Current limitations of the reference company, or of the assumed position and the environment in fulfilling technical requirements.
- III. Fundamentals of Standardization and Conformance Assessment.
  - a. Identifying the products/services or processes and areas (participants must work on the choice they made in the preliminary proposal).
  - b. Standardization Process (required to fulfil the requirements).
  - c. Life cycle of Product
- IV. Business Strategy
  - a. The Business Model.
  - b. Ability to innovate and standardize – Competitive edge (changes in products/ ervices, processes, and equipment or in the organizational-partnership format).
  - c. Network externalities (strategic alliances, verifying the need to buy patent royalties or develop models of usage, brand, designation of origin and/or other intellectual property instruments, among others).
  - d. Competitive Strategy.
- V. Conclusions and Recommendations

The work groups must read the chapters in the Handbook for content of the Integrating Work.

Additionally, as i mentioned on page 5, the program has 5 Master Conferences.

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### 3.3 KEY REFERENCE SUMMARY

The course lecturers have provided students with references of books for consultation. These serve as a complement of information for comprehending the issues treated and introducing the Peruvian reality. The following were handed out to the students:

- 1) **VÁSQUEZ VELA, EDGAR MANUEL 2010 “The Technical Obstacles to Trade in the International Arena”. At GUEVARA, ERNESTO y NOVAK, FABIAN. Peru and International Trade. Lima: Pontificia Universidad Católica del Perú, Fondo Editorial, pages 165-184.**

A concrete presentation is made of the basic aspects to be considered by small and medium-sized entrepreneurs who wish to export their products or services, with respect to the existing non-tariff measures in those markets. Starts with the basic definitions of tariffs and non-tariff measures and technical obstacles to trade, among other definitions. It presents the international question associated with non-tariff measures. The TOT (Technical Obstacles to Trade) agreement of the WTO is discussed along with a summary of Peru’s regional and bilateral agreements regarding the issue of TOT. The basic characteristics of the regulatory and quality systems and tools regarding the unnecessary TOT are given. This material

provides the students with knowledge of the general framework in terms of regulations and technical obstacles to trade and the Peruvian businesses are making their best effort to reach new markets.

**2) “7th Conference on Standards and Conformance”** – August 10-11, 2008 Cusco, Peru.

This book presents issues regarding standards and conformance assessment. It also includes the regional specialized entities and the international organizations and standards and conformance in education – challenges regarding the contents of textbooks, a development and cooperation network in the APEC region. Trade facilitation. Introduction to the effects of TFTA, a seminar on environmental standards, and standards on trade facilitation in the APEC are included. The European Union’s RoHs directive – upcoming revision-- and Singapore’s initiatives to support the RoHs and their scope are reviewed, together with. The SCSC – ABAC dialog and negotiations round.

The conference presents the initiatives offered within the APEC region, and how our economy has participated in them. Peruvian cases, regarding Asparagus and Coffee, are also presented.

**3) “Export Quality Management” – book with answers for small and medium-size entrepreneurs.** Series: The Key to Trade in the International Trade Center, Peruvian Edition, Indecopi, Lima 2007

This publication presents the benefits of using the fundamental elements of quality control, the technical standards, conformance assessment, accreditation and metrology, as tools available and at the disposal of entrepreneurs with the aim of fostering the competitiveness of micro and small businesses and facilitating their ability to access international markets.

**4) “Procedures Manual – Tools for Multiple Certifications among Groups of Coffee Producers”.** Authors: Frank Schreiber, Carlo Costilla Mora – February 2011. This manual presents a take on the reality regarding the production of coffee in Peru. It discusses the importance of accessing new markets and the organizational difficulties of small producers in accessing the tools for multiple certification through associations of small producers so that these producers can be assured access the main coffee crop certifications, by fulfilling the required standards.

**Additional bibliography references are featured in Appendix 1.**

## **4. STUDENT ACTIVITIES AND FEEDBACK**

### **4.1 STUDENT FEEDBACK**

This is an interesting program with a host of new information and knowledge delivered pertaining not only to the standards framework, but also to Peru’s position regarding other

economies and the requirements to be taken into account to export, focusing mainly on standardization.

The text is very interesting in its general context; however, the cases presented in the handbook provide little help in reinforcing the understanding of the concepts, since the industrial development in our economy is very different. It is important to enrich the examples in the book with examples from the Peruvian or Latin American reality.

Developing a course about quality infrastructure and incorporating this aspect as part of a business strategy allows for a more integral vision of the aspects related to standardization and conformance assessment linked to international trade, since, for the most part, businesses are created and develop with a superficial understanding of these issues. However, standardization should be the pillar upon which individuals may design a business and the differentiation strategy for their product, using the standard as a benchmark when starting a business.

This program has made us aware of the importance of quality management as a key tool for innovating and developing a business and, in this context, how technical standards, conformance assessment, and accreditation contribute to improving business management, favoring both productivity and competitiveness.

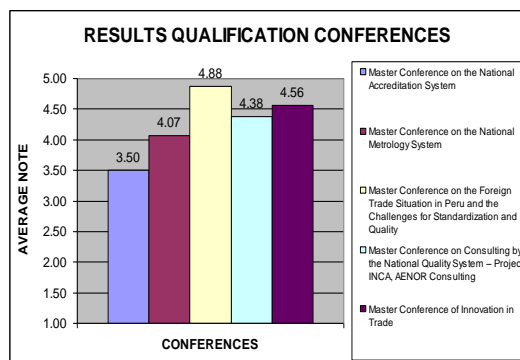
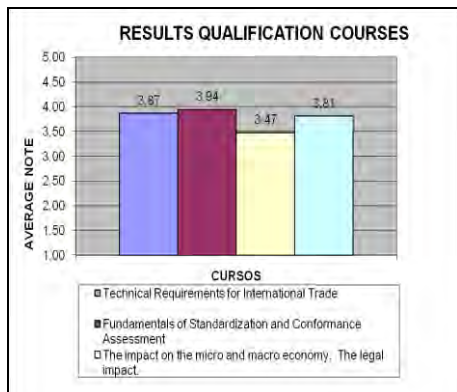
As part of the program, an academic performance assessment survey was conducted with the aim of validating the information and content of the courses and conferences as a main feature in the development of the business strategies for projects. The grading was done on a scale from 1 to 5, where 1 is quite poor, 2 is poor, 3 is average, 4 is good and 5 very good. See the tables below:

#### **Summary Qualification Table - Courses**

<b>EVALUATED CONCEP</b>	<b>Usefulness of contents</b>	<b>Organization and clarity of the material</b>	<b>Methodology</b>	<b>Examples</b>	<b>AVERAGE</b>
<b>COURSE</b>					
Technical Requirements for International Trade	3.94	3.85	3.88	3.88	<b>3.89</b>
Fundamentals of Standardization and Conformance Assessment	4.00	4.06	3.89	3.71	<b>3.91</b>
Impact on the micro and macro economy. The Legal Impact.	3.65	3.59	3.15	3.35	<b>3.44</b>
Business Strategies and Innovation for Tackling Trade	3.94	3.75	3.63	3.67	<b>3.74</b>
<b>AVERAGE QUALIFICATION</b>	<b>3.88</b>	<b>3.81</b>	<b>3.64</b>	<b>3.65</b>	<b>3.75</b>

**Summary Qualification Table – Master Conferences**

CONCEPT COURSE	EVALUATED			
	Usefulness of content	Organization and clarity of material	Examples	AVERAGE
Master Conference on the National Accreditation System	3.85	4.06	4.12	4.01
Master Conference on the National Metrology System	3.85	4.06	4.12	4.01
Master Conference on the Foreign Trade Situation in Peru and the Challenges for Standardization and Quality	4.29	4.33	4.39	4.34
Master Conference on Consulting by the National Quality System – Project INCA, AENOR Consulting	4.92	4.75	4.94	4.87
Master Conference on Innovation in Trade	4.62	4.44	4.63	4.56
<b>AVERAGE QUALIFICATION</b>	<b>4.30</b>	<b>4.33</b>	<b>4.44</b>	<b>4.36</b>

**4.2 STUDENT ACTIVITIES AND CLASS SUMMARY**

The students developed an Integrating Work that focused on designing a business strategy with an emphasis on the international market which also allowed them to incorporate the concepts of standardization and conformance assessment as a competitive and management tool to better face a demanding international market.

The purpose of the Integrating Work is that the student integrate the knowledge acquired in the class sessions and design a business strategy in an orderly manner, based on the Standardization handbook: Fundamentals, Impact and Business Strategy Proposed by the APEC Sub Committee on Standards and Conformance.

The participants formed groups between four and six persons. Each group selected or designed a “**referent company**”, depending on the chosen product, the target market, and the market segment.



It was recommended that the participants select a referent company that had an interest in improving its levels of competitiveness in the international market through the implementation of efficient systems of standardization, or that otherwise was poised to take on that objective.

To carry out the integrating work, the work groups had the support of the lecturers for each subject matter, who assigned homework related to the content of said work. The homework was turned in on the dates specified, either as a physical document at the IC-PUCP Campus, or by E-mail.

#### Initial Integrating Work (IW) Workshop

With the goal of helping the work groups adequately approach the development of the Integrating Work and optimize their resources, the workshop tutors requested each group to provide an initial IW proposal.

It was of paramount importance to have this initial document, since it allowed the tutors to provide better orientation to each work group, thus focusing and facilitating their communication efforts through a series of institutional contacts. These enabled the groups to identify the referent companies or the specialized professionals in their chosen fields.

In the IW workshop, the tutors provided and presented several information sources, both to the three groups in the coffee chain, and to the work group who chose to work on software for managing small and medium-sized businesses. The objective was giving the groups support in defining the product/service and the market, which would subsequently be validated with the benefit of experts' opinions. As products and markets were becoming more specific, more supporting information was provided to the groups.

The participants conducted visits and interviews with businesses and institutions connected with the two cases selected for the development of their projects: Coffee and Information Technology.

**Please See the following section 8. Appendix 3.– STUDENT'S LIST AND PICTURES**

## ACTIVITIES CARRIED OUT BY THE COFFEE GROUPS

Entity	Date/s	Event	Objective
Committee of Coffee Entrepreneurs of the National Industrial Society	19-May	Interview	Getting in touch with coffee entrepreneurs
Central of Coffee Agricultural Cooperatives of the Valleys of Sandia (CECOVASA)	20-May	Coffee Fair (Larco Mar Mall, Miraflores, Lima)	Finding out in what context organic coffee is developed
Hemalud Coffee Cooperative of Bosques del Inka (COOPCHEBI, Villa Rica)	20-May	Coffee Fair (Larco Mar Mall, Miraflores, Lima)	Finding out in what context organic coffee is developed
Central of Coffee Agricultural Cooperatives of the Valleys of Sandia (CECOVASA)	25, 28 May; 6 and 16 of June	Interviews	Learning what CECOVASA is all about, knowing the mechanisms for operating the export chain for green coffee, obtaining information about the critical points for getting the best prices for green coffee, the demand for green coffee, critical parameters for exporting green coffee, mechanisms for obtaining organic certification, sustainable forests and fair trade, and the administrative and documentation processes for exporting green coffee.
BID (Inter-American Development Bank) Attended the National Innovation Convention between 25 and 26 May at the Lima Chamber of Commerce	26-May	Interviews	Finding out about the group stances regarding their initial workshop proposals.
PROMPERU (State agency: Commission for the Promotion of Peru)	2 June / 6 June	Interviews	Drawing inferences about compliance with the required standards for exporting green coffee.
Junta Nacional del Café	07-June	Interviews	The context of the coffee market, the standards, conformance assessment, and financing for producers.
ADEX (Association of Peruvian Exporters)	15-June	Interviews	Obtaining information regarding the technical rules and regulations applicable to coffee.
CERPER (Certifications of Peru)	16-Jun	Interviews	Obtaining information regarding conformance assessment and the existence of accredited methods.
INASSA (International Analytical Services)	16-Jun	Interviews	Obtaining information regarding conformance assessment and the existence of accredited methods.
AENOR Peru (Spanish Standardization and Certification Association)	17-Jun	Interviews	Obtaining information regarding conformance assessment and the existence of accredited methods.

Entity	Date/s	Event	Objective
Association of Ecological Producers of Valle Santa Cruz INKAFFE	26-Jun	Show of Ecological Products (Parque de la Exposición, Lima)	Local situation of the coffee market and promotion of the domestic market as a sustainability strategy.
Lima Chamber of Commerce	31-May	Interview	Gathering information about software companies at the LCC, standardization and meeting with representatives from the companies the group will work with.
SUNAT (National Tax Administration Superintendency of Peru)	From 25-May to 17-June	Emails	Establishing contacts regarding software-related tax regulations.
ANDESTEC SCRL. (IT Systems and Consulting)	03-June	Interview	Establishing contact with textile software entrepreneurs.
INDECOPI (National Competition and Intellectual Property Protection Institute of Peru)	17-June	Emails	Contacting standard-enforcing agencies from Mexico and Argentina.
PUCP Quality Institute (Pontificia Universidad Católica del Perú)	22-June		Gathering information on standards.
PROMPERU (State Agency: Commission for the Promotion of Peru)	23-June	Interview	Obtaining quality standards on production software.
PROMPERU (State agency: Commission for the Promotion of Peru)	23-June	Interview	Obtaining information about markets in Argentina and Mexico, trade agreements and non-tariff technical barriers.
PROMPERU (State agency: Commission for the Promotion of Peru)	23-June	Interview	Obtaining information about markets in Argentina and Mexico, trade agreements and non-tariff technical barriers.
Mexican Embassy	27-June	Email	Obtaining information on standards and technical regulations and tax and market information.
Argentine Embassy	27-June	Email	Obtaining information on standards and technical regulations and tax and market information.
Peruvian Chamber of Electronic Commerce	27-June	Email	Obtaining information on standards and technical regulations and tax and market information.
National Association of Information Technology Educational Institutions, A.C.	27-June	Email	Obtaining information on validation of standards and technical quality regulations in Mexico.
NYCE	27-June	Email	Obtaining information on validation of standards and technical quality regulations in Mexico.
Lima Chamber of Commerce	27-June	Email	Tax and trade information about Peru in relation to Mexico and Argentina.

## **5. LESSONS LEARNED (SUMMARY AND CONCLUSION)**

### **5.1 COURSE DESIGN**

It proved very useful to include master conferences because these helped students to understand the situation in Peru with respect to what was presented in the handbook.

Considering the depth of the issues that were treated, the program should be extended, and, therefore, in that context, it would be convenient to assign more hours to each of the courses, thus increasing the duration of the program. It would also be helpful to provide a greater number of tutoring sessions, while still including practical export cases, mainly regarding companies that have developed initiatives in terms of quality, standards framework, and other areas.

It would be good to develop the concepts of closed innovation, such as those conducted by companies that have their own research and development departments.

Moreover, it would be important to hold a meeting of lecturers and students to deal with the results of the program and then conclusions about the further development of the program, so that the feedback received can be used effectively to restructure the design for the following version of the course.

### **5.2 COURSE OPERATION**

It would be advisable to call a meeting among lecturers prior to the start of the Program, to share the methodology and planning for each session. It is important at that time to include information sources, not only regarding bibliography, but also any web pages or links where students can obtain information that allows them to develop the deliverables assigned to them for the Integrating Work.

Also, it is of great importance that the lecturers include in their classes cases that do relate to the Peruvian reality.

With the experience now gained from this first version of the Program, we have observed that it will be very useful to implement a shared platform where lecturers and students alike can post and retrieve information.

### **5.3 STUDENT PARTICIPATION**

Student participation in the expository classes took place through questions asked by the students to the lecturer/speaker. This methodology allowed us to clear doubts, as well as enriched the topic with input from the participants themselves. On the other hand, it is important that, at the end of each session, the kinds of questions that are asked do lead to discussions that enable the lecturers to verify that learning objectives have indeed been met.

## 5.4 STUDENT EVALUATION

Featuring tutoring sessions, where tutors provide feedback on students' progress regarding their deliverables, is very helpful. Moreover, with respect to the Integrating Work, it was deemed convenient to have a greater number of tutoring sessions, so that the work groups can be monitored more closely throughout the scheduled workshops where then students can continue to interact with the tutors and lecturers for each course.

## 5.5 TEXTBOOK UTILIZATION

It proved to be very important to provide the students with two reference books that have complemented the APEC handbook, mainly in terms of clarifying the terminology, as well as with the development of their projects.

The books recommended as complementary texts are the following:

- **Export Quality Management – Book with Answers for Small and Medium-sized Entrepreneurs.** Series: The Key to Trade of the International Trade Center, Peruvian edition, Indecopi, Lima 2007
- **Procedures Manual – Tools for Multiple Certification Among Groups of Coffee Producers.** Authors: Frank Schreiber, Carlo Costilla Mora – February 2011

## 5.6 OTHER PRACTICAL COMMENTS FOR DESIGN OF FUTURE COURSES

For greater student participation from the industrial entrepreneurial sector, it would be convenient to coordinate before the program execution with the trade associations or institutions, such as the National Industries Association, the Lima Chamber of Commerce, the Peruvian Exporters Association. By being closely connected to the national industrial sector, these connections can drive greater participation by the students.

Below, we include suggestions as quotes from lecturers in the Program:

“Include major fundamentals of quality, for example, the theoretical basis of Deming, Juran, Ishikawa”  
(José Carlos Flores)

“I believe that it shall be important to share these concepts and especially the approach with the Technological Innovation Centers that are connected with Produce, both public and private, of which I am in charge, as well as with the institutions that are part of the Industrial Technological Innovation Center, CINTECIN.”  
(Inés Carazo).

“Yes, I consider information to be an important contribution for the market operators (businesses) to incorporate quality strategies in their businesses. Furthermore, I think that it is important to foster the discussion from the public sector when designing strategies for a national quality policy.”  
(Santiago Dávila).

“Among the examples, we should consider information from different sectors and business sizes, prioritizing strategic plans by sector, economywide, so that the results and the recommendations may represent a significant contribution to the entrepreneurial sector.”  
(José Antonio Torres).

## 6. APPENDIX 1 - STUDENT’S BEST WORK: EXPORTING OF ORGANIC GREEN COFFEE TO THE UNITED STATES IN NORTH AMERICA

According to the results from evaluation references in Item 3.1.3, the lecture tutors selected the final best final integrative work.

Group Members: Patricia Infante (Quality System Consultant), Patricia Castro (Indecopi), Romina Necochea (Sunat), Eusebio Robles (DIGESA)



Best Work – Group members’ photo



Quality control



Dry process



Storage

## 6.1 OBJECTIVE

To evaluate and analyze the role of standardization in the business of exporting coffee to the United States in North America.

## 6.2 GENERAL INFORMATION ABOUT THE COMPANY

CECOVASA LTDA<sup>1</sup>, is an organization of small coffee producers (5000 approx). Its area of operation comprises the districts of San Juan del Oro, Yanahuaya, Alto Inambari, and San Pedro de Putina Punco. It was founded in the city of San Juan del Oro, Sandia, on 24 June 1970, and its legal status is registered as a Registered Association in the Public Registry of Juliaca. CECOVASA is located in the Puno region, neighboring the Bahuaha Sonene National Park. The life areas where the CECOVASA coffee is produced are part of a highly moist tropical forest (bmh-S), sub-tropical rain forest (bp-S), and low montane subtropical rain forest (bp-MBS). The geographic location, the genetic material and the production system, all produce CECOVASA's specific qualities of odor, acidity, aromas, etc.

One of CECOVASA's accomplishments is introducing special coffee beans, both in Europe and the United States, including being awarded first prize in the II Quality Coffee National Contest of 2005, and first prize in the III Quality Coffee National Contest of 2007, with a coffee bean produced at an altitude of 1600 MASL, following Sustainable and Ecological production principles. In 2010, with the TUNKI brand, it was deservedly declared the best special coffee in the world at the "Twenty-second Fair of the Specialty Coffee Association of America (SCAA)", in the United States, after a tough competition against 139 other samples. Its quality is, therefore, unquestionable. CECOVASA, started its Ecological Growing activity in 1997 through the Organic Coffee Program.

Peru produces 4% of the world volume of coffee. CECOVASA's coffee produces 2% of Peruvian coffee. Peru produces one- third of the world's organic coffee volume. In 2009, approximately 250,000 hundredweights of organic coffee were sold as conventional coffee.

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<sup>1</sup> For further information about CECOVASA: <http://www.cecovasa.com.pe/>;  
[http://youtu.be/46xiN\\_aMk3Q](http://youtu.be/46xiN_aMk3Q)  
<http://youtu.be/cHehPn0sVfk>  
<http://youtu.be/d4SAdJmhPyY>

## 6.3 IDENTIFYING THE MINIMUM TECHNICAL REQUIREMENTS FOR EXPORTING GREEN COFFEE TO THE UNITED STATES OF AMERICA

### (STANDARDIZATION)

#### 6.3.1 National Requirements for Organic Green Coffee for Export

In Peru, there are two entities that regulate product exports: DIGESA and SENASA. The following table shows CECOVASA's compliance.

DIGESA: Free Trade Certificate, Food and beverages processed industrially, whether produced nationally or abroad, may only be sold after obtaining the Sanitary Registration, Container and Packaging and Labeling Sanitary Registration  
 SENASA: Packaging requirements - Wood: seal certifying that it has received the thermal treatment or Methyl Bromide fumigation against pests, Pesticides and fungi prevention.  
 MINCETUR: Certificate of Origin

There are also voluntary technical standards (INDECOPI) that CECOVASA complies with:

NTP-ISO 4149:2001 GREEN COFFEE. Olfactory and visual exam. Identifying foreign matter and flaws; NTP-ISO 4150:2005 GREEN COFFEE. Granulometry and hand-sifting analysis; NTP-ISO 6667:1999 GREEN COFFEE. Identifying beans damaged by insects; NTP-ISO 10470:2006 GREEN COFFEE. Flaws reference table; NTP-ISO 1446:1999 GREEN COFFEE. Determining humidity content. Basic reference method; NTP-ISO 6668:1999 GREEN COFFEE. Preparing samples for sensory analysis; NTP 209.314:2005 GREEN COFFEE. Determining Ochratoxin A. Thin-layer chromatography method

#### 6.3.2 Regulation requirements demanded by the United States

FDA: Physical exam, exam on dock, or sample exam; Physical, chemical microbiological and sensory requirements  
 AMS USDA: Quality to comply with the specified grades.  
 New York Board of Trade: Tolerances for coffee.  
 Bureau of Customs and Border Protection, Department of Homeland Security: Container requirements., General Food Labeling, Economy of Origin Marking  
 USDA: LAW AGAINST BIOTERRORISM: Production, distribution and sale of foods of North America origin and imported, for the prevention of possible terrorist attacks, Organic Foods Certification (Label Approval Certificate), through the Application Form for Certification/Extension of Bottle Label/Approval, TTBF 5100.3.



The voluntary requirements are also complied with and they are:

C-TPAT<sup>2</sup>: C-TPAT, Load handling and movement in the import supply chain of the USA, and their safety  
 BASC<sup>3</sup>: BASC, verifying the conformity of the Safety Control Management System (SCMS) applied to the logistic chain of the trade  
 ISO: ISO 1446:2001 Green coffee – Determining the water content – Basic method of reference; ISO 3509:2005 Coffee and products – Vocabulary; ISO 4072:1982 Of green coffee in sacks – Sampling; ISO 4149:2005 Green coffee – olfactory and visual exam and determining foreign matter and flaws; ISO 4150:1991 Green coffee – Size Analysis – Manual sifting; ISO 6667:1985 Green coffee – Determining the proportion of beans damaged by insects; ISO 6668:2008 Green coffee – Preparing samples for sensory analysis; ISO 6669:1995 Green and roasted coffee – Determining the bulk density in the free flow of whole beans (routine method); ISO 8455:2011 Green coffee – Guidelines for storage and transport; ISO 10470:2004 Green coffee – Reference flaws table

### **6.3.3 Current limitations of CECOVASA when complying with the Technical Requirements**

Complying with green coffee standards is not a problem for the company. It currently exports in compliance with all the standards demanded by the Peruvian state (DIGESA, SENASA) and the US authorities (FDA, USDA and APHIS). It is preparing to export ground roasted coffee.

The critical indicators for commercialization are the degree of **humidity** of the green bean, (which must not be greater than 13%), the number of **flaws** and the results of the **tasting**, within the client's stipulations. This last point is the most important in the evaluation of conformance of the coffee.

CECOVASA utilizes its own laboratories located in Juliaca (Puno). Before closing a sale, it sends the sample to the client for them to give their approval. Once the approval is given, the shipment is made. When the lot arrives in the USA, the client repeats the analysis on the lot, and if all is in compliance, they accept the lot. CECOVASA has not had any problems in this respect

The persons who conduct the tasting are certified as tasters by the Specialty Coffee Association of America (SCAA).

CECOVASA applies the Technical Standards Regulated and by Consensus (domestic and international), private Regulations and Standards, and those which have supported the introduction of this product in the market, whether in trade fairs or other venues.

## **6.4 FOUNDATIONS FOR STANDARDIZATION AND CONFORMITY ASSESSMENT**

**6.4.1 Product identification:** The Exportable Product is green coffee, whose name and customs classification code is: Coffee in green organic bean SPN 0901110000, the target market is the United States in North America.

<sup>2</sup> Customs – Trade Partnership Against Terrorism

<sup>3</sup> Business Alliance for Secure Commerce

### **6.4.2 Standardization Process and Standards Life Cycle**

CECOVASA's objectives have evolved according to the market, as did its de facto standards. At the beginning, the central objective was to collect the largest amount of coffee (at that time the quotas system for export by economy was already in place and the challenge for each organization was to maintain or increase its participation). It is at a later time, when entering Fair Trade in 1993, that the better prices encourages the choice of the best product, the first segmentation takes place, collecting and focusing on the objective of quality improvement.

This is how good prices incentivize the choice of the best product and, hence, the first segmentation, collecting Extra and Regular Coffee. At that time the National Technical Standard (de jure) is complied with, which classifies as Extra Coffee, the large and fresh, well dried, flawless bean. The beans that do not have the right size and flaws in the drying are classified as Regular Coffee. Moreover, in order to minimize the risk of exporting coffee that does not comply with the quality required by the clients, and determining the responsibility of the grower who has not complied with supervising their production, the Union of Cooperatives determines as a de facto standard that each grower identify the coffee they produce on the bags that they deliver and define the internal traceability process.

It is worth mentioning that the de facto standards established by CECOVASA override the existing de jure standards, because the facto standards regulate each stage of the production process up to commercialization, being even stricter and establishing higher criteria in order to obtain a product of greater quality.

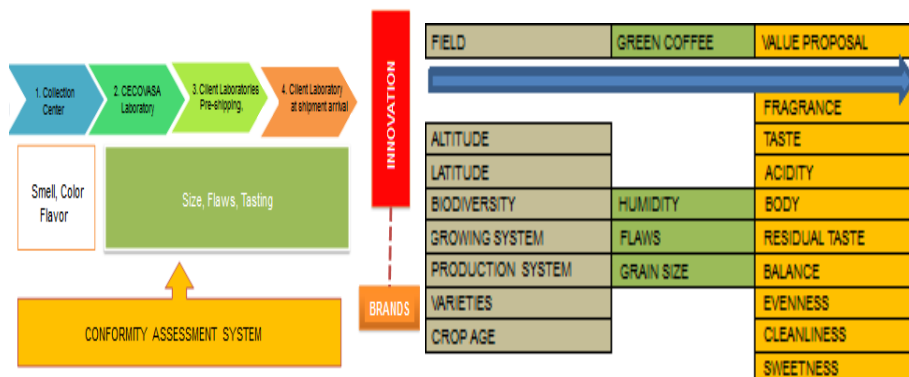
### **6.4.3 Aspects to Consider for Conformity Assessment**

It is important to consider that, before entering standardization CECOVASA had to organize in such a way that in the last four decades it has developed in stages. CECOVASA started to improve coffee quality substantively to offer it in Fair Trade since 1993.

The mechanism for control or conformity assessment started with the first control conducted by the growers at the Collection Center, where the organoleptic analysis (odor, color, taste) is carried out. The quality team is formed from 6 collectors plus one head of laboratory. They are all trained. Four have received international trade training and are SCAA-certified. Once the sampling is approved, in terms of humidity, size, and flaw characteristics, the taster tastes the roasted and ground coffee. The corresponding Quality Certificate is then issued, which is a very important document for the control of the Union of Cooperatives, but it is not determinable for the clients, who conduct their own testing.

It is worth clarifying that, for a conformity assessment laboratories with accredited testing still don't exist in Peru. CECOVASA strives to keep its clients' trust and carries out this practice through its own methods, metrological, and calibration practices. It is mindful of certifying its tasters (end-product). These same tests are conducted by the clients' laboratories and, to this current date, CECOVASA's system works as far as the results are concerned, and speed, which is what the clients require.

CECOVASA's greatest support comes from its own persistence and from the alliances established through the technical support and international cooperation.



## 6.5 BUSINESS STRATEGY

### 6.5.1 Business Model

CECOVASA's business model involves two very important key groups, who must be satisfied: The clients and the partners within the cooperative. CECOVASA takes advantage of their competitive edge, since they generate value while satisfying both interest groups. The clients require that the products be of **standard quality and that they be certified under the organic denomination, and that they respect the environment and guarantee fair trade.**

Currently, CECOVASA is at a stage of strengthening and studying its commercial strategy, given that the quality of the product is already part of the organization's management system. Nonetheless, CECOVASA keeps seeking optimization and better use of the resources in the field, through innovation and compliance with standards, as well as logistics. CECOVASA seeks alliances with technical and support institutions that contribute to the value proposal provided to their clients.

### 6.5.3 Capacity for Innovation and Standardization. Competitive Edge and Innovation.

The development of technological innovation in the coffee sector has been linked to progress in product research. Hence, the following sequence: Being mindful of the quality produced, directly linked to innovating in the fight against pests to reach a higher level of productivity or yield per hectare; Application of organic fertilizers and pesticides, research on those fertilizers, as well as other methods for handling coffee trees; Genetic evolution in alliance with research centers; Organizational innovations regarding the agents who take part in the production chain (a lack of regulation in the coffee market was identified).

There are many initiatives already presented in the sector; hence the work group has identified several priorities for the Technological Innovation of the **Peruvian coffee sector,**

such as Infrastructure and specialized equipment for the coffee sector, Applied Research, implementing a specialized information system (ERP-based), Technological Surveillance, Coffee Germoplasm Banks, Specialized Training for trainers and extensionists, and Specialized Training for coffee tasters.

### **Standardization**

In the coffee sector, the need is to apply and improve the national standards **NTP 209.027: 2007 GREEN COFFEE. Requirements**, have been identified, so it would also be appropriate to design guidelines for the dissemination of good practices for growing, fertilizing, harvesting, post-harvest, etc.

From this standpoint, the objectives that are pursued through standardization are directed toward: Providing the guidelines that characterize the production of organic coffee; Promoting diversified systems for the production of coffee; Integrating an approach of social development and environmental conservation; and Integrating the criteria for diversified shades of coffee, those for organic coffee-growing and Fair Trade, all in a single certification system.

### **Competitive Edge**

CECOVASA's competitive edge covers several fronts: Organization, The use of standards and a conformity assessment system, Client and Market Awareness, Connection to sources of International Financing and Cooperation, Management Style, Continual Improvement and Innovation, Experience and Knowledge of Certification systems, Improvement and Standardization of production processes, Improvement of Quality Management, Development of environmentally sustainable technologies, Optimization of technical-productive processes, Implementation of good farming practices, and Improvement in the post-harvest stage. It is important to stress that these improvements have been accomplished without the presence of the State.

#### **6.5.4 Network Effect**

An increase in the demand for a product may affect positively or negatively the demand for that product on the part of other buyers. In the case of green bean organic coffee, the competitive strategy is differentiation, not mass production. At CECOVASA, the priority is to improve coffee sales prices before obtaining a greater number of clients. Compatibility is an important factor when speaking of the network effect. In this regard, it is not satisfactory for the market that a product, such as green bean organic coffee be produced in a single manner, only satisfying a given average demand. Instead, it is healthy for the market that there be different configurations offered for green bean organic coffee products (meaning that they are compatible), in such a way that it is possible to satisfy the demands of different clients.

As far as the market structure, the indirect effects of the network are similar to the market's balance mechanism. When an additional buyer joins the group of buyers, the selling group seems to win a marginal effect, that is, it attracts additional sellers. Inasmuch as CECOVASA has a better positioning in the market, it shall offer a greater variety of products, better made, with the possibility of the participation of other agents who benefit from the

business. Finally, the total and marginal effects from the additional sellers on the buyers group may be due to the indirect way of purchasing on the part of the additional buyer

### **6.5.5 Competitive Strategy**

There are two types of competitive edge that a company can have: Low costs or differentiation. The choice of either of these strategies shall depend on the company's weaknesses or strengths. CECOVASA's choice lies in the DIFFERENTIATION of its products, which has driven it to obtain international prizes, such as the latest one.

Its strength is the high quality of its beans (an average of ten flaws per bean, having also achieved a production with zero flaws), whose value proposal is positioning itself and strengthening it. To that effect, CECOVASA has developed certain aspects that are highly valued by their clients, chooses attributes that are perceived as important, and prioritizes satisfying those needs, the exclusiveness of which shall be rewarded with a higher price

## **6.6 CONCLUSIONS AND RECOMMENDATIONS**

- Strengthening its own conformity assessment system, which works to the satisfaction of its clients, using a proactive mechanism, as markets are ever-changing and demanding.
- Publicizing the fact that CECOVASA is recognized internationally and that the price it obtains for its specialty coffees is quite competitive; Taking advantage of its connection with International Cooperation, also to commercial ends.
- CECOVASA has an expertise earned in organic certifications, which nonetheless must be strengthened through good agricultural practices to increase its productivity per hectare, without resorting to the use of growth enhancers or conventional fertilizers.
- Highlighting the fact that CECOVASA's partners belong to the ancestral Peruvian Quechua and Aymara communities, who value communal work. These ethical values and behavior standards favor the integration of their members and limit idleness and fraud in both productive and commercial activities.
- The product differentiation fostered by CECOVASA rests on the standardization of its coffees, which has led them to innovating their products. For this reason, although their competitive strategy is differentiation, standards take on a supporting role in the creation of new products (Innovation). Moreover, the brands are differentiated according to the location, existing biodiversity, the ethnic groups who inhabit the area, etc.; these factors being the value proposal offered to clients, aside from the quality of the product and its certifications.

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<b>Fundamentals of Standardization and Conformance Assessment</b>	<ul style="list-style-type: none"> <li>● <b>APEC SUB COMMITTEE ON STANDARDS AND CONFORMANCE</b> – 2009 - 7th Conference on Standard and Conformance. Cusco - Perú</li> <li>● <b>PERUVIAN COMPETITION AND INTELLECTUAL PROPERTY PROTECTION INSTITUTE - INDECOPI</b></li> <li>● <b>GP 001:1995</b> Directives for the Drafting, Restructuring and Presentation of the Peruvian Technical Standards</li> <li>● <b>GP 002:1995</b> Guide for Presenting Peruvian Printed Texts of Schemas, Projects, and Technical Standards.</li> <li>● <b>GP ISO/IEC 2:2007</b> Standardization and Related Activities. General Vocabulary. 3d edition.</li> <li>● <b>GP ISO/IEC 21-1:2007</b> Regional or National Adoption of International Standards and Other Products of International Standardization. Part 1: Adopting International Standards.</li> <li>● <b>GP ISO/IEC 21-2:2008</b> Regional or National Adoption of International Standards and Other Products of International Standardization. Part 2: Adopting Other Documents Resulting from Different International Standards.</li> <li>● <b>GP ISO/IEC 51:2008</b> Safety Aspects. Directives for Their Inclusion in the Standards.</li> <li>● <b>GP ISO/IEC 59:2008</b> Code of Good Practices for Standardization.</li> <li>● <b>GP ISO/IEC 15:2008</b> Code of Principles for “standards References”.</li> <li>● <b>GP ISO 64:2008</b> Guide for the Inclusion of Environmental Aspects for Product Standards. 2<sup>nd</sup> ed.</li> </ul>
<b>Impact on the Micro and Macro Economy. The Legal Impact.</b>	<ul style="list-style-type: none"> <li>● <b>APEC. Standardization: Fundamentals, Impact, and Business Strategy.</b> APEC Sub- Committee on Standards and Conformance. Education Guideline 3 – Textbook for Higher Education. Chapters 4 and 5.</li> <li>● <b>Quality Systems and Standards Toward Building a Competitive-Edge.</b> Guasch, J., Jean-Louis Racine, Isabel Sánchez y Makhtar Diop (2007) World Bank..</li> </ul>
<b>Business Strategies and Innovation to Undertake Trade.</b>	<ul style="list-style-type: none"> <li>● <b>“Standardization: Fundamentals, Impact, and Business Strategy”</b> Heessang Lee, Sungkunkwan University. Korea</li> <li>● Research on the Innovation-promoting Policy for SMEs in APEC. Survey of Case Studies, 2006</li> <li>● <b>Successful Experiences of Innovation Management. Complementary Seminar at “Foro PYME APEC Chiclayo” (Peru)</b> , 26 August 2008 (Text and CD)</li> </ul>

## 8. APPENDIX 3 - STUDENT'S LIST AND PICTURES

### 8.1 STUDENTS AND LECTURES



#### A2.2 List of Students and Their Characteristics

N°	Profession	Academic Degree	Specialties	Work Experience
1	Systems and Computing Engineer	Master's	Chartered Engineer, Master's in Management Science specialized in Organizational Management. Second major in Information Safety and System Auditing	Full-time. Experience in the public sector in Information Systems Safety and Control.
2	Fisheries Engineer	Master's	Business Management Major. Specialized in Standardization and Quality Systems. Master in Business Administration.	Full-time. Experience consulting for businesses in the Food industry for the introduction of new products into the market.



N°	Profession	Academic Degree	Specialties	Work Experience
3	Chemical Engineer	Professional Degree	Specialized in Plastic Packaging.	Full-time. Experience in the Plastics and Ink sector of the Graphics Industry.
4	MD Pediatrician	Master's	Professional Degree. Master's in Organizational Psychology. Studies in Japan - Total Quality Management	Full-time. Experience in health services within State health businesses and institutions.
5	Business Administration	Master's	Specialist in Project and Quality Management. Master's in Management, Organization and Quality.	Full-time. Experience in consulting for service-sector businesses.
6	Public Accountant	Professional Degree	Chartered Public Accountant. Degree in International Accounting Standards NIIF.	Full-time. Professional Accounting Consulting services, with ample experience in taxes, accounting, auditing, and process improvement.
7	Industrial Engineer	Professional Degree	Postgraduate in Strategic Management and Human Resources. Specialized in Project and Quality Management.	Full-time. Experience in the industrial manufacturing sector and the garment and shoes sector.
8	Fisheries Engineer	Doctor	Professional Degree. Specialized in Information Technologies. Master's and Doctorate in Business Administration. Specialized in Information Technologies Auditing and Safety.	Full-time. Experience in businesses in the Information Technologies and State sectors.
9	Zootechnical Engineer	Professional Degree	Studies in Japan - The Quality Management Program for Latin America Training Program for Consultants in Provider Development.	Full-time. Experience in Projects that promote increase in competitiveness and productivity in businesses in the mining and finance sectors.
10	Food Industry Engineer	Professional Degree	Specialized in Total Quality Management and Productivity. Specialized in Quality Management Systems and Trials and/or Calibration Laboratories.	Full-time. Experience in the soft-drink and milk sector. Experience in the implementation of quality management systems.

N°	Profession	Academic Degree	Specialties	Work Experience
11	Economist	Master's	Bachelor in Social Sciences with Major in Economics Master's in Business Administration with Major in General Management.	Full-time. Experience in International Trade, market evaluation and financing foreign trade with Korean businesses.
12	Biologist	Master's	Master's in Public Health. Specialized in Quality and Safety Management Systems.	Full-time. Experience in auditing for quality-certifying companies.
13	Food Engineer	Professional Degree	Food Industry Engineering.	Part-time. Experience in product research and development.
14	Lawyer	Professional Degree	Customs Specialist.	Full-time. Experience in Customs.
15	Pharmaceutical Chemist	Master's	Postgraduate studies in Toxicology and Forensic Chemistry. Master Scientiae in Environmental Sciences.	Full-time. Experience is mainly in State entities: Health Ministry, Digesa, Essalud, and Ministry of the Environment.
16	Industrial Engineer	Master's	Master's in Finance. Specialized in Project and Quality Management.	Full-time. Experience in textile-sector businesses.
17	Environmental Engineer	Professional Degree	Chartered Engineer. Industrial Hygiene and Safety Engineer. Expertise in Occupational and Environmental Health.	Full-time. Experience mainly in Occupational Health and Environmental Health for State entities: Digesa, Inst. Nec. De Salud. Teaching at the Universidad Nacional de Ingeniería for the Environmental Engineering Department.
18	Physicist	Professional Degree	Degree in Quality Management. Studies in Quality Management in Trial and Calibration Laboratories. Studies in Metrology and Uncertainty in Measurement.	Full-time. Experience consulting for public-sector entities.

N°	Profession	Academic Degree	Specialties	Work Experience
19	Accountant	Professional Degree	Degree in Training for Consultants in the Technical Requirements for Access to US Markets. Specialist in Textiles and Garment Technical Standards.	Full-time. Mainly textile-sector businesses.
20	Food Industry Engineer	Professional Degree	Postgraduate in International Agricultural Trade. Specialist in Total Quality and Productivity Management. Quality and Food Safety.	Full-time. Experience in the agricultural, cattle sector, dedicated to dairy production.

# Ch.12 Management of Technology and Innovation Strategy: Quality Management and Standardization

**Economy** : Indonesia  
**University** : Trisakti University  
**Department** : Industrial Management  
**Students** : Master (21) \*all part-time students

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## 1. EXECUTIVE SUMMARY

This course was offered to Master level students in industrial management. The title was “Management of Technology and Innovation Strategy: Quality Management and Standardization”. Twenty- one of the students registered and attended this course (14 male and 7 female) ten students came from industry, such as Quality Assurance. Nine students were lecturers, and one was a businessman.

The main objective of the course was to have students learn and understand specific aspects of technology, innovation, and standards, including technology change as incorporated into the strategic thinking of a firm; technology change, and enhancement; and collaboration for technological standards and standardization and its effects on market expansion.

To enhance and enrich the quality of the course, three guest speakers were invited to present. Unfortunately, of the three guest speakers invited, only one came. Both guest speakers from industry could not attend because of their busy schedules. However, they have promised to come at another time even though this current course has ended.

Student feedback was obtained through a questionnaire with four main questions posed, namely: First, satisfaction with this course; second, the importance of standards in business

strategies gained in this course; third, satisfaction with the guest speakers; fourth, specific benefits gained from this course. The results showed that students were very satisfied (67.7 %) with the course, and more importantly, they agreed that their knowledge of standards strongly related to their job assignment (71.4%).

Active participation of students in the class was largely determined by their understanding of the concepts being delivered, then enriched with readings of scientific articles / journals. Course material was delivered before the lectures. In the group discussions, the students were enriched in their understanding of understanding of the lecture. They were very enthusiastic when participating in the group discussions, sometimes the hour of lecture time was exceeded by up to an hour.

In conclusion, standards for the course were a major part of the infrastructure that leads and supports efficient innovation. The focus of standards is on the impact of crisis on the market for products and services. Standards can affect innovation through various mechanisms. Standards form an important part of the framework and conditions for business and affect the possible routes to reach the market legally or validate the offered market. As a set of information, standards are necessary in order to disseminate knowledge and market acceptability and archive technical information to reduce uncertainty for both producers and consumers. Standards promote and enable the diffusion of technology into a form that is easily assimilated by any company with complementary capabilities to form and use the new method.

## **2. COURSE OVERVIEW**

### ***2.1 THE SYLLABUS***

#### ***2.1.1 Course Objectives***

In this course, students learn all aspects regarding technology, innovation, and standardization, such as technology change as incorporated into the strategic thinking of the firm, technology enhancement, and its effects on a firm's capabilities : Competitive advantage ; technological change and its effects on industry dynamics. The organizational implications of new technology (organizational structure, integration of people and technology) ; the advantages of collaboration for technological standards ; and the relationship between standards and innovation are addressed. Standardization affects market expansion and the advantages of collaboration to meet technological standards.

#### ***2.1.2 Course Timeframe and Characteristics***

- Start : 4/18/2011 – End : 7/28/2011
- Time of Class : 2 Credits (each class is 2 hours)

### 2.1.3 Syllabus – Class Planning

Table 1. Syllabus and Class Planning

Week-Date	Session Topic	Class Description	Readings
1 4/18/2011	Introduction to the course	Definitions and Functions  Role of technology and standards	APEC textbook Chapters 1,2, & 3
2 4/25/2011	Technology Environment	Technological environment in particular  The main actors in a technological environment  Major current developments facing firms in the technological environment	VK Narayanan Chapter 2
3 5/2/2011	Innovation and Diffusion	Dynamic diffusion  Attributes of an innovation can facilitate or hinder diffusion  Factors' driving the process of diffusion	VK Narayanan Chapter 4
4 5/9/2011	Technology and Competition	Consequences of technological change  Industry differences in terms of technological characteristics  Systematic patterns of industry dynamics triggered by technological change	VK Narayanan Chapter 5
5 5/23/2011	Standard and Innovation	The role of standards and innovation  Linkage standards and innovation	Guest Speaker

6 5/30/2011	Technology and Organization	The drivers of technological change for processes and organization  Major shifts in value chain configurations  Technological changes influencing the internal functioning of an organization	VK Narayanan Chapter 6
7 6/6/2011	Pre-Final		
8 6/13/2011	Technology, Innovation, & Standards	Discussion + Case Study	
9 6/20/2011	Standards Battle in Technological Innovation	Discussion + Case Study	
10 6/27/2011	Collaborative Strategy	Discussion + Case Study  Benefits and Effects of a Collaborative Strategy  Types of Collaborative Strategy and Organizing Them	APEC textbook Chapter 9
11 7/4/2011	Standardization and Competitive Strategy	Discussion + Case Study	Guest Speaker
12 7/6/2011	Technological Innovation Using Standardization	Discussion + Case Study	APEC textbook Chapter 7
13 7/11/2011	Business Model and Standardization	Discussion + Case Study	APEC textbook Chapter 8
14 7/18/2011	Market Strategy and Standardization <b>(1)</b>	Discussion + Case Study	APEC textbook Chapter 8
15 7/25/2011	Market Strategy and Standardization <b>(2)</b>	Discussion + Case Study	APEC textbook Chapter 8
16 7/28/2011	Term Paper Competition		

## 2.2 STUDENT CHARACTERISTICS

The Number of Students: 21 (14 male and 7 female) ; Student Levels: Graduate Programs; Student Majors: Engineering; Work Experience of Students: Part- time.

The majority in the school come from industry. Twenty-one students were registered and attended this course, of which ten came from such industries as Quality Assurance. Nine students were lecturers, and one student was a businessman.

## 3. OPERATIONAL STRATEGY AND CLASS SUMMARY

### 3.1 OPERATIONAL STRATEGY

The Masters in Industrial Engineering Program at Trisakti University has selected a Student-centered learning method as being more in line with those internal and external conditions that present challenges for students to make decisions effectively for the problems they face. Through implementation of student-centered learning, these students must participate actively and always challenged to have the critical power to analyze and solve their own problems.

An Innovative Learning Student Centered Learning model offers a diversity of learning method that requires active participation from students. The methods applied in this course were: (a). Information Sharing utilizing brainstorming, cooperative, collaborative, group discussion, panel discussions, symposia, and seminars; (b). Experience- Based Learning with simulations, role playing, games, and group meetings; (c). Problem- Based Learning to address and analyze case studies, tutorials, and workshops.

Evaluation criteria were the following : Mid- term examination (20%), final examination (30%), Team Project (20%), and individual presentations (30%)

Trisakti University does employ intermediate grades such as A- and B+. The following list illustrates this common practice:

- A: 4.00, A-: 3.67, B+: 3.33, B: 3.00, B- : 2.67, C+: 2.33, C: 2.00, C-: 1.67, D+ : 1.33

### 3.2 CLASS SUMMARY

Following are the details of each class session:

- Introduction to the Course

As the introductory class for the course, the main purpose of this class is to have students understand the relationship between technology, innovation, and standardization, the definition and function of standardization and its various functions, and the role of



technology and its standards. In addition, course descriptions, including the assignments for individual papers and group discussion and presentations, are given as well. Finally, reading materials, evaluation scale, and grading policy are reviewed.

- Technology Environment

This session helps students understand that changes in the technological environment may exist autonomously, or they may be induced by changes in other segments of the macro-environment. The influence of the political/ regulatory and economic environments is also another factor to identify within these changes. There exists a reciprocal linkage between the economic and the technological environments. Major technological innovations stimulate development; economic conditions, however, will exert a major influence on the pace and level of all technological change.

- Innovation and Diffusion

This session helps students understand that any diffusion of innovation is always associated with the community development process. Innovation is a starting point for social change and constitutes the core of community development. It is a process whereby changes occur in the structure and functioning of social systems. Social change occurs in three phases: (1) discovery (Invention), (2) diffusion (Diffusion), and (3) consequences (Consequences). Discovery is the process by which ideas / new ideas are created and developed. Diffusion is the process by which new ideas are communicated to members of the social system, whereas consequences refer to a change in the social system as a result of the adoption or rejection of the innovation.

- Technology and Competition

This session helps students understand that product and the process of innovations are two means by which the competitive game is played and either won or lost. These innovations enable firms (1) to erect entry barriers to competitors; (2) bring about product and process substitution; and (3) redefine the rules of competition where needed or desired

- Standards and Innovation

Guest Speaker: Dr. Bambang Setiadi (President of the National Standardization Body-62-21-5747043, [www.bsn.go.id](http://www.bsn.go.id))

Standards are a major part of the infrastructure that supports efficient innovation. These Standards focus on the impact of crisis in the marketing of products and services. Standards can affect innovation through various mechanisms.

- Technology and Organization

This session helps students understand that organizations that take advantage of technological developments will be subject to change. Change not only affects production capacity, but also the performance of staff. By leveraging technology, efficiency and effectiveness can occur. Technological change indeed influences the internal functioning

of an organization.

- Technology, Innovation, and Standards

This session helps students combine creativity with resources and the expertise of related technologies to develop new products or processes. These standards are based on the results of advances in technology and can deliver optimum benefit to the community.

- Standards Battle for Technological Innovation

This session helps students understand that dominant design comes from a broader appeal to customers and a broader market share for innovating and imitating companies as a de facto standard derived through competition.

- Collaborative Strategy

This session helps students understand that collaborative arrangements are visible in the appropriation and deployment of technology as new products and value chains and the marketing of that technology. All collaborative arrangements involve three types of risk: (1) loss of intellectual property, (2) competitive risk, and (3) organizational risk.

- Standardization and Competitive Strategy

This session helps students understand that establishing a standard is an early and sizeable investment to make to face the market. However, there is no guarantee that the innovative product will succeed in the marketplace. Still, whenever a new generation of standards is defined, a new market is also created, thus giving an opportunity for new players to compete and succeed.

- Technological Innovation Using Standardization

This session helps students understand that early standardization of products can encourage innovation in complementary technology and may promote subsequent incremental designs to perfect the origin of the technology. Dynamic standardization is an important enabler of innovation.

- Business Model and Standardization

The concluding session for this class explains that standardization alone does not guarantee market expansion. In the network product market particularly, coordination with complementary product manufacturers is required to complete a strategic standardization.

- **Market Strategy and Standardization (1)**

The conclusion offered in this class suggests that technology superiority through dominant design is needed to enter a market.

- Market Strategy and Standardization (2)

This concept helps students understand that standards are necessary to disseminate knowledge and market acceptability to contain technical information and reduce uncertainty for both producers and consumers. Standards promote and enable the diffusion of technology into a form easily assimilated by any company with the complementary capabilities to form and use the new method.

- **Term Paper Competition**

The aim of this competition is to improve students' ability to perform a critical review of related articles and demonstrate problem-solving abilities (abstracts of selected papers shown in 4.2.1).

### **3.3 KEY REFERENCE SUMMARY**

One supplementary textbook was distributed to the students in addition to the main textbook.

#### ***3.3.1 Introduction to Standardization (in Indonesia) - National Standardization Body (BSN, 2009)***

This book is used as the textbook for the undergraduate class to introduce standards and standardization issues relevant for Indonesia particularly.

The book has eight chapters:

Chapter 1 introduces the introductory philosophy of the standard, and its basic understanding, the historical development of standardization, the historical development of standardization in Indonesia, the purpose of standardization in general, the main principles of standardization, and the benefits of standardization.

Chapter 2 covers the standard scope of a standard, standard type, and system standardization.

Chapter 3 discusses development standards for the development of national standards, the basic principle of standard-setting, the formulation of SNI, the harmonization of international standards, standard structure, a standard arrangement, the verbal format use to express provisions, and additional general rules.

Chapter 4 addresses the standard application for the principle of application of standards, the application of SNI, the technical execution of ISO standards, examples of the application of standards, the impact of standards on commerce, and management system standards.

Chapter 5 contains the principle of conformity assessment for conformity assessment, testing, inspection, certification, accreditation, conformity of technical regulations, conformity assessment in Indonesia, signs of conformity, and control of trade-related technical regulations.

Chapter 6 introduces metrology, metrology and conformity assessment principles, the role of metrology, the SI unit system (The International System of Units), standard size, traceability and calibration, legal metrology, and the development and management of national measurement standards.

Chapter 7 covers the preliminary standard for economic benefit, the economic impact of standardization, benefit standards, and the impact of implementation of standards –these contents are all based on the standard classification of economic influence.

Chapter 8 offers a standard for innovation and understanding innovation and the role of standards, the role of standards in the innovation process, the dynamics of innovation, the characteristics of the standard, the spread (diffusion) standards, the creation of value through standards, and patents.

## 4. STUDENT ACTIVITIES AND FEEDBACK

### 4.1 STUDENT FEEDBACK

Student feedback was obtained through a questionnaire with four main questions posed, namely, first, satisfaction with the course; second, the importance of standards for business strategies in this course; third, satisfaction with the guest speakers; and fourth, benefits gained from the course. The answers from 21 students were as follows:

1) Overall, I am satisfied with this course:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
0	0	0	7	14

2) I now recognize the importance of standards of business strategies in this course.

Strongly Disagree			Disagree	Neutral
0	0	0	1	20

3) How much were you satisfied with the guest speakers?

Topics	Very Unsatisfied	Unsatisfied	Neural	Satisfied	Very Satisfies
Standards and Innovation	0	0	3	7	11

4) I gained a lot of benefit from this course regarding the following aspects.

Aspects	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Knowledge of standards related to my job assignment	0	0	1	5	15
Strategic importance of standards through utilizing business cases	0	0	3	8	10

As can be seen, students were very satisfied (67.7 %) with the course and more importantly they felt that their knowledge of standards did relate to their job assignments (strongly agree: 71.4%).

## 4.2 STUDENT ACTIVITIES

### 4.2.1 Individual Paper Assignment

This task aimed to improve students' ability at performing critical reviews of related articles and problem-solving abilities. Some selected papers (abstracts) will be presented as follows:

#### Paper 1: **Multi-level Standardization and Business Models for Cognitive Radio : The Case of the Cognitive Pilot Channel – Alwi Fauzi**

This paper discusses the inter-organizational process of international collaboration for the development of cognitive radio, intended as a basic change in the value of telecommunications networks, as well as changing the functional architecture, costs, and other value structures that will eventually be judged as the services are deployed as a network. The paper also analyzes the transition in telecommunications from linear standardization in the domain of formal standardization organizations. The process is very complex and multi-level, simultaneously involving the formal organization, informal bodies, and industry consortia. Further, the Cognitive Pilot Channel is developed to show how innovation in the telecommunications market is determined by complex interaction. It explores how the collaborative process between research, regulation, and standardization of the Cognitive Pilot Channel standardization for different platforms (i.e., IEEE SCC41 and ETSI TC RRS) can ultimately affect the deployment of such technologies as cognitive radio and networks and services enabled by the analysis of a business model exploration scorecard on several different models and revenue sharing for the divergent design choices of the CPC.

#### Paper 2: **Standardization Hinders Innovation-Anastasia Widyawati**

This paper determines empirically whether the standard-based management system can hinder the process of innovation in an organization. Some of the conclusions of this paper are as

follows: First, the absence of dependence of the management system standard on the innovation process are based on the characteristics of the organization.

Secondly, managers and the people involved in management system standards provide a statement that the standards do not hinder the process of innovation.

Thirdly, there was no difference in the perception that the management system standard was a barrier to the process of innovation by both depending on the number of management system standards that are implemented and the integrated management system standard.

Fourthly, level statements of management system standards inhibit the decreases in the innovation process when the standard management system is seen as being implemented in the future. Lastly, there is a contrast between the other variables in the standard management system that relate to the important view that management system standards inhibit the innovation process. However the difference is not significant.

### **Paper 3: Collaborative Knowledge: Cases of Small Medium Enterprises (SME's)- Akbar Gunawan**

Modeling method in enterprise engineering has been often applied to integrate the enterprise system, for intra as well as inter- enterprises. The modeling method of many frameworks and the existing methodology has focused on single enterprise manufacturers, so it needs to be adjusted. The current research is intended to develop a modeling method used to model knowledge collaboration for an industry cluster based on the HEMO modeling framework (Holonc Enterprise Modeling Ontology). Modeling analysis uses IDEF0, IDEF5, and FGD tools. To implement a modeling method, it is chosen as a rattan cluster in Trangsan, Gatak, Sukoharjo. The research findings show that a cluster concept or industry center can be approached using the Holon concept that exists in the HEMO modeling framework.

The HEMO modeling framework has been adjusted to be a HEMO-Cluster and, together with the stance knowledge concept on knowledge management system, can be used to model knowledge collaboration for an industry cluster/ center. The implementation result is able to depict knowledge collaboration through activity modeling on the cluster. Modeling done in this fashion provides a compass and media of documentation for collaboration, so that tacit as well as explicit knowledge and other intangible activities of the industry cluster/center can be identified and created, then documented, structured, easily traced, distributed and reused through both documentation and discussion.

#### **4.2.2 Group Discussion**

Group discussion is aimed at improving students' ability to communicate, interact, and cooperate in developing their knowledge (*knowledge sharing*). Some topics selected from the group discussions were dedicated as follows :

##### **Innovation and Standards – Group Discussion 1**

This group discussed Technology innovation; Standards for Technology Innovation; and IT use of Standards. The results of the discussion were: *First*, standards can be the baseline for

any innovation. *Second*, innovation is dynamic, and standards control the dynamics of an innovation. *Third*, a standard interface allows a firm to make its technology compatible with that of other producers while still concealing the mechanics of the core functionality.

#### The Benefits of Collaborative Strategy – Group Discussion 2

The results of this group discussion were *First*, companies are required to use more advanced technology, so hopefully these technologies will result in innovative products whereas these products will have their own advantages compared with similar competing products, *Secondly*, technology is needed for creating more value of new products and attract consumers asking for these products.

#### **Business Model and Standardization – Group Discussion 5**

The results of this group discussion were *First*, business model and standardization are closely related, and in general should have a standard business model in order to run its business in accordance with community needs. *Second*, innovation and standardization activities will encourage a business or an established business model of a specific innovation model to follow market development and increase the competitiveness among businesses.

## **5. LESSONS LEARNED**

### **5.1 COURSE DESIGN**

Innovation and standardization is an interesting topic and very important to convey to these students, especially at the Master's level. Unfortunately, the time delivery is very limited (only one semester and two hours per week). Learning from this experience, it is recommended that innovation and standardization can be not also topics but a course or even an Institute for Innovation and Standardization. Economies in the Asia Pacific region should propose establishing this program. Further, the submitted materials should be tailored to cases that apply to the economy concerned, such as the development and application of standards for Small and Medium Enterprises (SMEs).

### **5.2 COURSE OPERATION**

In general, these lectures were conducted in two parts. The first part explained the concepts related to lecture material (lecture method or one-way communication). The second part related to cases in discussion groups (two-way communication). Innovation and Standardization will be more interesting and important if it is also practiced in real life. Therefore, it is advisable to create an applicable course, such as giving students the opportunity to do practical work (about one month) in the industry that has implemented the standard.

### 5.3 STUDENT PARTICIPATION

Active participation of students in the class is largely determined by their understanding of the concepts being delivered, then enriched with readings of scientific articles / journals. Course material should be delivered before the lecture is delivered. In group discussions will enrich the students' understanding of the lecture. These students were very enthusiastic about participating in group discussions, sometimes even the discussion hours exceeded an hour.

### 5.4 STUDENT EVALUATION

Grading was based on the mid-term (20%), final exam (30%), the team project (20%) and paper, and individual presentations (30%). All participants were enrolled, 21 students and actively attended classes – fifteen students showed 100% attendance rate, four students showed 80% rate, two students showed 70%. The results of the evaluation at the end of the course were delivered, so that all participants passed. These evaluation details are as follows: A (5 students); A- (15 students), B + (1 student). Although the level of attendance and student evaluation showed satisfactory results, it is recommended that the course have a uniform evaluation system among all colleges/institutions that organize this learning.

### 5.5 TEXTBOOK UTILIZATION

Lectures were delivered by using references decided as mandatory (two references). It is recommended to use other references as well, such as the *Introduction to Standardization*, published by the National Standardization Body (BSN, 2009) to enrich students' knowledge still further. It is recommended to put a book on *Standardization* together. Another important aspect to consider in making these books is the local wisdom of each economy when developing its standardization

### 5.6 PRACTICAL COMMENTS FOR FUTURE COURSES

As an additional reference, *Introduction to Standardization* published by the National Standardization Agency (BSN, 2009) is recommended for reading by students before the class begins. This book helps students learn the early stages of standardization. BSN has facilitated in providing this book, distributed free to students. Some important topics that need to be added included intellectual property strategy, standards and the value chain, and community participation for developing standards activities. It is recommended to establish an education forum for Standardization (APEC forum for Standardization) to develop further education goals and practices for Standardization learning.



## 6. APPENDIX – INSTRUCTOR’S SPECIAL ESSAY ON EDUCATION ABOUT STANDARDIZATION

*Syamsir Abduh<sup>1)</sup> Nunu Wisnuaji<sup>2)</sup>*

<sup>1,2</sup>Trisakti University-Indonesia

Thinking about the process of education for Standardization is presented in the Appendix, based on the experience of Standardization taught at several universities in Indonesia with special attention paid to local wisdom. The title is *The Integrated Dounsoni Competency Toward Sustainable Development in Standardization* by **Syamsir Abduh and Nunu Wisnuaji**

### 6.1 BACKGROUND

As the call for relevance in higher education opens the doorway from the classroom to the community, creations and innovations to provide viable academic exercises within this context are being sought by increasing numbers of faculty and administrators. One of these is the adoption of Dounsoni, a local wisdom -based educational principle to extend our vision of higher education as a required competency a graduate must meet. It is simply put a three- bound principle that says *Ing Ngarso Sung Tulodo, Ing Madyo Mangun Karso, Tut Wuri Handayani* (Dounsoni is abbreviated in this work) that guides one’s moral, attitude, and behavior in social life toward the accomplishment of sustainable development goals. Rooted to such an educational vision is the question of how best faculty can translate this wisdom into teaching and learning activities that begin with course design writing and move on to both implementation and evaluation. In order to have a meaningful teaching- learning process that is gear toward the enhancement of education quality, endeavors are needed to standardize the teaching-learning program based on the local wisdom principle .

### 6.2 PROGRAMME OBJECTIVE

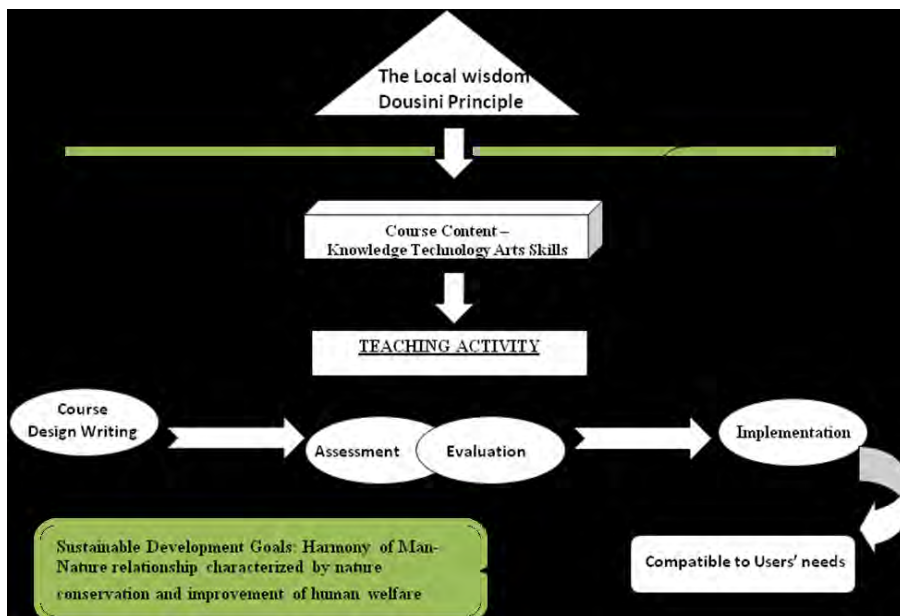
This programme of standardization for teaching learning practice that begins with course design writing is aimed at helping higher education institutions have independence of the learning outputs as ready agents within the concept of sustainable development in terms of compatibility, interoperability, and quality.

### 6.3 PROGRAMME CONTENT

The Dounsoni principle is a philosophical basis for the orientation of a student-centered, teaching-learning activity in which education is viewed as a cognitive process of placing a learning participant with his/her intrinsic potential to lead in an environment motivate and help others in finding truth through a variety of reliable optimal routes when exposed in non-optimal states. This potential possession to lead a group will require an individual to have the ability to

be a model to follow by motivating and helping other members to accomplish common tasks or goals. This concept is a set of principles defined as the Dounsoni competency that becomes the main goal of education, namely, what any learning output needs to possess in order to have his/her mastery of academic content defined as the means or instrument to discover the truth. Thus, there is an integration of the Dounsoni principle and the academic content. To approach such a vision, the role of instructors is mainly to facilitate the learning when delivering knowledge, skills, and information, and it goes without saying also perform the Dounsoni principle when carrying out his/her duties and responsibility.

This is it then. The principle constitutes the orientation of teaching activity, from course design to course implementation and evaluation. The following illustrates how local wisdom is applied in academic exercises to yield meaningful learning and bringing individual awareness that the goals of sustainable development can be accomplished only if the individual participates in the process (see Figures below).



### Dounsoni- based Course Design Writing

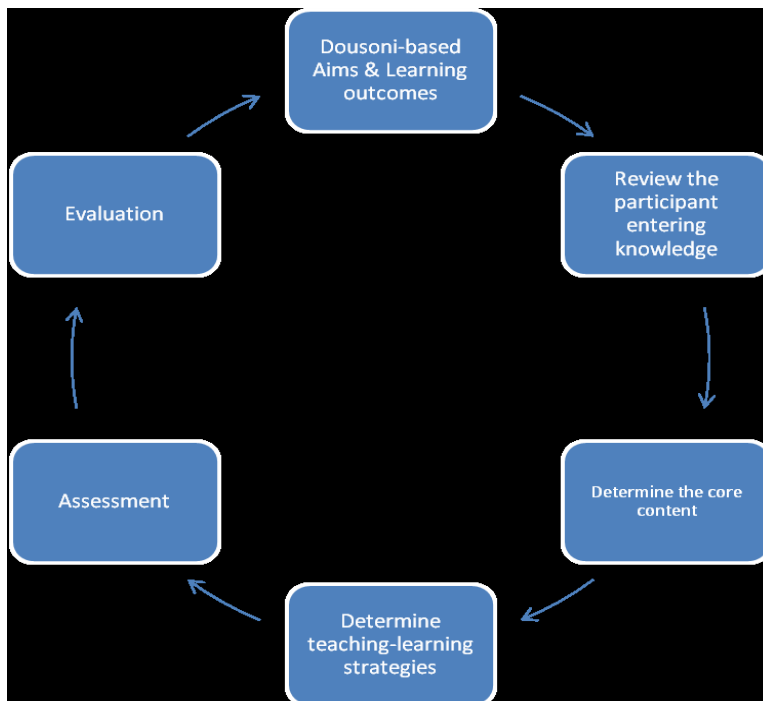
Course writing is a cyclic process that involves (see figures below):

1. Definition of aims and learning outcomes

*Aim:* Dounsoni principle-based Statement of Intent or Purpose

*Learning Outcome:* Specify what individual learning participants should have after completing the course

2. Review the participants' entering knowledge, prior learning experience, learning styles and needs, motivation for doing the course. Revise aims and learning outcomes, where necessary
3. Determine the core content needed to deliver the desired learning outcomes,
4. Determine precise teaching-learning strategies that will support and reinforce the course statement of intent.
5. Assess to measure the learning achievement accurately and precisely
6. Continual and ongoing evaluation of all aspects of the program (materials, time allocation, teaching techniques, etc.)



## 6.4 MONITORING AND EVALUATION OF RESULTS

A small- scale local project on the improvement of teaching methodology was carried out in the academic year of 2005/2006. Participated by fifteen faculty members from different schools, the project aimed at re-adopting older educational principles, which Dounsoni, thought to be local wisdom, into teaching practice, ranging from course design writing to implementation to evaluation. This effort was based on a need analysis of the output users as stakeholders, both public and private. The bulk of the demands on the output qualification put importance on leadership and the possession of a sustainable mind frame.

Albeit, most of the project participants had no previous pedagogic training, they could still manage the adoption well due to their familiarity with the principle of local wisdom and our peer review program in course design writing held during academic recess. Additionally, peer class observation, discussion and evaluation helped implement course design. The result was first that the local wisdom -based- teaching learning implementation product is compatible with users' needs to step toward sustainable development goals. Second, was its simplicity and ease of following the teaching-learning procedure, which is duplicable into the various teaching-learning programs. Third was the knowledge that the local wisdom-based teaching-learning pattern does improve meaningfulness and the quality of the learner's knowledge journey in higher education.

## **6.5 MAJOR ACHIEVEMENTS, INCLUDING PERFORMANCE INDICATORS**

The major achievements gained from program implementation were:

### *A. For the education institutions*

Enjoying reputation and more trust from stakeholders by improving output quality, the average number of learning participants in one class was 40 to 45. Before the program implementation, only 20 % of participants could complete their education on time and 5% occupied discipline- related jobs, 14 % worked in unrelated areas, and 1% were involved in entrepreneurship, After the implementation, 15 % completed their education over time, and 46% did so on time, while 55% occupied their discipline- related job market, and the rest decided to undertake entrepreneurship.

### *B. For the learning participants*

The learning participants had a meaningful and humanistic learning experience and were given opportunities to exercise leadership by applying science, knowledge, and theories in actual practice.

### *C. For the faculty members*

The faculty members found new ease in facilitating their learning participants and helping them develop their expected competencies. More and more faculty members now apply the principle into their teaching-learning programs.

## **6.6 FUTURE DEVELOPMENT**

The goal will be to develop this project into greater national and wider scales through research and workshops, applying the theme, Dounsoni Standardization for Higher Education.

# Ch.13 Business and Global Standardization

**Economy** : **Japan**  
**University** : **Waseda University**  
**Department** : **Graduated school of Global Information and Telecommunication Studies**  
**Students** : **Master(98) + Bachelor (54)**

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## 1. EXECUTIVE SUMMARY

This course was offered to students taking undergraduate courses and graduate courses and majoring in information and telecommunication. Students belonged to the Graduate School of Global Information and Telecommunication Studies and Computer Science and Engineering at Waseda University and Osaka University, respectively. The lecture was transmitted through an Internet video teleconference system because the campuses are distributed in a wide area in Japan. The locations of the lecture are two campuses in Tokyo, one campus in the Saitama Prefecture and one campus at Osaka University in the Osaka Prefecture. The total student attendance was 152, including 120 students belonging to the Graduate/Undergraduate course in the Faculty of Science and Engineering at Waseda University, 26 students belonging to the Graduate School of Global Information and Telecommunication Studies, and 12 students at Osaka University. Of these, 20 students were foreign students, and the others were Japanese. The lecture was given in Japanese and/or English. The lecturers were professors from Waseda University, the Japanese Standard Association and the National Graduate Institute for Policy Studies.

The main objectives of the course was to deliver to students the overall aspects of standards for domestic and international standard institutes, fundamental knowledge, the process of standardization activities, the relationship between IPR and standardization, and the

relationship between business and standardization. In the lecture, specific examples of cellular communication, namely, iPS and IPTV, were also introduced.

Nine guest lecturers were invited to enhance the quality of the lectures. Most were invited from the Japanese Standard Association. They are professional members and involved in standardization activities and they have a lot of experience with standardization activities. For example, Dr. Masaya Tanaka was President of ISO. Dr. Hiroaki Ikeda was Professor of National Chiba University and had lot of experience giving lectures on standardization. Dr. Kouich Sumikura of the National Graduate Institute for Policy Studies is contributing iPS for standardization and he gave the current status of iPS in global standardization. Dr. Takaharu Nakakuki and Dr. Tomoko Nomura gave lectures about Europe and US standardizations associations. Dr. Kyouko Sato gave a lecture on ISO9000, ISO14000 etc... These lectures covered wide standardization areas, including not only telecommunication and information technologies, but also other industrial technologies.

Grading was evaluated using mid-term examinations. Four lecturers gave reports to all students and evaluated the reports of all the students individually. It was determined that most of the students were satisfied with the contents of the lecture based on the evaluations on a questionnaire.

Overall evaluation of this lecture is useful to give fundamental knowledge on standardization activities. This lecture is also useful for enlightening the role of standardization for business as well as for our live. After this fundamental lecture, advanced standardization lectures will be required. In the future, we have a plan to give advanced lectures in this area also.

## **2. COURSE OVERVIEW**

### **2.1 SYLLABUS**

#### ***2.1.1 Course Objectives***

This course intelligibly presents the activities of the international standardization committees and the patent pools of IPR issues. This lecture also clarifies the role of standardizations on the influence of economics and business activities. This class invites lecturers who are leaders and contributing to the standardization committees on information communication technology, the next generation Blu-ray, Securities, Semiconductor, IPTV, iPS or Batteries, etc. This class is authorized by credits earned before matriculation and subjects of other graduated schools. This class is also programmed to meet the objective of planning/IPR/standardization and the engineering and business departments of companies.

#### ***2.1.2 Course Schedule and Class Characteristics***

- Start April 1 2011—end was July 2011
- Times and credits : Two credits (each class is 90 minutes)

### 2.1.3 Syllabus – Class Planning

No	Lecture Title	Lecturer	Outline
1	Importance of Standardization in Society (Introduction)	Dr. Hiroaki Ikeda [Japanese Standard Association]	Understanding the importance of standardization, public standardization organizations and new study items from the viewpoint of global standardizations.
2	Principles of Standardization	Dr. Kiich Fukuda [Japanese Standard Association]	Understanding the current change of thinking for standardization activities as well as the role of standardization and fundamental knowledge of the global standard.
3	Standardization and Certification Rule	Dr. Masaya Tanaka [Japanese Standard Association]	Understanding the outline, role, and application of the certification system for standardization activity.
4	Standardization and IPR	Dr. Sadao Takeda [Japanese Standard Association]	Proposing the example of the relation between IPR and standardization and understanding the importance of standardization as a business tool and the process of a patent tool.
5	Business Strategy and Standardization	Dr. Hitoshi Yoshida [Japanese Standard Association]	Understanding standard utilization in the business society.
6	Business Strategy and Standardization (Case Study: Cellular System)	Dr. Takuro Sato [Waseda University]	Understanding study examples of for business strategies supported by standardization activities.
7	Business Strategy and Standardization (Case Study II : iPS standardization)	Dr. Kouich Sumikura [National Graduate Institute for Policy Studies]	
8	Business Strategy and Standardization (Case stud III : IPTV)	Dr. Wataru Kameyama [Waseda University]	
9	Standardization in new study cases (CSR,BCP etc.)	Dr. Shouichi Kurosawa [Waseda University]	Presentation of CSR, BCP (Security) as new study items in ISO and understanding the wide knowledge of standardization activities.

No	Lecture title	Lecturer	Outline
10	Outline of Consortium · Forum Standard	Dr. Sadahiko Kano [Waseda University]	Understanding the relation of ISO IEC and JIS in De Jure and forum standards on information communication technology.
11	Standardization Organization in Foreign Economies	Dr. Takaharu Nakakuki and Tomoko Nomura [Japanese Standard Association]	Understanding standardization activities in Europe and the US and allocation of standardization given by administration
12	Certification Rule(ISO 9000, ISO14000, etc)	Dr. Kyouko Sato [Japanese Standard Association]	Understanding current status of ISO 9000, ISO14000, etc. and standard application by the private sector
13	Application of Standardization by Administration	Dr. Hajime Arai [Waseda University]	Understanding the relationship between role and standardization by introduction of examples of administration and importance to private self- management.

## 2.2 STUDENT CHARACTERISTICS

Most of the students were studying information and telecommunication technology. As indicated in the executive summary, the total number of students attending the class was 152, including 120 students belonging to the Graduate/Undergraduate program in the Faculty of Science and Engineering at Waseda University, 20 students in the Graduate School of Global Information and Telecommunication, and 12 students from Osaka University. Out of all the students attending, 20 students were foreign students, and the rest were Japanese students. In the class, three kinds of students studied the lectures. The first kind of students were in a preoccupation class for their Master's course. They were faculty students. The second kind was major students. They were also faculty students. The third was students in the Master's course. This class was organized by the graduate program in the Graduate School of Global Information and Telecommunication Studies.

## 3. OPERATIONAL STRATEGY AND CLASS SUMMARY

### 3.1 OPERATIONAL STRATEGY

The class operational strategy was to give fundamental and wide knowledge about standardization through the lecture style. The theme of each lecture and speaker was changed



for every class because standardizations have links with the broad business world, and standardizations have relationships with many institutes. On the other hand, professional and experienced people were asked to present lectures in standardization. In these lectures, many guests with a lot of experience in standardization were invited to be lecturers. This class was announced for undergraduate students as well as Master's students. The class was opened to business people. Therefore, the contents of class were preliminary or middle level education. The students attended this lecture on several campuses at different locations. Therefore, a distance learning system was also prepared for the lectures. There are four campus located on the Nishi-Waseda campus in Tokyo, a Waseda campus in Tokyo, a Honjo-campus in the Saitama Prefecture and also Osaka University in the Osaka Prefecture. The main center for providing the distance learning is the IT center located on the Waseda campus in Tokyo. Class grading was based on report evaluation done by each speaker.

### 3.2 CLASS SUMMARY

The details of each class follow below.

(1) Importance of standardization in society

(Introduction)

Dr. Hiroaki Ikeda

[Japanese Standard Association]

This lecture discusses the importance of standardization, public standardization organization, and new study items from the viewpoint of global standardizations. The outline of the lecture includes:

- a) Today's society
- b) Importance of standardization;
- c) Rules of standardization;
- d) Current and future study items regarding standardization

(2) Principles of standardization

Dr. Kiich Fukuda [Japanese Standard Association]

This lecture discusses the current change in thinking for standardization activities as well as the role of standardization and fundamental knowledge of the global standard. The outline of the lecture includes: follows:

- a) What is standardization?
- b) Role of standardization;
- c) Revolution in standardization activities;
- d) Fundamental knowledge of standardization.

(3) Standardization and the Certification Rule

Dr. Masaya Tanaka

[Japanese Standard Association]

This lecture discusses the outline, rule, and application of the certification system for standardization activities. The outline of the lecture includes:

- a) Relationship between standardization and R&D;
- b) IRP, standardization, business completion, production specification, and trade.

(4) Standardization and IPR

Dr. Sadao Takeda

[Japanese Standard Association]

This lecture discuss standard utilization in business society. The outline of the lecture includes:

- a) IPR; b) Relationship between standardization and IPR; c) Patent pool; d) Patent policy of standardization organizations; e) Problems with patent policy; f) Solutions for patent policy; g) Summary

(5) Business Strategy and Standardization

Dr. Hitoshi Yoshida [Japanese Standard Association]

This lecture discusses standard utilization of standardization in business. The outline of the lecture includes:

- a) General drift standardization affairs in the world, significance of WTO/TBT;
- b) Importance of business activities and the approach to standardization;
- c) Organization of standardization.

(6) Business Strategy and Standardization

(Case Study I: The Cellular System)

Dr. Takuro Sato [Waseda University]

This lecture discusses the standardization activities for cellular systems including 2G, 3G, and the next generation cellular system.

(7) Business Strategy and Standardization (Case Study II : iPS Standardization)

Dr. Wataru Kameyama [Waseda University]

This lecture discusses standardization activates and the process for iPS in the world; the current status of business strategy; R & D, IPR, and standardization.

(8) Business strategy and Standardization

(Case Study III : IPTV)

Dr. Wataru Kameyama [Waseda University]

This lecture discusses standardization activities and process for IPTV.

(9) Standardization of new study items (SR, BCP, etc.)

Dr. Shouichi Kurosawa [Waseda University]

This lecture discusses CSR, BCP (Security) as new study items for ISO and wide knowledge of standardization activities.

(10) Outline of the Consortium • Forum Standard

Dr. Sadahiko Kano

[Waseda University]

This lecture discusses the relationship of ITU, ISO, IEC, and JIS in De Jure and forum standards for information communication technology.

(11) Standardization Organization in Foreign Economies

Dr. Takaharu Nakakukiand Tomoko Nomura [Japanese Standard Association]

This lecture discusses standardization activities in Europe and the US and allocation of standardization by administration

## (12) Certification Rule (ISO9000, ISO14000,etc)

Dr. Kyouko Sato [Japanese Standard Association]

This lecture discusses the current status of ISO9000, ISO14000, and standard application in the private sector

## (13) Application of Standardization in Administration

Dr. Hajime Arai

[Waseda University]

This lecture discusses the relationship between rule and standardization by introducing examples of administration and the importance of using private self-management.

### 3.3 KEY REFERENCES SUMMARY

In the lecture, three textbooks were provided by APEC and the lecturers. APEC text was distributed to every student and two textbooks were prepared for each lecture by the lecturers. Lecturers also prepared the supplementary materials. The texts were the following:

**3.3.1** 1<sup>st</sup> Textbook: *Standardization: Fundamentals, Impact, and Business Strategy* (APEC SCSC Education Guideline 3, Textbook for Higher Education).

This book presents general knowledge about standardization. The book was a commonly used text for all lectures.

**3.3.2** 2<sup>nd</sup> Textbook: *Textbook for Cooperate Business and Global Standards*. 300+ pages .

This text was provided as content for each lecture. The text was prepared by each lecturer. This text was distributed for all students via hard copy and soft copy on the website.

**3.3.3** 3<sup>rd</sup> Textbook: Individual materials provided by each lecturer

This text was provided to all students as supplemental material for each lecture.

## 4.0 STUDENT ACTIVITIES AND FEEDBACK

### 4.1 STUDENT FEEDBACK

It was difficult to obtain feedback data from all students to complete a total evaluation. The feedback was evaluated for students in the Graduate School of Global Information and Telecommunication Studies. As far as the results of the evaluation, students were satisfied with the class/lectures on the standardization.

A questionnaire was filled out after the course. As for the results of this questionnaire, 80-90% of students were satisfied with the lecture. The Questionnaire is shown as follows:

Question	Very bad	Bad	Neutral	Good	Very good
Q1. Is this course useful for your study ?	0%	0%	0%	10%	90%
Q2. Is this course useful for your work after entering a company in the future?	0	0	0	10	90
Q3. Is the course easy to understand?	0	0	0	80	20
Q4. Is the course's speech clear and were you able to hear the lecture?	0	0	0	80	20
Q5. Are the texts and materials easy to understand personally?	0	0	0	80	20
Q6. Were the contents of this lecture interesting for you?	0	0	0	10	90

## 4.2 STUDENT ACTIVITIES

The report items for student's assignment are shown below:

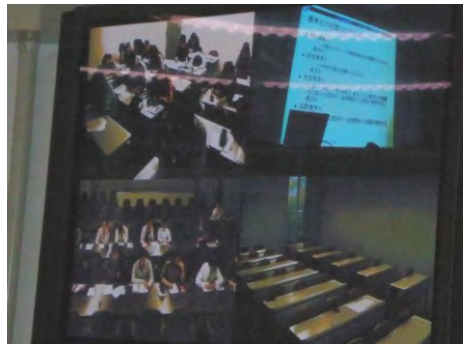
- 1) Describe the different activities taking place in standardization and research.
- 2) Describe objectives of existing study items of standardization activity and future study in standardization.
- 3) Describe an example of standardization for each standardization process.
- 4) Describe why standardization is important in the business field.
- 5) Describe the roles of government and business that precede standardization.

## 4.3 LECTURE SCENES

Actual lecture scenes are shown below:



Lecture on the Nishi-Waseda Campus



Distance Learning System in progress

## **5.0 LESSONS LEARNED**

### **5.1 COURSE DESIGN**

This course was designed for the purpose of providing students with general knowledge about standardization. This course is one of the standardization classes provided by Waseda University. This course has an especially strong relationship with industrial society based on ICT. Therefore, this course invited guest speakers from the Japanese Standard Association. Waseda University will prepare for another standardization lecture that focuses on ICT, which will begin next semester in 2011. Both courses will be constructed to work well together. This course design was effective to provide general knowledge as an introduction to standardization education.

### **5.2 COURSE OPERATION**

It was proposed that this course be distributed to four campuses through the distance learning system. Each lecturer was asked to organize the class on four campuses and a TA (Teaching Assistant) supported the operation of the class at each location. Since the course invited many guest speakers, each lecturer needed to know the prior lecture to maintain the commonality of all the lectures given for the full course. At the beginning of the course a guideline of lecture content was ready. Each lecturer was also able to confirm the lecture content of other speakers through a common server. This process was useful so as not to duplicate topics in different lectures. This course organization and operation was very good for both the lecturers and the students.

### **5.3 STUDENT PARTICIPATION**

This course was widely recommended for students in both undergraduate and graduate schools. Therefore, the total number of registered students totaled more than 150. This course was managed as a lecture style; however, discussion time was scheduled for students. Discussion between the lecturer and the students was accomplished through the distance learning system and by e-mail. These discussions were very useful to help students understand all the elements of standardization. This course was an effective way to give education about standardization to many students in different locations.

### **5.4 STUDENT COURSE EVALUATION**

An examination was required to evaluate the performance of students in this class. The evaluation criteria were different for the four campuses, because they each have different rules for evaluation. The evaluation was examined by reports shown in 4.2. As a result of the evaluations, around 30% of students acquired 60-69 points; around 30% had 70-79 points;

around 30% achieved 80-89 points; and around 10 % gained 90-100 points. The results of examination were good because 40 % of the students achieved more than 80 points.

## 5.5 TEXTBOOK UTILIZATION

In the lectures, it was recommended to use textbooks. The titles were *Standardization: Fundamentals, Impact, and Business Strategy* provided by APEC, *Cooperated Business and Global Standard*, issued by each lecturer, and individual supplementary materials provided by each lecturer. They were all very useful for studying standardization.

## 5.6 REFERENCES

- [1] *Standardization: Fundamentals, Impact, and Business Strategy* (APEC SCSC Education Guideline 3, Textbook for Higher Education).
- [2] *Cooperated Business and Global Standard* provided by lecturers.
- [3] Individual material provided by the lecturers

# Ch.14 Electronic Commerce and Standardization

- Economy** : Republic of Korea  
**University** : Yonsei University  
**Department** : International Management Program, Graduate  
School of International Studies  
**Students** : Master (18) \*multi-national students
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## 1. EXECUTIVE SUMMARY

This course was offered as a partial course in combination with a typical electronic commerce course. The students were all at the Master's level and majoring in business-related subjects. The course helps students understand concepts, business models and technologies, including standards and standardization, related to electronic commerce. Throughout the course, the instructor describes and explains current electronic commerce businesses and related notions (e.g. business models, convergence, smart phenomena, etc.) from the perspective of, standards and standardisation.

Eighteen students attended this course. The cohort was quite diverse. Out of 18, four students were on exchange program; the rest were Yonsei-enrolled. By nationality, nine economies were represented other than Korea: Argentina, Russia, Turkey, Thailand, Singapore, Netherlands, Australia, Finland, and the U.S. This diverse national background offered unique opportunities for discussing relevant issues based on their own economy cases.

Out of the 16 weeks, about one third or five weeks were allocated to standards and standardization. As standards and standardisation are a core notion of digital business and electronic commerce, standards and standardisation is the central focus of the whole course. The standards section was offered in combination with the EC section. Even when the conventional stuff on EC was lectured and discussed, its relevance to standards and standardization was still

highlighted and emphasized. The course was made up lectures (including guest lectures on standards) and student presentations. The students were grouped into eight teams, each team being two or three students. Each team made two presentations; one on a reading from each class and the other on a case writing assignment.

For case writing, students were encouraged to choose a case that was relevant to standards. As a result, the Finnish students chose the Nokia-MS alliance. The other topics included Smart TV and the smart grid. In dealing with these cases, standards and standardization was the lens through which the cases were both described and analyzed.

To maximize the students' exposure and learning about standards, an examination was also utilized. A long essay style-question was asked about standards, and the question was given in advance to help the students focus on the standards section. An innovative method was used. After the exam, the students were asked to submit a two-page report on the same question from the exam within three days. It was expected that the students searched further for ore information and supplemented and strengthened their exam answer. Thereby they were able to elevate their understanding of that topic. The idea was to give the students an opportunity to reflect again on their answers and related issues and thus deepen their overall knowledge. Students were overall satisfied with the class, particularly in that they were able to learn something that they had not learned before. However, they also gave constructive criticisms for future course development.

From the instructor's viewpoint, there was too much to teach and learn. Electronic commerce itself deserves one semester of 16 weeks. The textbook for EC is huge in volume. Although efforts were made to integrate the dual parts of EC and standards, it was not always successful. Therefore, when the course is offered as simply a partial like this course, guidelines for instructors need to be prepared so as to deal effectively with a five-week course. In terms of the APEC textbook, more information on which chapters to use and in what sequence needs to be given. Using these guidelines, future instructors will be able to avoid such comments from students as "a rather fractured picture of standards".

For effective education, course preparation should start well in advance, for example, it's important to secure guest lecturers' availability beforehand. Instructors should communicate with these lecturers regarding the content to be delivered by letting them know the whole curriculum and the structure of the course.

The two-part exam with the follow-up essay was found to be very effective in terms of student learning. By answering the same question twice, once on the exam and the second time in an essay composed to include revision and research, students did enhance their level of knowledge on the key aspects of the course. The instructor also found out that there were big developments from the exam answer that related to the essay content.

## **2. COURSE OVERVIEW**

This course is designed to help students understand contemporary digital business environments. Standards and standardisation are a core notion of digital business and electronic



commerce. As such, standards and standardisation is the central focus of the whole course although the standards section does take up about one- third of the course.

This course provides an introduction to the concepts and processes used in doing business electronically. The focus is on business, rather than the technical aspects of electronic commerce. The course will examine both business-to-business and business-to-consumer electronic commerce. Topics covered include convergence, broadband and mobile infrastructure, business models for EC, e-marketing, and more. Students also learn new trends in e-business including Web 2.0, social networking sites, Smart phone, Smart TV, smart work, cloud computing, and more.

Among others, standards and standardisation are increasingly important in electronic commerce, and all the topics above are related to standards and standardisation in some way and another. To understand and win the competition in electronic commerce and ICT sectors today, it is essential to know the standards and standardisation and how they work. For this purpose, the relationships between standards, innovation, strategies (competitive and collaborative) and intellectual property rights are highlighted in the course.

## **2.1 SYLLABUS**

### ***2.1.1 Course Objectives (Learning Outcomes)***

The course aim is to help students understand the concepts, business models, and technologies, including standards and standardization, surrounding all of electronic commerce. It also seeks to enable students to assess both the opportunities and the risks for those firms involved in electronic commerce.

After completing the course, students will be able to:

- Explain the basic concepts and technologies of electronic commerce and standardisation,
- Discuss organizational, business, and social issues of EC and standardisation, and
- analyse and evaluate EC businesses and standardisation strategies currently in practice

### ***2.1.2 Course Timeline and Course Characteristics***

Start: 3 Mar 2011 to 15 June 2011

The whole course runs for 16 weeks. The APEC standardization portion takes up about one- third of that time or FIVE weeks. Each weekly class lasts doe three hours.

### ***2.1.3 Syllabus – Class Plan (Structure of the Course)***

The course has four clusters as seen in the box below. Throughout the course, the instructor will describe and explain current electronic commerce businesses and their related notions (e.g. business models, convergence, smart phenomena, etc.) in relation to or from the perspective of, standards and standardisation. For this purpose, ‘Foundation of Electronic Commerce’

was delivered after the first cluster, and the first guest speaker was invited to give an introductory, although comprehensive, lecture on standards and platforms.

#### Cluster 1: Foundation of Electronic Commerce

In this cluster, basic concepts and definitions of EC are introduced. The cluster provides an overview of the implications of EC on the industry and market structure, EC applications, and basic EC technologies and infrastructure. The issues related to business-to-consumer (B2C) EC are covered here, including functions of market, e-marketing, and electronic payment.

Other topics include:- Convergence- Mobile commerce (e.g. location based services)- Broadband networks- Business models. Cluster 2: Business-to-Business Electronic Commerce

This cluster examines issues related to business-to-business (B2B) EC. In particular, the concept of supply chain and the problems associated with the traditional supply chain are explored. The bullwhip effect is learned by playing the beer game. Cluster 3: Current Issues in Electronic Commerce

This cluster deals with current issues, including Smart phone, Smart TV, SNS, cloud computing, Smart work, etc. Cluster 4: Standards and Standardisation  
Topics in this cluster include: - Economics of standards- Standardization and innovation- Competitive and collaborative strategies for standardization

- Platforms: A new basis of competition

Then many electronic and mobile businesses and competitions, both in B2C and B2B, were presented and discussed. Toward the end of the course, four lectures on standards and standardization were offered during which many of the applications and notions learned in the previous weeks were revisited and reviewed from the perspective of standards and standardization.

The sequence of these ‘standards’ lectures was as follows:

<b>Week 4</b> <b>29 March</b>	The Competition for Platforms and Standards: Mr. Y. Jung, Veyond Partners
<b>Week 12</b> <b>24 May</b>	Introduction to Standards and Standardisation (APEC Chapter 1): Mr. D. Choi, Korean Standards Association
<b>Week 13</b> <b>31 May</b>	Standards and Strategies: A collaborative Strategy (APEC Chapter 9): Professor H. Yang, Ewha University
<b>Week 14</b> <b>7 June</b>	Standardization and Innovation (APEC Chapter 7): Professor H. Lee, Sungkyunkwan University
<b>Week 15</b> <b>14 June</b>	The Economics of Standards: Professor H. Lee, Yonsei University

## **2.2 STUDENT CHARACTERISTICS**

Eighteen students enrolled in this course, all master level students. The cohort for this semester was quite diverse. Out of the eighteen, four students were on an exchange program; the rest were Yonsei-enrolled. Most were majoring in Business or economics. By nationality, nine economies were represented other than Korea: Argentina, Russia, Turkey, Thailand, Singapore, Netherlands, Australia, Finland, and the U.S.

This diverse national background offered unique opportunities for discussing relevant issues based on their own economy cases. For example, two students from Finland presented a case on the alliance between Nokia and Microsoft in the area of smart phones. They analysed their case from the perspective of standards and standardization.

Not all of the students had not been exposed (i.e. formally taught) to any issues regarding standards and standardization. Only a few were aware of its significance in terms of common sense through widely publicized examples of standards wars, such as IBM compatibles vs. Apple.

## **3. OPERATION STRATEGY AND CLASS SUMMARY**

### **3.1 OPERATION STRATEGY**

The standards section was offered in combination with the EC section. Even when the conventional material on EC was lectured on and discussed, its relevance to standards and standardization was further highlighted and emphasized. The course was composed of lectures (including guest lectures on standards) and student presentations. The students were grouped into eight teams, each team having two or three students. Each team made two presentations; one on a reading from each class and the other on an assignment of a case writing.

Certain readings were selected on the basis of their relevance to standards. As for the case writing, the teams were encouraged to choose a case that was relevant to standards. As a result, the Finnish students chose the Nokia-MS alliance. The other topics included Smart TV and the smart grid. When dealing with these cases, standards and standardization were the lens through which the cases were both described and analyzed.

To maximize the students' exposure and learning about standards, an examination was also utilized. A long essay style-question was asked about standards, made available in advance to the students to help them focus on the standards section. This time, however, a new innovative method was used. After the exam, the students were asked to submit a two-page report on the same question that was on the exam within three days' time. It was expected that the students would further searched out information to supplement and strengthen their exam answers. Thereby they would elevate their understanding of the topic. The innovation was designed to give the students an opportunity to reflect again on their answers and the related issues and deepen their total knowledge. Details of the innovation are given in Section 4.1 on student activities.

## 3.2 CLASS SUMMARY

The followings summarize the details of each class. **A. Competition for platforms and standards**

The guest speaker was a consultant specializing in TMT (telecommunications, media and technology) sectors. Today, the platform strategy is closely linked to standards. From the practitioner's point of view, the speaker gave plenty of examples for where platforms are used as the basis of standards strategies, including the battle between Android and iPhone. The students read the following two papers as preparation:

- Michael A. Cusumano, Technology Strategy and Management - The Evolution of Platform Thinking. *Communications of ACM* 53(1): 32-34 (2010)
- West, J., & Mace, M. Browsing As the Killer App: Explaining the Rapid success of Apple's iPhone. *Telecommunications Policy* 34: 270-286 (2010)

### **B. Introduction to Standards and Standardization**

This class was an introductory class on the subject of standards and standardization. Chapter 1 of the APEC textbook was the basic reading. The main purpose of this class was to have students understand standards and standardization, the history of standardization, the function of standardization, and its various functions. The guest lecturer guided the students from the basics of standards to several contemporary issues by giving many interesting examples from the long history of standards, including the QWERTY keyboard standard which was originally used in typewriters.

### **C. Standards and Strategies: A Collaborative Strategy**

As collaboration is one of the emerging business strategies in today's business environment, the collaboration strategy was presented, and students discussed how collaboration could be applied to technological standards. Various types of collaborations and the considerations to be addressed when creating an alliance were discussed. The author of Chapter 9 in the APEC textbook led the class:

Shapiro, C. and Varian H. The Art of Standards Wars. *California Management Review*. 41(2): 8-32 (1999)

### **D. Standardization and Innovation**

The relationship between standards and innovation was a key notion. It was discussed in terms of what circumstances of innovation and standards affect each other. Innovative technology does not always win the game of standards. The topic was also examined for how an innovative technology can become a market standard. Several examples were presented to facilitate the discussion. The author of Chapter 7 in the APEC textbook led this class.

## E. The Economics of Standards

This session was a wrap-up of the previous lectures. Many notions regarding standards and standardization which had been introduced and applied in the previous sessions were revisited and summarized. They include network effects (direct and indirect), platforms (two- or multi-sided), positive feedback, complementary and supplementary strategies, switching costs, lock-in, path dependency, increasing returns and related others. This session was led by the instructor of the course. The reading for this session was:

-- Hanseth, O. The Economics of Standards. Chapter 4 in *From Control to Drift: The Dynamics of Corporate Information Infrastructures* C. Ciborra and Associates. Oxford University Press, 2000.

### 3.3 KEY REFERENCES – A SUMMARY

West, J., & Mace, M. Browsing As the Killer App: Explaining the Rapid Success of Apple's iPhone. *Telecommunications Policy* 34: 270-286 (2010)

This paper examines the Apple's iPhone case. As this case deals with a contemporary topic of smart phones which are quite familiar to ordinary people including the enrolled students, it stimulated their interest. Although some of the content may be difficult for newcomers to this topic, I recommend it as a starting point, particularly for advanced students and doctoral students.

Hanseth, O. The Economics of Standards. Chapter 4 in *From Control to Drift: The Dynamics of Corporate Information Infrastructures* C. Ciborra and Associates. Oxford University Press, 2000.

This material is very informative on certain related notions of standards. It covers notions like network effects (direct and indirect), positive feedback, switching costs, lock-in, path dependency, and increasing returns in a compact way. Reading this short article, students gained an overall view of the economic aspects of standards.

Michael A. Cusumano, Technology Strategy and Management - The Evolution of Platform Thinking. *Communications of ACM* 53(1): 32-34 (2010)

Now standards are increasingly connected to platforms. This article gives students an easy-to-read introduction to platforms and helps students understand the relationship between the two, increasingly important notions to know to comprehend contemporary digital businesses or ecosystems. This piece is another good starting point for advanced students who are interested in analyzing today's business environment.

## 4. STUDENT ACTIVITIES AND FEEDBACK

### 4.1 STUDENT ACTIVITIES

#### 4.1.1 Group Assignment

Students were asked to complete a team project for writing a case. Each team consisted of two or three students. They were encouraged to select a case that had relevance to standards and standardization. Out of eight teams, however, only three teams worked on a relevant case.

The reports were submitted and assessed in two rounds. The first version was submitted and presented in the middle of the semester. Feedback on each paper was given, and students were then asked to revise and strengthen the paper, using the feedback given. Three of the cases were written on standards as follows:

- A. Joining forces to win platform wars: The alliance of Nokia and Microsoft B.
- B. Smart grids in the international energy markets
- C. Consumers' views of Smart TV

In these three papers, students employed the notions of standards and standardization as a lens through which they described, investigated and analyses their cases.

#### 4.1.2 Field Trip to 2011 World IT Show

The students went on a field trip to the '2011 World IT Show', held in COEX, the biggest convention centre in Seoul, Korea May 11~14 2011. The show consisted of five sections as shown below. Many of the items in each section had relevance and implications for a study of standards. The students were asked to find one item that had specific relevance to standards. In the next class meeting, we discussed these. It was very useful for the students to examine recent ICT developments and discuss their relevance to standards and standardization.

#### 4.1.3 Exam

The biggest portion of the exam addressed standards. The following two articles on Google's recent development of Google Wallet were given for the exam:

- A. Google Reveals Mobile Payment Plan (By Paul Taylor in New York and Maija Palmer in London Published: May 26, 2011 23:12) <http://www.ft.com/cms/s/2/e5d9e5ac-87df-11e0-a6de-00144feabdc0.html#axzz1Qqi4Ev6H>
- B. Android Mobile Wallet Service Planned for US (By Maija Palmer in London and Paul Taylor in New York Published: May 25 2011 19:46) <http://www.ft.com/intl/cms/s/2/5878dbb4-86f4-11e0-92df-00144feabdc0.html#axzz1Qqi4Ev6H>

Students were then asked to answer the following question.

**Question 1. Read the articles given and answer the following questions. (60 marks = 60 minutes)**

Why do you think Google chose MasterCard, Citigroup and Samsung Electronics as partners? Give a reason(s) for each. (15 marks) What is Google's business model for their new payment service? (15 marks) Will this new service succeed or not? By 'succeed', Google may mean 'widely adopted and used in a relatively near future in the payment market'. Based on what grounds do you agree? Justify your answer. In answering this question, you may include 'barriers for success' or 'conditions for success' in your discussion (30 marks)

Students with high performance were expected to use the notions from a platform and/or standards wars.

#### **4.1.4 Individual Essay on Standards**

Students were asked to write an individual essay on standards. As mentioned before, the same question from the exam was given for this essay, and three days were allowed to complete the essay.

Some students submitted a high quality essay that was much improved from their exam answer. Two of these are attached in Section 6.1 and 6.2. Some students also commented that this assignment was very effective for their own learning.

#### **Individual Essay on Standards**

You have read the articles about Google Wallet. Will this new service succeed or not? By 'succeed', you may mean 'widely adopted and used in a relatively near future in the payment market'. Based on what grounds do you agree? Justify your answer. In answering this question, you may include 'barriers for success' or 'conditions for success' in your discussion. In this part of the assignment, it is expected that you reflect on the answer you gave on the exam and deepen and strengthen it by further search and research on the topic from various sources, such as the media and the Internet, and by using what you have already learned (e.g. theories, frameworks, concepts, etc.) in this class or otherwise..

## **4.2 STUDENT FEEDBACK**

Written feedback was collected from all the students. The table below shows the positive and negative aspects of the standards section. Although there are certain aspects that do need to be improved, the overall responses of students were both positive and encouraging.

Positive Points	Recommended Improvements
<ul style="list-style-type: none"> <li>• “the two-part exam &amp; essay was a highly effective learning method, because it required the development of two different responses over a short period of time on the same topic”</li> <li>• “ the diversity among the topics</li> <li>• “a series of guest lectures was very helpful in terms of understanding its meaning in real world”</li> <li>• “was able to learn a lot about EC and standardization, something I was never aware of”</li> <li>• “textbook was useful in order to understand overall standardization”</li> <li>• “Varied approaches to a common subject helped to open up the different concepts, and multiple examples further drove the point home”</li> <li>• “Overall, the sessions were beneficial to widen the views of standard in various industries and businesses”</li> </ul>	<ul style="list-style-type: none"> <li>• “assigning a related article to read before coming to class or at the outset would help to provide a sense of prior knowledge”</li> <li>• “a rather fractured picture of standards”</li> <li>• “since most guest speakers do not know what we have gone through in class, they tended to give an introduction to the topic from the start”</li> <li>• “overlapping issues”</li> <li>• “It might be a better idea to post a specific question to both students and the guest speaker about an emerging issue e.g. about the Google wallet”</li> <li>• “lack of dealing with current issues”</li> <li>• “some aspects of the history of standards did not need to be emphasized as much”</li> <li>• “more emphasis on the APEC material”</li> </ul>

As can be seen here, students were overall satisfied and particularly in that they were able to learn something that they were “never aware of” earlier. However, they also did not hesitate to offer constructive criticisms. They correctly pointed some specific aspects that require improvement. Given that this course was being offered for the first time, some problems were likely unavoidable. In the next section, these issues are discussed from the point of view of both what was learned and how to use that new knowledge to improve future offerings of the class.

## 5. LESSONS LEARNED

### 5.1 COURSE DESIGN

There was too much to teach and for students to learn in this class. Electronic commerce alone deserves one semester of 16 weeks. The textbook for EC is huge in volume. Although efforts were made to integrate the two parts of EC and standards, that decision was not always successful. Therefore, when the course is offered as a partial as this course was, guidelines for instructors need to be prepared for what is to be dealt with in, say, a five-week course. When it



comes to the APEC textbook, information on which chapters to use in what sequence also needs to be given. Using these guidelines, future instructors will be able to avoid comments like “a rather fractured picture of standards”.

## **5.2 COURSE OPERATION**

This section is closely linked to the above one. The sequence of the guest lectures was supposed to be organized based on the pedagogical logic, that is, what follows is due to the nature of the contents delivered. In reality, however, the sequence was decided more often by the availability of the guest speakers than by the actual logical flow of the content being delivered.

Another typical problem with the guest lectures was also observed, namely repetitions by the lecturers of commonly understood and/or basic information.

To minimize the impacts from these common problems, future course preparation should start well in advance so as to leave time to secure guest lecturers' availability that matches the class material delivery. Also, instructors should communicate with the lecturers regarding the content to be delivered by them and let them know the whole curriculum of the course and where they fit into it.

## **5.3 STUDENT PARTICIPATION**

As suggested by some students, a specific question that relates a pre-set reading article should be given to both the students and guest speakers. Doing may generate active and positive interaction between the two. Also, it would be better if the article and lecture notes include precise and relevant examples from contemporary businesses, not just from classical and/or historical cases.

## **5.4 STUDENT EVALUATION**

The two-part exam and use of the follow-up essay was found to be very effective in terms of students' learning. By answering the same question twice, once on the exam, and the second time in an essay with additional and research, students could enhance their level of knowledge on the key aspect of the course. The instructor also found out that overall student produced considerable development in their discussion and analysis from the exam answer to the essay content.

## **5.5 TEXTBOOK UTILIZATION**

It was too much material to cover to have two textbooks, one for electronic commerce and the other for standards. Therefore, as suggested above, precise guidelines on what to cover need to be offered to those who will teach a partial course.

Supplementary readings that include recent examples can also raise the level of student interest and participation.

## **6. APPENDIX: STUDENT'S ESSAY ON GOOGLE WALLET AND STANDARDIZATION**

### **6.1 STUDENT ESSAY 1 ON 'GOOGLE WALLET AND STANDARDIZATION'**

**By Student: Mikko Rummukainen**

In the answer I gave for the question presented on the exam, I argued that Google Wallet would be a successful venture for developing a global ePayment standard. In my brief explanation, I referred to the fact that Google had already chosen and teamed up with a coherent, yet complementary, set of the biggest brands related to the necessities that each company applied to ePayments should prepare to deal with. These partners are Sprint, one of the biggest telecommunications operators based in the US; MasterCard, one of the world's two major credit card companies; Samsung, the world's leading mobile phone manufacturer and the biggest provider of Android Smartphones and finally, Citigroup, one of the world's major banks operating worldwide.

By choosing these partners to support Google Wallet, Google has already answered many of the questions related to what makes a new offered standard a winning one – one that will eventually become so widespread, if not ubiquitous, that it will leave all possible rivals (such as ISIS) very little room to compete for ePayment users.

Since these partners are the biggest players in their respective industries, they will already have contact with vast amounts of potential ePayment users. Furthermore, seeing as how the services offered by Sprint (connection), Citigroup (banking), MasterCard (credit card functionality), Google (cloud-based global access) and products provided by Samsung (devices) do offer a high level of convergence between services, access, and mobility, Google would have a very strong initial standing even before the actual war for the ePayment standard even truly began.

Additionally, while Google has developed a strong value proposition by offering consumers a more convenient and interchangeable payment method (that works online just as well as real-life transactions via one account), their apparent business model not only secures revenue streams for Google's partners by stronger contact with each other's client bases (critical mass or installed base as it were), but Google has planned its eWallet service to provide revenues to the company via advertising costs incurred from vendors and service providers interested in being a part of Google Offers.

The only substantial obstacles or hindrances to the success of Google Wallet would be: 1) possible legal complications with their older competitor PayPal, although given that company's approach to ePayments, Google would already be very far ahead of that competition with Google's focus on the 'mobile commerce'-side of electronic purchasing. 2) The threat of

entering competitors, such as ISIS or other regional competitors (i.e. competitors located in Europe or Asia specifically). As for the main competitive threat offered by ISIS, Google has two very strong competitive advantages – one their access to a huge amount of potential users capable of driving sales worth \$245B. worldwide within a few years, and the fact that the Google Wallet partnership is already launched while competitors are just appearing g. 3) Support from infrastructure, as NFC devices require compatible Point-of-Sales (POS) devices to work properly. As long as these POS devices are in a widespread manner, Google Wallet will have a much easier road becoming a standard; yet without the proper infrastructure, any perceived convenience of ePayments would not be fully realized in real-life transactions, and without Google Wallet would not be much different from services now provided by PayPal.

As for what industry experts say on the topic, regarding aspects I did not mention either in the exam or within this paper so far, other success or failure factors seem to have a uniform consensus among analysts and expert journalists.

Regarding success factors not yet mentioned, the consensus among industry experts points toward such factors as incentives offered to consumers using ePayment services (e.g. coupons or loyalty benefits) (Erich, 2011) or the variety of payment options offered or having backwards compatibility with existing devices (Smith, 2011). These will determine how widely used Google Wallet will eventually become.

However, there has been quite a bit of skepticism regarding how necessary or useful Google Wallet is at the moment just reaching/approaching both sides of *the market* – buyers and sellers, so to use NFC technology ubiquitously is a very substantial obstacle between Google Wallet's success and the current reality of how payments are handled (Daw, 2011). Furthermore, security is being continuously been raised as a strong point of concern, even though Google Wallet seemingly does have a built-in security system that prevents theft or fraud. Nevertheless, industry experts are not entirely convinced that Google Wallet can provide a sufficiently competitive level of security and privacy compared to more traditional methods of payment, such as cash and debit and credit cards (Daw, 2011; Smith, 2011).

Perhaps one of the most interesting success factors mentioned by the industry experts is effective target marketing in the initial phases. Marks (2011) wrote that “commuters are the people that will determine the success or failure of Google's nascent mobile wallet technology for cell phones.” What this opinion refers to is the fact that currently not everyone will find mobile payment methods especially necessary. Those who do, are by nature, circumstance, or convenience mobile themselves – e.g., commuters who spend long periods of time daily on different modes of transports and need a convenient method to make payments on the go and handle their finances.

In my opinion, this thinking seems to be missing from how Google Wallet has been introduced; thus, considering the *stages of new technology adaptation*, the *early adopters* need to be found in the market and decisively targeted to show the benefits of mobile commerce to the larger segments of any market. In the Google Wallet case, it would definitely be the commuters who are already open to mobile connectivity who would drive the initial demand for NFC-ready payment services.

To conclude, while Google Wallet does seem to be a very potential success, the partnership between Google and other major global brands still needs to define the initial target market and respond to issues regarding usefulness and security in order to truly win the public opinion on what this new ePayment standard can be.

### Comments on the Standards Section of this Course:

**Positives:** Varied approaches to a common subject helped open up the different concepts, and multiple examples and further drove these points home. Always fantastic to hear opinions and viewpoints of industry experts.

**Negatives:** Workshop-approach to guest-led lectures, more emphasis needs to be put on the APEC material (or disregard the APEC altogether and focus more on course materials) with less emphasis on student presentations within the standards section of the course.

### References of Section 6.1

Daw, David 2011. Google Wallet Reality Check: Experts Handicap Mobile Payment Plan. *PCWorld*. [http://www.pcworld.com/article/228838/google\\_wallet\\_reality\\_check\\_experts\\_handicap\\_mobile\\_payment\\_plan.html](http://www.pcworld.com/article/228838/google_wallet_reality_check_experts_handicap_mobile_payment_plan.html), accessed on June 20<sup>th</sup> 2011.

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## 6.2 STUDENT'S ESSAY 2 ON 'GOOGLE WALLET AND STANDARDIZATION'

Student: David S. Roberts

In writing *Economics of Standards* in 1998, Ole Hanseth described an *infrastructure* as an evolving shared, open, and heterogeneous installed base. Another author 30 years earlier defined it as a sub-structure or underlying foundation on which the continuance and growth of a community will depend (Guralink, 1970). Taken together, these two definitions describe Google Inc.'s latest platform innovation in e-commerce—the Google Wallet. Google Wallet makes savings for the consumer simple, storing many credit cards without the bulk. It is a radically new online and offline e-payment infrastructure (aka platform) that is bound to have success because of the strategies employed by Google and their partners. Google Wallet will succeed because it is a needed, shared, secure, yet open technology that enables cross-industry interdependencies. According to Hanseth and the course discussions in e-Commerce & Standardization, these linkages will produce deep ecological penetration for sustained growth over the long term. But first, there is a question to answer—is a new e-payment system even needed?

Digital commerce has been growing incredibly fast. In 2010, total e-Commerce sales totaled over 227 billion USD in the U.S., and by 2013, they are expected to reach 1 trillion USD. Just over a decade ago, 70% of the consumers in the U.S. said they would not use the Internet for purchases (Yankelovich, 1998). Yet, in 2009, ComScore, the digital market intelligence firm, found that 70% of U.S. consumers now access their credit card accounts via the Internet. Despite this growth in revenue and usage, e-Commerce still only makes up 8% of all retail purchases. This percentage is incredibly low, but it is expected that e-payment transactions will continue to grow considerably in the coming years. Thus, Google has now converged online and offline purchasing ability by devising the Google Wallet, which itself came about by the convergence and partnership of leaders in the finance, communication, and retail industries.

Aware of what disintermediation meant when past digital platforms removed traditional third parties in the value chain, Google's goal is to focus on intermediation by investing in technologies and platforms that help both consumers and merchants. The consumer side benefits of Google Wallet are in the digitization and aggregation of loyalty programs and receipts, as well as speedy check-out capabilities. On the sales side, merchants are being given the ability to produce location-based offers, transaction history offers, and varied incentives offered relative to the different spending levels of the consumer.

How is Google able to offer these new benefits? Google's innovative platform is based on NFC chip technology and mobile and banking infrastructures that build upon the ecology of the existing infrastructure by connecting and interrelating to prior platform models like Master Card's PayPass platform. Also, we know from the existing research that the vital combination of two or more infrastructures can present an ecology that meets the higher standards of sustainability than simply trying to work within a single infrastructure, i.e., Google were to have created Google Wallet from scratch (van der Heijden, 2008). By using the existing PayPass infrastructure, Google automatically began with an installed base of 120,000 terminals at the merchant level in the U.S., and 300,000 worldwide. The number of POS terminals for the Google Wallet is continually growing, with major retail operators, such as Macy's, American Eagle, Subway, Walgreen's, and Toys-R-U's, already signed on to roll out the new system. Who is paying for the costs of these terminals? Google isn't. The consumers also aren't asked to subsidize the cost. It is the credit card companies who are eager to pay it forward. Google CEO, Eric Schmidt, recently stated that the payment processing companies (credit card companies) have the incentive to pay for these costs because fraud rates will be so much lower with the new Google Wallet payment system. With powerful, industry leading partners, a sufficient installed base, and now with the incentive for retailers to support the cost of rolling out additional terminals for merchants, Google needs only to ensure full security for consumers.

Security was an issue that according to Google, they took very seriously from the outset. They adopted the industry standards and best practices of PayPass and then sought to add more security on top of that level. The NXP chip with the Secure Element from NFC is the same chip used in digital passports. The chip has a great deal of protection built in, such as tamper protection to prevent breaking in and laser protection to prevent sniffers like those in the infamous T.J. Maxx data theft case. Additionally, the phone is equipped with a screen lock. One only has to input their Google pin, and the credit card data is encrypted, and the card is never fully displayed on the phone screen. With a list of security measures like these, Google is not

likely to have any problems convincing consumers in the 20-40 year old range. The research data seems to show that older generations are increasingly adopting Internet usage as well.

In sum, Google is uniquely positioned to bring together the type of complex ecosystem of partners that building a new platform of this nature requires. It is not likely that any one company could do so on their own, not even a multi-national organization as large and talented as Google. Google Wallet provides the consumer with incalculable new choices, and levels the playing field, so that even small, local merchants like your neighborhood pharmacy or florist can be attracted to provide complementary products. As Grindley's 1995 economy of standards graph dictates, such an advantage will have the effect of making the Google Wallet cumulatively more attractive and increase the credibility of the Google Wallet standard, making it even more attractive to new users and increasing adoption of the platform as a convenient means to use for making purchases and so much more. Despite the competition that may or may not eventually challenge Google Wallet, the platform Google is forming is here to last, and we will all be able to use it within a year's time wherever its terminals exist. COMMENTS:

As always, any guest speaker peaks the interest of the class at the outset, but depending on the content and delivery of that speaker, the attention of the class will be constant, or fade or be a combination of the two reactions. My attention to the three speakers was a combination of the two; however, I believe that many of my classmates might have lost interest quickly. I tried to ask relevant questions to clarify aspects that I thought were germane to the topic at hand. I also think that because my term paper dealt with standardization, I had prior knowledge that the whole class may not have had. Perhaps in the future, assigning a related article to read before coming to class or at the outset before the speaker begins would help to provide a sense of prior knowledge. Also, in keeping with modern learner-centered pedagogical methods, informing the students in advance, how the information they will hear will relate to the assessment on the final would be highly recommended. I thought the two-part exam and follow-up essay was a highly effective learning method because it required the student to develop two different responses for the same question over a short period of time on the same topic. Thank you

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## Ch.15 Opportunities and Challenges for Education on Standardization in Universities

- Summary Report of 2011 Joint Meeting of  
the APEC Sub-Committee on Standards and Conformance (SCSC)'s  
Project Advisory Group on Education (PAGE)  
and the American National Standards Institute (ANSI) 's  
Committee on Education (CoE) -

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Held in Washington, D.C., on February 28, 2011 "Opportunities and Challenges for Education on Standardization in Universities" was a joint meeting of the APEC Subcommittee's Project Advisory Group on Education and ANSI's Committee on Education. In total, more than 100 leaders from government agencies, industry, and prominent universities from APEC economies were in attendance to discuss strategies for more effective standards education in the Asia-Pacific region. This workshop was co-chaired by Korea (Mr. Dong Geun Choi, KSA) and the US (Mr. Erik Puskar, NIST). This workshop lunch and reception was sponsored by ANSI, UL, Qualcomm, and Microsoft. The workshop has two keynote speeches and four panel discussions.





ANSI President and CEO, Mr. Joe Bhatia presents keynote I

The keynotes were presented by two US representatives - S. Joe BHATIA, President and CEO, American National Standards Institute (ANSI), United States; Dr. Patrick GALLAGHER, Under Secretary of Commerce for Standards and Technology and Director, National Institute of Standards and Technology (NIST).

"Standards education at the university level and in the professional environment is vital because standards and conformance play a critical role in the economy, impacting over 13 trillion dollars in commodity trade on an annual basis," said S. Joe Bhatia, president and CEO of the American National Standards Institute (ANSI) in his keynote address to the APEC audience.

"Put simply, effective utilization of standards and conformance promotes technological interoperability and drives the global competitiveness of businesses. A new graduate or professional who is familiar with the standards relevant to their industry and how the standards system works is a strategic asset to their employer."

"To advance our objectives in standards education, we need to share best practices on our wide range of approaches, both at the university and the workplace levels, and exchange information so that the teaching of standards incorporates the wide variety of policy, legal, and business environments in our region," said Patrick Gallagher, Under Secretary of Commerce for Standards and Technology and Director of the National Institute of Standards and Technology (NIST), who addressed the meeting participants during a luncheon keynote address. "Achieving some convergence on how we approach standards education will be beneficial in our close work together in the future as our economies become more interdependent."

"Standards are a significant factor in who wins and who loses in the global marketplace," concluded Bhatia. "It's hard to win if you don't know the game."

The Workshop program featured four panels which drew attention to various aspects of why education is important and included many specifics on how to integrate standards education into the university curricula in the region. Many of the presentations highlighted successful education programs introduced in recent years. Woven throughout the presentations was the theme that standards training is critical to supporting economic growth. During the panel discussions, representatives from the APEC economies discussed various aspects of standards-related education, including the followings:

- ◆ **#1: *Voices of Industry, Government and University: Why Standards Education Now?***  
*Explored the standards education needs and perspectives of business, policy makers, and academia*



NIST Director and US DOC Under Secretary, Dr. Patrick Gallagher presents keynote II

- ◆ **#2: Mechanics of Developing a University Level Standards Education Program**  
*Described ways to create, share, and validate content at the university level (peer review, curriculum delivery, textbook selection process); reviewed research activities on standardization*
- ◆ **#3: Opportunities and Challenges in Standards Education**  
*Identified potential opportunities and hurdles to introducing educational programs that meet the diverse needs of stakeholders; explored how can teaching materials best address issues on which there are a diversity of views.*
- ◆ **#4: Standards are Vital: Business, Legal, and Policy Implications and Knowledge Transfer**  
*Examined how standards-related education can be integrated in the curriculum of Business, Legal, Public Policy, Engineering studies and the importance of the impact of standards on trade*

In the view of academia, university educators discussed that the critical components of a successful university program should incorporate the followings -- A strong, coherent curriculum that ties theory to practical applications; Peer review to build program integrity and consistency; Knowledge resources, including a textbook and case studies.

Business and industry participants stressed the followings -- Education on standardization should be extended to younger professionals as the community of standards experts our economies have relied on is retiring, and also to younger generation in primary/secondary education; Standards education should be viewed holistically, as standards cross domains and impact policy, legal and business environments.

Other observations during the workshop include the followings: Skill-set required for standards development draws on both technical expertise and a variety of soft-skills including negotiation skills; Standards education opportunities must be part of continuing education and formal academic programs; Convergence is key characteristic of standards and business today, and standards education should incorporate this reality that standards complex and multi-dimensional.

In summary, the following recommendations were raised during the workshop:

- A broad set of education tools is needed to reach diverse communities of learners
  - ex. case studies, web-serviced programs, education inventory
- Promotion of standardization research and theory for education
  - ex. Cost-benefit analysis, standardization and innovation, standards and IPR
- Too few publication outlets and academic for a exclusively on standardization;
  - it is important to increase publication outlets and to create or support academic for a to support education on standardization

Representatives from all APEC economies in attendance agreed that education on standardization principles has broad importance – young engineers and scientists have historically been targeted for standards education programs, but an understanding of standards is just as vital for business, legal, and public policy students. This reiterates the emphasis on education in standardization first noted at a high level in the 2006 APEC Ministerial Meeting Joint Statement, which says that, "Ministers recognized the importance of standards education and encouraged members to develop reference curricula and materials to address the significance of standards and conformance to trade facilitation in the region."

Also, APEC SCSC PAGE welcomes continuing cooperation with ANSI Committee on Education, and vice versa, and agreed to implement ideas and recommendations of the joint workshop, and to promote education on standards and conformance in this region.



## About the Editor & Authors



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He developed a high speed cellular MODEM on the AMPS cellular system in the US in 1983. He also proposed standardization of the CCITT (now ITU) SG17 in cooperation with British Telecom, and in 1990, he developed the W-CDMA system named IS-665 in TIA for the next generation of cellular systems. The test bed results were evaluated by the JTC officers. W-CDMA passed its evaluation tests and became TIA Standard IS-665 and T1P1 Standard J-STD-015 in 1996. In 1998, he contributed to the standardization process for IEEE 802.11a and established the venture company, Key Stream, to provide LSI integrated circuits to 802.11 wireless LAN systems. In 1996, he became a Professor at the Niigata Institute of Technology.



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In addition to standards, he has experience in the fields of information technology, funding innovative high-risk technology and fiscal affairs/taxation. Previous to SSG, Erik was a program manager with the Advanced Technology Program of NIST and has held other positions with the U.S. Government, international development organizations, and consulting. Erik received a BA in economics from Rutgers University and a MS in Public Management and Policy from Carnegie-Mellon University.