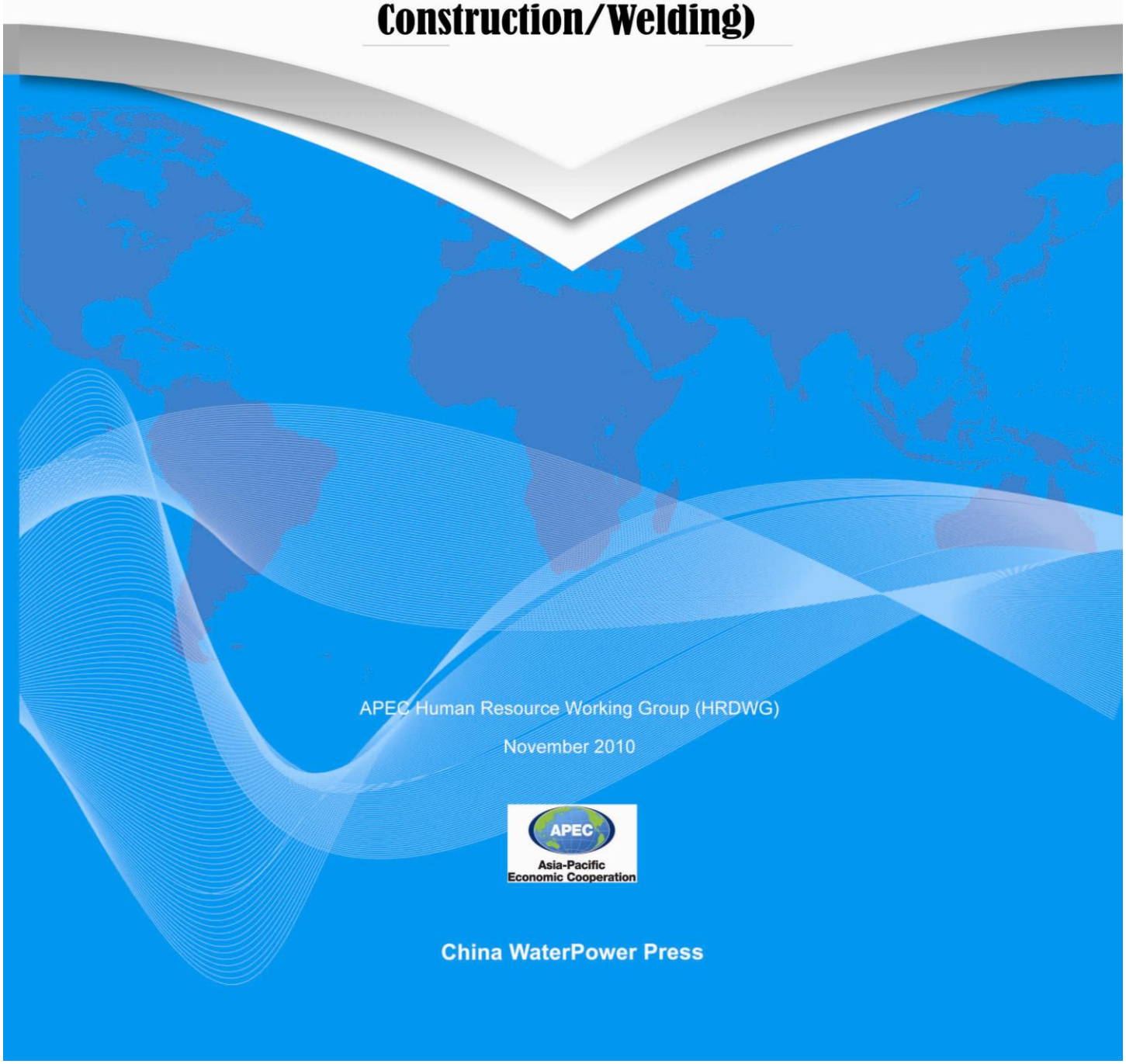
APEC PROJECT RESEARCH REPORT

The Report of Survey of Comparability and Benchmarking of Competencies and Qualification Frameworks in APEC Region (Pilot Area: Construction/Welding)



APEC Human Resource Working Group (HRDWG)

November 2010

China WaterPower Press

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November 2010

Project Name Comparability and Benchmarking of Competencies and Qualification Frameworks in APEC Region (Pilot Area: Construction/Welding)/ HRD-02/09

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November 14, 2010

APEC#210-HR-01.8 ISBN 978-981-08-7493-3

Content

Acknowledgement

We would like to acknowledge the support from the member economies that responded to the survey.

Definition of Terms

As used in this questionnaire, the following definitions shall be used:

- *Qualification is a formal certificate issued by an official agency, in recognition that an individual has been assessed as achieving learning outcomes or competencies to the standard specified for the qualification title, usually a type of certificate, diploma or degree.* Learning and assessment for a qualification can take place through workplace experience and/or a program of study. A qualification confers official recognition of value in the labour market and in further education and training. (OECD)
- *Qualification* - the combined aptitudes and skills which permit someone to take up a job. (ILO)
- *Qualifications system includes all aspects of an economy's activity that result in the recognition of learning.* These systems include the means of developing and operationalising economy's policy on qualifications, institutional arrangements, quality assurance processes, assessment and awarding processes, skills recognition and other mechanisms that link education and training to the labour market and civil society. Qualifications systems may be more or less integrated and coherent. One feature of a qualifications system may be an explicit framework of qualifications. (OECD)
- *National qualifications framework (NQF)* is an instrument for the development and classification of qualifications according to a set of criteria for levels of learning achieved. *This set of criteria may be implicit in the qualifications descriptors themselves or made explicit in the form of a set of level descriptors. The scope of frameworks may be comprehensive of all learning achievement and pathways or may be confined to a particular sector, for example initial education, adult education and training or an occupational area. Some frameworks may have more design elements and a tighter structure than others; some may have a legal basis whereas others represent a consensus of views of social partners.(OECD)*
- *Competency- based training* - a system by which the student is trained on the basis of demonstrated ability rather than on that of elapsed time. (ILO)
- *Competency* – achievement of the knowledge, skills and attitudes required in the performance of a given task.
- *Competency standards* – a written specification of the knowledge, skills, attitudes and values required for the performance of a job, occupation or trade and the corresponding standard of performance required for these in the workplace.

- *Career development* - the continuous planning carried out to advance a person's career based on experience and on any training undertaken to upgrade qualifications or to acquire new ones. (ILO)
- *Certificate of Competency* - document certifying a person's aptitude, qualification and/or medical fitness for a particular job. Often applies to seafarers. (ILO)
- *Skill/ occupational qualification* - formal recognition of workers' skill qualifications, independent of the manner in which they were acquired. (ILO)
- *Vocational training* - activities aiming at providing the skills, knowledge and attitudes required for employment in a particular occupation, or group of related occupations, in any field of economic activity. (ILO)
- *Skill* - an acquired and practised ability to carry out competently a task or job, usually of a manual nature. (ILO)
- *Skill/ job analysis* - the systematic review of component attitudes, aptitudes and practices of experienced workers within a particular job. (ILO)
- *Occupation Skill Standards (OSS)* is a series of skill requirements for the workforce in a certain occupation. It describes all the skills a worker in that occupation would need to master if he/she wants to complete all the responsible work. (ILO)
- *Occupation Competence Standards (OCS)* is a series of abilities the employers need the employ to deal with many situations and work in team. It's broader than skill standards, and includes more qualities such as creativity, collaboration, communication etc. In some occupations in Building Trade, OCS contains industrial health knowledge and skill.

  For example, a qualified bricklayer need to know the basic knowledge about reading blueprint from architects, and can use all kinds of tool to measure the size of structures and accurately cement bricks to the right place. All the requirements about the skill like that comprise the Occupation Skill Standards. But in a complex and new-designed building, the bricklayers need more communication with architects and collaboration in team to solve some tough problem. The communication and collaboration ability can be understood as kinds of competence standards, which might be not requested in bricklayer skill standards.

Implementation Summary

This report is a research report of the project “Comparability and Benchmarking of Competencies and Qualification Frameworks in the APEC Region (focusing on Construction / Welding)”. The project was approved by APEC Secretariat in the end of 2008.

The project has been implemented as planned. When adjustments in schedules were needed, China and the Philippines which were the joint Project Overseers and implementers had been in close coordination with each other through electronic means to reach a common agreement.

During the last two years, China and the Philippines implemented the following steps:

1. Established project working group, collected co-hosting economies' existing qualification and competencies cases for the demonstration in the seminar which was arranged in October 2009.

2. Collected relevant occupation studies all around the world from international organizations, including EU, World Bank, International Labour Organization.

3. Drafted pilot questionnaire for collecting more basic knowledge about qualification and competencies across the co-sponsor APEC economies.

The questionnaire contains the following aspects:

a. Occupation Skill/ Competence Standards in construction sector among APEC economies

b. Qualification Credential/ Certification in construction sector among APEC economies

c. CTE/TVET Curriculum Criterion in construction sector among APEC economies

4. International Seminar on Sharing the CTE/ TVET System and Qualification Framework among APEC Economies

This International Seminar was already completed and was hosted by the Technical Education and Skills Development Authority (TESDA) at The Richmonde Hotel, Pasig City, Metro Manila, Philippines from 21-23 October 2009.

A total of 31 experts from 11 economies (Australia; Brunei Darussalam; Chile; the People's Republic of China; Indonesia; New Zealand; Philippines; Chinese Taipei; Kingdom of Thailand; the United States of America and Viet Nam) participated in the seminar. Of the total number of participants, 12 (39%) are females. They presented the CTE/ TVET System and the qualification framework of their own economy.

Resource speakers from ILO, Monash University of Australia, New Zealand Qualifications Authority, and the Colombo Plan Staff College also presented the

experiences on developing the qualifications frameworks and the TVET challenges in 21st century.

The seminar met the planned objectives to include:

(1) Sharing of existing CTE/TVET system and the qualification framework being adopted for the recognition of competencies of skilled workers by the APEC economies;

(2) Served as venue in the identification of qualification frameworks that could serve as possible model/benchmark for other economies;

(3) Identified and discussed commonalities and/ or divergence in each of the qualification framework.

After the seminar, compilation of Career and Technical Education/ Technical Vocational Education and Training (CTE/TVET) Systems of APEC Economies has been edited by working group experts from China and Philippine. The compilation is listed below.

5. Survey/ Benchmarking on Qualification Frameworks of APEC Economies

In order to gather detailed information on the existing qualification frameworks adopted by the APEC member economies, a benchmarking survey should be undertaken. The following activities had already been accomplished:

a. Prepared the survey questionnaire for collecting more basic knowledge about qualification and competencies across the sponsored APEC economies. The questionnaire contains the following aspects:

- Occupation Skill/ Competence Standards in construction sector/ welding among APEC economies
- Qualification Credential/ Certification in construction sector/ welding among APEC economies
- CTE/TVET Curriculum Criterion in construction sector among APEC economies

All the aspects are associated with the information about:

- organization which issue the qualification
- the number and name of occupations the qualification covers

b. The survey questionnaire was disseminated by the APEC Secretariat to the APEC focals to solicit their inputs

c. Collection of finished questionnaires (11 economies submitted. They are: Canada; Chinese Taipei, Hong Kong, China; Indonesia; Japan; Korea; Malaysia, Philippines; P.R.China; USA, and New Zealand)

6. Analysis of the Survey Results

The results of the survey was consolidated and analyzed in terms of similarities and differences. Specific recommendations have also been drawn based on the study results. The results of the study will be disseminated to the APEC HRD Focal Point in the member economies.

a. Eight APEC economies---- Chinese Taipei; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Philippines; P.R.China; and New Zealand have NQFs. The NQFs in operation in the member economies of APEC are diverse in their structure, coverage, operational purposes and governance. But they share some similarities. For

example, NQFs are always accompanied by qualification certification and quality assurance; it is the education and labour departments of government who are responsible for qualifications in most APEC economies; the requirements of a qualification are usually composed of knowledge, skills and aptitude.

As for the establishment of a regional qualifications framework in APEC economies, certain indispensable prerequisites are needed, such as common legal foundation, shared cultural foundation, institutions responsible for regional qualifications framework, and common momentum of regional qualifications framework development. In addition, it is important to fund the establishment and maintenance of regional qualifications framework. All these prerequisites are not available in APEC region. It isn't appropriate to establish regional qualifications framework at present due to survey result and status quo.

b. Compare research on welding competencies of all surveyed economies has been done in this research. This would help all surveyed economies share common understanding on welding qualification levels, competencies/skills/duties and tasks of welding qualification on different level. Educational and training material on welding qualification would be developed based on this common understanding. Thus the training on workers would meet the needs of market demand. Employees' mobility among APEC economies would come true.

c. The report includes the following recommendations:

- Qualifications usually relate to education and training areas and certain industry. In order to meet the requirements of qualification, government should play an important role to coordinate relationships among different departments relevant to NQFs.
- The APEC economies should work together to analyze the existing regional qualifications framework (such as EU's qualifications framework). Effective reference would be obtained from this analysis to lay the foundations for establishing regional qualifications framework.
- Economies with NQFs should share their critical experience in developing a national qualifications framework.
- APEC should use the survey results and the lessons provided by economies with NQFs to facilitate ongoing dialogue between member economies and other Asia-Pacific economies on national qualifications frameworks. The dialogue includes the following topics: the differences of NQFs among APEC economies, the advantages to be gained from understanding these differences; issues on quality assurance and qualification certification.
- On the basis of research and practice, a proposal for a voluntary regional qualification framework should be developed and disseminated amongst member economies for comments.

1. Background of the project

In 2007, Ministers of APEC economies recognized the need to address the challenges that face us in the area of 21st century skills. They also reiterated the importance of continued capacity building work in the area of human resources development. CTE/TVET is an emerging area of education in the 21st century that aims to provide quality technical education that tailor-fits the APEC workforce to the fast-paced, dynamic and stringent demands of the labor market in the region. There is a need to equip economies with the proper information, policies and training to take full advantage of freer movement of human capital and wider employment opportunities and to address the mismatch of skills and labor market requirements.

In addition, mobility of qualified persons ranks among the eight (8) main priorities and strategies of the APEC Human Resource Development Working Group. This is within the framework of the 1995 Osaka Action Plan Part II. In order to effectively push through with this identified priority, there is a need for APEC member economies to tackle issues and generate consensus on factors that affect the comparability of qualifications and movement of qualified persons. Relatedly, the APEC Business Advisory Council (ABAC) had prepared a proposal on the Trans-Pacific Business Agenda (TPBA) for consideration of the APEC Leaders. One of the components of the TPBA to intensify efforts on trade facilitation initiatives is through comparability and recognition of qualifications.

The Comparability and Benchmarking of Competencies and Qualification Frameworks in the APEC Region (focusing on Construction / Welding) was conducted under such circumstances.

The project was taken into account the recognition by APEC Leaders in the 2007 Report on Regional Economic Integration of the need to develop and implement longer term sustainable capacity building projects reflecting the extended time horizons involved in undertaking work on regional economic integration.

Project influence

This project proposal intended to build up and take stock of the current efforts and experiences gained in similar programs in comparability of competencies like the APEC Engineer and APEC Architect Project. Lessons learned from the implementation of these projects could be applied and adopted to other efforts on comparability of qualifications in other professions and skilled occupations.

With this proposal, the proponents hoped to pursue value-adding initiatives and complement other similar projects that delved on similar concerns like that of Australia’s Higher Education Quality Assurance and Accreditation Systems in the APEC region. This project also intended to harness the opportunities brought about by

the on-going initiatives of professional registers (APEC Engineers and Architects) by doing parallel work for skilled workers. The proposers have been adopting the multi-sectoral perspective to enhance the analytical and policy making tools of member economies in the efforts for comparability of competencies in the construction sector.

APEC is the most appropriate institution to fund this project as the comparability of qualifications is a key concern of the APEC member economies. The openness, flexibility and voluntary nature of APEC are important elements that can facilitate effective discussion of common issues like the comparability of skills qualifications. APEC being a mix of developed and developing economies sharing mutual interests in the region, it has the potential to advance common initiatives more effectively compared to a larger organization like the United Nations, the International Labor Organization and even with the ASEAN sub-regional grouping.

Methodology

During project, consultations with relevant stakeholders in the APEC economies and with multilateral HRD institutions have been done to increase the chances of success of the project. This has been undertaken in various stages of the project: conceptualization, implementation and evaluation.

In the Philippines and China, inputs and valuable insights have been solicited from the APEC HRD Working Group composed of HRD stakeholders from the government, private sector and from the academe. In order to ensure coherence and relevance to other initiatives in other APEC fora, broad-based consultations with the members of the Technical Board for APEC Matters consisting of agencies and organizations from various disciplines have also been done.

The project proposal has also been circulated to other APEC member economies for their insights and recommendations.

Survey questionnaire was adopted in the project of Comparability and Benchmarking of Competencies and Qualification Frameworks in the APEC Region.

Gender Concerns

Many projects have the potential to affect men and women differently because of their different roles and positions in many societies. What steps have this project taken to ensure that it benefits both groups and in particular the disadvantaged women? Common responses are: using gender analysis to design project methodologies and inputs (e.g. surveys); including women in the planning, management, allocation of resources and implementation of a project; taking steps to ensure equitable participation by men and women; making special efforts to disseminate project results to women; and using sex-disaggregated data for project assessment.

One purpose of CTE/TVET projects is to encourage women enter the labor market in order to enhance their social status and improve their income. In the

proposed project, comparability of qualifications is an issue that concerns both men and women. Especially, our project started at the construction industry which traditionally is not an area many females participated, for this reason, as an indicator, gender participation in construction industry has been designed into the project surveys and the gender analysis has been done in the project.

In the workshop and seminar, there are the topics of how to increase women employment ratio in different industries. By special invitation, women have been encouraged to participate in the seminar or workshop in the first stage and the last stage of the project. This is also apparent in the construction sector as several occupations in this area would require women expertise. Thus, gender issues that affect comparability of qualifications have been included in the workshops to be conducted. Women representation has also been sought in the various project stages, from conceptualization, planning, project development, project implementation and subsequently in project evaluation. The APEC economies had also been encouraged to send adequate women representation in the workshops/ symposia that were conducted.

Not accidentally, the chief architects of this project, Ms. Wang Wenjin (from China) and Ms. Marissa Legaspi (from the Philippines) are themselves outstanding women in the area of CTE/TVET. The female project team members both in China and the Philippines are not less than 50%.

Women certainly benefited from this project. Women participation was encouraged in the various stages of the project to ensure that their issues and concerns were well-taken cared of in the project. As some of the occupations in the construction sector are dominated by women, their inputs have been solicited and considered in the consultations and deliberations. The recommendations considered gender dimension especially in the aspect of education and training, job access, welfare and protection, among others.

2. Introduction

This project of *Comparability and Benchmarking of Competencies and Qualification Frameworks in the APEC Region (focusing on Construction / Welding)*has contributed to the achievement of HRDWG's mission of sharing experiences and skill by addressing its objectives of building 21st century Career and Technical Skills, developing common understandings about qualifications, skills, and professional recognition in order to facilitate the mobility of persons in a more competitive global skilled labor market, and enhancing employment creation and alleviating poverty.

The project also helped achieve the EDNET objective by identifying the best practices and urgent challenge on CTE/TVET in the region that serve as impetus for strong and vibrant learning systems across the region to adopt policies and programs that incorporate the benchmarks and respond to the pressing issues in the region.

The project was co-hosted by the Philippines and China. Under this arrangement, the Philippines hosted the conduct of the International Seminar on Sharing the CTE/ TVET System and Qualification Framework among APEC Economies in 2009. The highlights of the seminar were presented in the APEC HRD Working Group Meeting and in other relevant APEC fora. A report of the Seminar Proceedings was submitted to the APEC Secretariat and CD copies were distributed during the 32nd APEC HRD Working Group Meeting in Hiroshima, Japan last February 2010.

Objectives of the project

Generally, the project is aimed to "Better prepare skilled workforce for decent, equitable and sustainable 21st century by improving CTE quality."

The specific objectives of the project are:

- Develop a common understanding of the different Career and Technical Education (CTE)/ Technical Vocational Education and Training (TVET) Systems of APEC Economies
- Conduct an inventory of Existing Qualification Frameworks/ Systems of APEC Economies
- Do comparability of the competencies / qualifications of workers in the Construction Sector (Priority: Welding) in the APEC economies for benchmarking purposes

The phases of project

The project was implemented in phases as follows:

Phase I: International Seminar on Sharing the CTE/ TVET System and Qualification Framework among APEC Economies

Phase II: Survey/ Benchmarking on Qualification Frameworks of APEC Economies

Phase III: Analysis of the Survey Results

The first phase on the sharing of general CTE/TVET systems and frameworks paved the way for future workshops on comparability of qualifications frameworks in various sectors. The construction sector was the first area of focus in phases II and III of the project.

Comparability of qualifications of skilled workers in the construction sector is beneficial to several sectors to include the following:

- Business sector for harmonization of skills qualifications;
- Educational Institutions and Construction establishments for programming and capability build up initiatives;
- Professional and workers' associations for competency enhancement;
- Non-governmental organizations (NGOs) for advocacy, promotion and monitoring;
- Government agencies and departments – Education, Labor, Foreign Affairs, Trade and Industry, Public Works and Highways for policy and decision making.

The results of the survey was consolidated and analyzed in terms of similarities and differences. Specific recommendations have also been drawn based on the study results. The results of the study would be disseminated to the APEC HRD Focal Point in the member economies.

The achievements of the project

The multi-phased project has achieved the following:

- Compilation of Career and Technical Education/ Technical Vocational Education and Training (CTE/TVET) Systems of APEC Economies;
- Inventory of Existing Qualification Framework of APEC Economies;
- Comparability of competencies in the construction sector

3.Compilation of CTE/TVET Systems of APEC Economies

3.1 CTE/TVET System of China

China

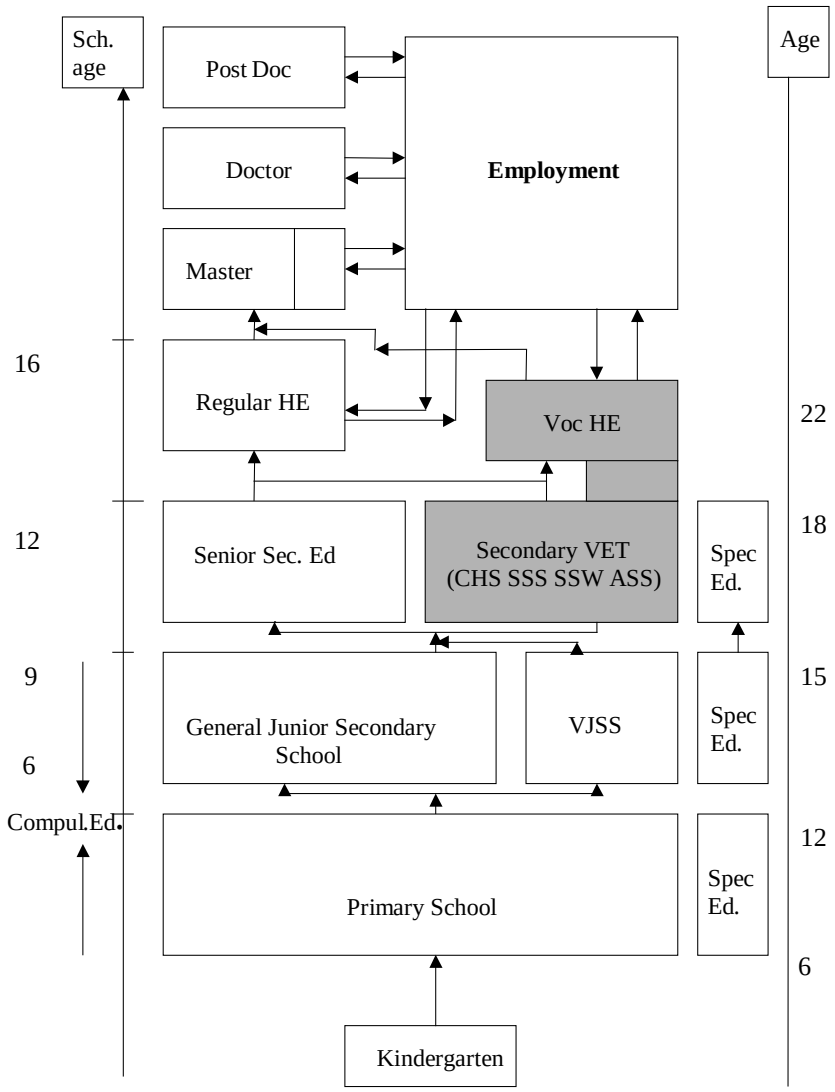

Fig1 Chinese VTET System

Note: Chinese children start their 9 year compulsory education since 6 years old. Elementary school needs 6 years, junior secondary school 3years and senior secondary school(general high school or secondary vocational school) usually is 3years. Higher VE is 2 years and university for bachelor degree is 4 years.

Vocational school education is academic credentials education implemented in junior secondary vocational schools, senior secondary vocational schools and higher vocational schools. Secondary VE implemented in secondary vocational schools that consist of secondary technical schools(STS), secondary vocational schools(SVS) and

skilled worker's schools(SWS). Higher VE is carried out by higher professional training schools, vocational and technical colleges, professional universities and general universities.

Intakes and educational system

___Junior secondary VE intakes elementary school graduates for 3years study.

___Senior secondary VE intakes junior secondary school graduates for 3 years or 4 years(a few schools) study.

___Higher VE mainly intakes senior secondary school graduates or those are in the same educational level for 2-3 years study. It also intakes junior secondary school graduates for 5 years study.

Strengths

1 Qualification Frame consists of Certificates of Schooling and Certificates of Occupational Qualifications.

2 Vocational training is non-formal, center-based, employment-oriented, multi-provider and aimed at occupational qualification certificate.

3 A double guarantee system includes standardizing school-running criterion and standardizing VE curriculum criterion.

4 Qualified instructional resources, administrative system, and regular teaching order.

5 There are Internal and external efficiency evaluation on vocational schools.

Weaknesses

1 The strategy position of VE has not been emphasized in some places; the attractiveness of VE still needs to be enhanced.

2 Insufficient investments, the conflicts between urgent demand for skilled-talents from society and insufficient supply from VE resources are outstanding.

3 The quality and relevant level of VE is still low.

4 VE system, mechanism, and modes are not suitable for economic and social development and the requirements of labor market to talents scale, structure and quality.

5 The internal efficiency of VTE programs is low.

6 The funds and running condition level of vocational schools is lower than general education.

7 Vocational education resources are scarce (average books occupation, teaching and research instruments and facilities).

8 The practical application level of information technology in VE college education, teaching, and research is far more behind than other equivalent domestic education and overseas VE development.

9 There are still a lot of obstacles between the cooperation of schools and corporations.

10 The courses lack standards, course contents are out of date, theoretical contents presented in specialization teaching materials outweigh practical ones.

11 Shortage of teaching stuff, “Double qualification” teachers are insufficient and distributed imbalanced in different areas.

12 Lack of specific measures to fulfill related policies.

13 The structure setting of majors impedes economy development.

Opportunities

1 Chinese government emphasizes on establishing and perfecting the vocational education system which owns the characteristics as the combination of vocational school education and vocational training, inter-communication and coordinating development within and among vocational education and other education types.

2 Current situations constrain rural areas development, agricultural structure alignment and farmers’ income increase. To develop new economy, it is urgent to put heavy effort on developing VE.

Threats

1 There are still a lot of obstacles between the cooperation of schools and corporations; the industry does not have adequate strength to play the role.

2 The new historical task we will face in the future is the transition from a large number HR economy to a high quality HR economy.

3 The low quality of our front line labors and lack of skilled-talents is outstanding.

4 The traditional concepts still exist in some area which despise VE and labor skills. They emphasize only on knowledge, but underestimate the practical skills.

5 Related law and regulation about employment permission are not integrated, and fail to apply the law enforcement, which weaken the attractiveness of VE towards students, their parents and other young people.

6 In many rural areas, VE position has not been emphasized; VE development, reform and skilled-talents development have not been brought into local economic, social and educational development plan.

Strategies

1 Continue to enlarge scale, enhance VE’s attractiveness (quality, relativity, and flexibility).

2 Innovate the system and mechanism.

3 Improve teaching quality.

4 Deepen instructional reform.

5 Guarantee the criterion of school-running (the evaluation of school- running conditions, teaching and learning process and educational outcomes).

3.2 CTE/TVET System of Chinese Taipei

Chinese Taipei

1) Education System in general

1. The present education structure supports 22 years of formal study. Completion times are flexible, depending upon the needs of the students. Normally, the entire process requires 2 years of preschool education, 6 years of primary school, 3 years of junior high, 3 years of senior high school, 4-7 years of college or university, 1-4 years of a graduate school program, and 2-7 years of a doctoral degree program.

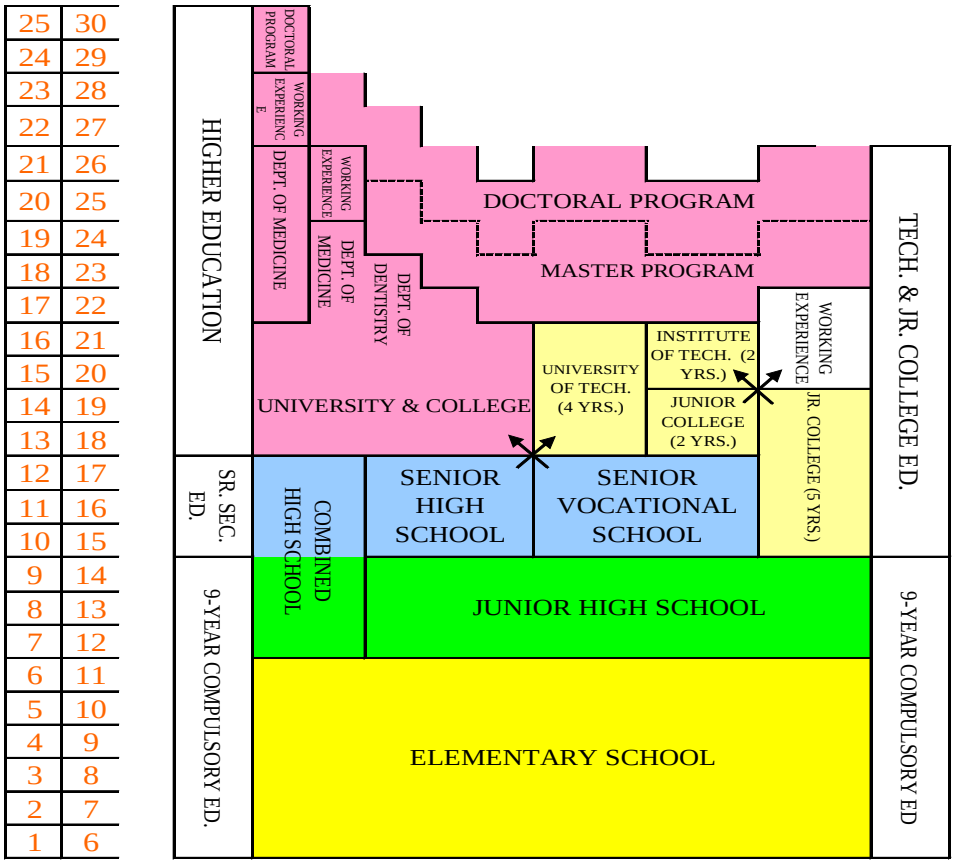

Fig2 CTE/TVET System of Chinese Taipei

2. Senior High and Senior Vocational Education.

There are two types of institutions for students above the junior high school level. They are senior high and senior vocational schools, both taking three years to complete. Senior vocational schools offer courses in areas such as agriculture, industry, business, maritime studies, marine products, medicine, nursing, home economics, drama and art.

3. Junior College Education

Junior colleges fall into two categories, five-year junior college and two-year junior college. Five-year junior colleges admit junior high school graduates, and offer a curriculum that is normally completed in five years. Two-year junior colleges admit senior vocation high school graduates and offer a curriculum that is normally completed in two years.

4.University Education

University undergraduate programs require four years of study. Specialized undergraduate programs such as dentistry or medicine require six to seven years, including an internship period of one year.

2) CTE/TVET's place the Education System

There are two tracks for junior high school graduates to choose. One is academic educational system, which includes senior high schools and academic universities; the other choice is TVE system, which includes vocational high schools, junior colleges and 4-year colleges of technology or universities of science and technology.

Strengths

1 BEVT carries out planning, research, and implementation evaluation of employment and training policies.

2 Examinations for professional and technical personnel are held by the Examination Authority.

3 Skill testing is conducted by the Council of Labor Affairs.

4 Various agencies of the central government issue professional certificates in fields under the jurisdiction of the particular agency in accordance with relevant regulations.

5 TVE/BEVT has been adjusted continuously to meet the needs of various kinds of workforces.

Weaknesses

1 The social and economic status of students in the vocational and technical education track tends to be comparatively weak, and their level of internationalization is insufficient.

2 They still have not received the necessary approval, leaving the training and certification system without the legal foundation that would enable across-the-board promotion of the system.

3 The establishment of standards for the tests is influenced and limited by the available equipment, the location, and other subjective factors, resulting in a lack of clarity on the scope and benchmarks for the test standards and disputes over differences in the strictness of the evaluations.

4 The standards for most skills are determined by specialists, with little input from employers.

Opportunities

1 With the changes and transformation in the manufacturing industries, the need for skilled manpower has abruptly increased.

2 It is generally recognized that TVE has played an important role in Chinese Taipei's economic transformation.

3 In accordance with the government’s new policy, TVE has experienced a gradual transition from the planning-directed mode to a more market-oriented approach.

4 The TVE system is confident of playing a major role in providing lifelong learning opportunities for the people in Chinese Taipei.

5 Facing trends of global competition and cooperation, Chinese Taipei needs to strive for competitive development of human resources and personnel training.

Threats

1 The gap between industries’ needs and what the educational system provides results in students being unable to use what they have learned.

2 Recent university graduates will be facing a highly competitive job market.

3 The traditional view that studying in a general senior high school is better than attending a vocational senior high school makes it difficult for students to select the choice most suitable for them.

4 Industry is lack of affirmation and recognition of the value of skills certification.

5 The level of recognition and authority given to our skills certification is rather limited.

6 The social and economic status of students in the vocational and technical education track tends to be comparatively weak, and their level of internationalization is insufficient.

Strategies

1 The content of the skills tests should fit the needs of industry.

2 More comprehensive regulations should be established to provide a firmer legal basis for implementation.

3 The efficacy of the skills certification system needs to be broadly established.

4 Testing standards for certification should be consistent.

5 Management of the testing and certification process should be under one agency.

6 Skills certification and the job market should interact closely.

7 Flexibly adjust the educational system for CTE/TVET and offer students more channels to pursue further studies.

8 Enhance technical and handicraft courses in junior high schools and attain the ideal of teaching students in accordance with their aptitudes.

9 Emphasize the pragmatic learning of CTE/TVET and upgrade the skills certification system.

10 Strengthening the relationship between educational partners and building up diversified learning systems.

11 Promote a responsive CTE/TVET and strengthen the professional status of CTE/TVET.

12 Establish diversified learning systems and a lifelong learning society.

13 Enhance the administrative effectiveness of TVE and give TVE more space to develop.

14 Reinforce public perception in favor of TVE and build up correct vocational values.

15 Encourage public and private enterprises to support and cooperate with the skills certification system.

16 Increase the efficacy of skills certification.

17 TVE/BEVT in Chinese Taipei will continue to adapt to the needs of its developing society as well as to the new ideas and worldwide trends in the field of TVE/BEVT.

3.3 CTE/TVET System of Viet Nam

Strength

1 Establish and create favorable facilities and equipment for public vocational training institutions.

2 Current vocational training standards have been developed in compliance with the requirements of manufacturing and technology innovation, directing towards the integration of skilled labor in the region and in the world.

3 In order to make the legal basis for skills evaluation and accreditation, the Vocational Training Law draft has one chapter to describe the national evaluation and accreditation system.

4 There are not any differences between government institutions and private institutions having some in terms of the acquisition of national occupational skill certification.

Weakness

At present, they have only national skill evaluation and certification system in the economy.

Opportunity

1 At present, Viet Nam's National Assembly is building the Vocational Training Law to promote the vocational training development both in terms of scale and in quality.

2 Latest laws on Vocational training have been enforced on 1st January, 2007 regulated training as 3 levels: Primary Vocational training centers; Secondary vocational training schools; Vocational training colleges.

3 Those who did not go to secondary school were encouraged to take part in vocational training or professional secondary training.

4 Viet Nam ese Government takes big efforts to solve above problems such as unemployment situation, vocational training, poverty, health care and social welfare, etc. and encourage labor force in both of number and quality.

5 Reform the training and education including vocational training in order to meet the demand of the economy's socio-economic reform and the process of modernization and industrialization.

6 Quality of graduates from vocational training schools are accepted by labor market.

Strategy

1 Quickly increases vocational training on the diploma and secondary level to serve industrial zones, dynamic economic areas and labor export.

2 Expand the vocational training institution network, develop vocational training centers at the district level.

3 Create basic changes in vocational training quality; accessing to the advanced level of the region and the world.

4 Strengthen vocational training socialization; encourage the development of all kinds of vocational training in a diversified and flexible way: non-state vocational training, enterprise-based vocational training, traditional village-based training…

5 Create favorable conditions for laborers to learn vocations and make their own business; organize vocational training activities.

6 Transfer suitable production techniques and technologies for peasant and ethnics.

3.4 CTE/TVET System of USA

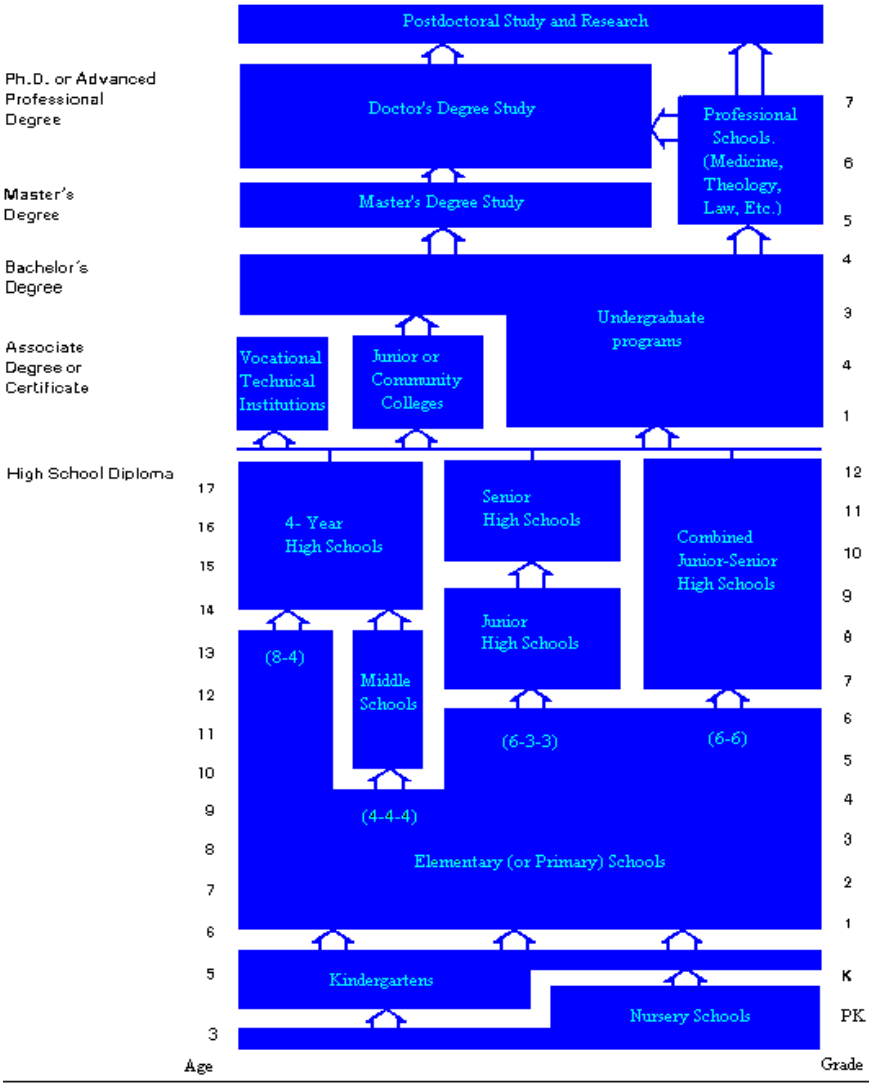

Fig3 CTE/TVET System of USA

USA

1) **your economy's Education System in general;**

Education in the United States is highly decentralized and is primarily a state and local responsibility. In creating the U.S. Department of Education, Congress made clear its intention that the Secretary of Education and other Department officials be prohibited from exercising "any direction, supervision, or control over the curriculum, program of instruction, administration, or personnel of any educational institution, school, or school system." The establishment of schools and colleges, the development of curricula, the setting of requirements for enrollment and graduation—these are responsibilities handled by states and local communities, as well as by public and private organizations, not by the U.S. Department of Education. The U.S. Department of Education is responsible for collecting and

reporting on economy-level data about education. The National Center for Education Statistics within the Institute for Educational Science of the U.S. Department of Education provides a large number of reports on the condition of education in the U.S. The Department also provides financial support for education (including CTE) through a variety of grants. However the overall amount of federal support for education consists of approximately 10 percent of the total cost of education at the state and local level. This again reflects the fact that education in the U.S. is a state and local responsibility.

2) **CTE/TVET's place the Education System; and**

There is a long history of interest and support for Career and Technical Education (Vocational Education) in the United States. The Smith-Hughes of 1817 has been identified as a significant milestone in creating the current CTE system. Career and Technical Education is offered as an educational option at secondary and tertiary levels. CTE courses and programs are offered in most comprehensive secondary schools across the United States and in almost every community college (2 year tertiary institutions). Approximately half of all secondary students and up to a third of all tertiary students participate in a substantial way in CTE programs. In addition, at the tertiary level it is estimated that as many as 40 million adults participate in short-term occupational training.

Career and Technical Education, much like the larger U.S. educational system, is a state and local responsibility. States and local school districts determine the amount and variety of career and technical education that is offered in the various programs. Many of these program offerings are based in the occupational needs of the local community; i.e., rural and farming communities tend to offer more agricultural CTE courses; allied health and nursing CTE may be offered at more urban and suburban schools. Secondary students may participate in CTE with varying degrees of intensity from just one course to a concentration of 2, 3, or more courses within a specific occupational area. Many secondary school CTE courses and programs are designed to link to advanced education and training at a tertiary institution. In fact as more occupational areas require some amount of additional education beyond secondary education, all students are encouraged to prepare for tertiary education by taking rigorous academic courses along with their CTE courses.

3) **CTE/TVET system in particular:**

In 2006 the United States Congress revised the Carl D. Perkins Career and Technical Education Act (Perkins Act), which in its various forms has been the basis of support for CTE at the economy level for decades. This Act is only the most recent legislation supporting CTE. The Perkins Act of 2006 identifies the major goals of career and technical education and provides a formula for providing a share of financial support to State governments as they provide CTE at the local level. This Act further aligns with the No Child Left Behind Act, the main

legislation at the economy-level that helps promote the reform of schools.

At the program level, the goal of the Perkins Act is to improve the academic and technical knowledge and skills of students so that they can transition successfully to tertiary education or the workforce.

Career and technical education in the U.S. is an extensive enterprise that involves most secondary schools, the majority of community colleges, and many baccalaureate level tertiary education programs. At the secondary school level, CTE courses are offered within comprehensive secondary school programs, but they can also be the focus of an entire secondary school itself such as might be offered in a special school program (i.e. High Tech High School in San Diego, California; Fiorello H. LaGuardia High School of Music & Art and Performing Arts, New York City, NY). Students at the tertiary level can take occupational courses that are non-credit, short-term programs that lead to an occupational certificate, or they can enroll in a full, credit bearing program as might be required to attain training, certification, and licensure as a Registered Nurse (R.N.).

Students that participate in CTE or occupational training can often get immediate employment in their area of training. Often they will return to tertiary programs to continue to improve their knowledge and skills as they continue their employment.

Strength

1 The TVET system like the education system as a whole is highly decentralized and operates within a framework of the federal, state, and local governments.

2 Most secondary schools are comprehensive schools with both general education courses and TVET courses.

3Career academies, a type of special magnet school offer a rigorous college-preparatory curriculum based around a central TVET area.

4 TVET curriculum development and delivery is the primary responsibility of state and local authorities.

5 Assessment of programs is normally performed at the local school level.

6 Technical colleges are funded by student fees, state FTE funding, and a variety of special state and federal initiatives targeted as special client groups.

7 Curriculum development and delivery is primarily performed by the postsecondary institutions themselves, but operates within broad state institutional accreditation.

8 The qualifications usually are a combination of education, experience, and test scores.

9 Credentials vary on many dimensions, including marketability and recognition of the credential, alignment of the underlying standards to the CTE curriculum, quality of the input standards used to create the test plan and items, technical quality of the assessment system, and usability in educational settings.

Weakness

1 Although the three types (registration, certification, and licensure) are distinct in theory, in practice there may be overlap between certification and licensure.

2 There is a growing shortage of TVET teachers.

3 Many existing teacher education programs at the university level have been eliminated.

4 There are overlaps between the secondary education qualification and the TVET Certificate level 1 qualification, which means that portions of the learning outcomes have commonalities in both qualifications.

Opportunity

1 Integrated TVET and academic courses are being developed across the United States to help prepare students for postsecondary education and careers.

2 Financing of education in the United States is highly decentralized, and funding sources include federal, state and local governments, as well as private and nongovernmental contributors.

3 The federal government spends approximately $1.3 billion dollars annually on TVET, representing approximately five percent of the total funding available for public TVET education.

4 In recent years, there has been a concentrated focus in the United States to establish defined career pathways for easing the transition between educational systems for youth and adults.

5 There are a number of different organizations who are conducting research and trying to improve the image of TVET, including activities by the U.S. state TVET organizations, Career and Technical Student Organizations, business and industry, and other associations that have initiated activities.

6 States, local districts and schools are finding creative and innovative ways to incorporate TVET into academic courses and into secondary and postsecondary education reform movements.

7 States are turning to TVET as a school improvement resource.

8 In addition to academic knowledge and technical skills, employment in the 21st century requires workers to possess “soft skills”.

Threat

1 There are critical shortages in TVET teachers and administrators.

2 The general public has misconceptions about the quality, increased rigor and relevance of the TVET programs of today.

3 The increase in the number of students enrolled in TVET courses results in a demand for more classes and more teachers.

Strategy

1 Raise the awareness and increase the understanding of TVET and its programs.

2 Increase the knowledge about the rigor, relevance and skills students learnt in TVET to be prepared for today's workforce.

3 Improve the understanding about the variety of TVET careers and educational options available.

4 Educate the public about the integration of TVET and academics.

5 Encourage the government, states and local school districts to continue funding TVET programs.

6 Schools and organizations need to highlight TVET promising practices and programs as well as develop appropriate messaging to engage their schools in delivering this information to the media, government, business and industry, and local communities.

3.5 CTE/TVET System of Thailand

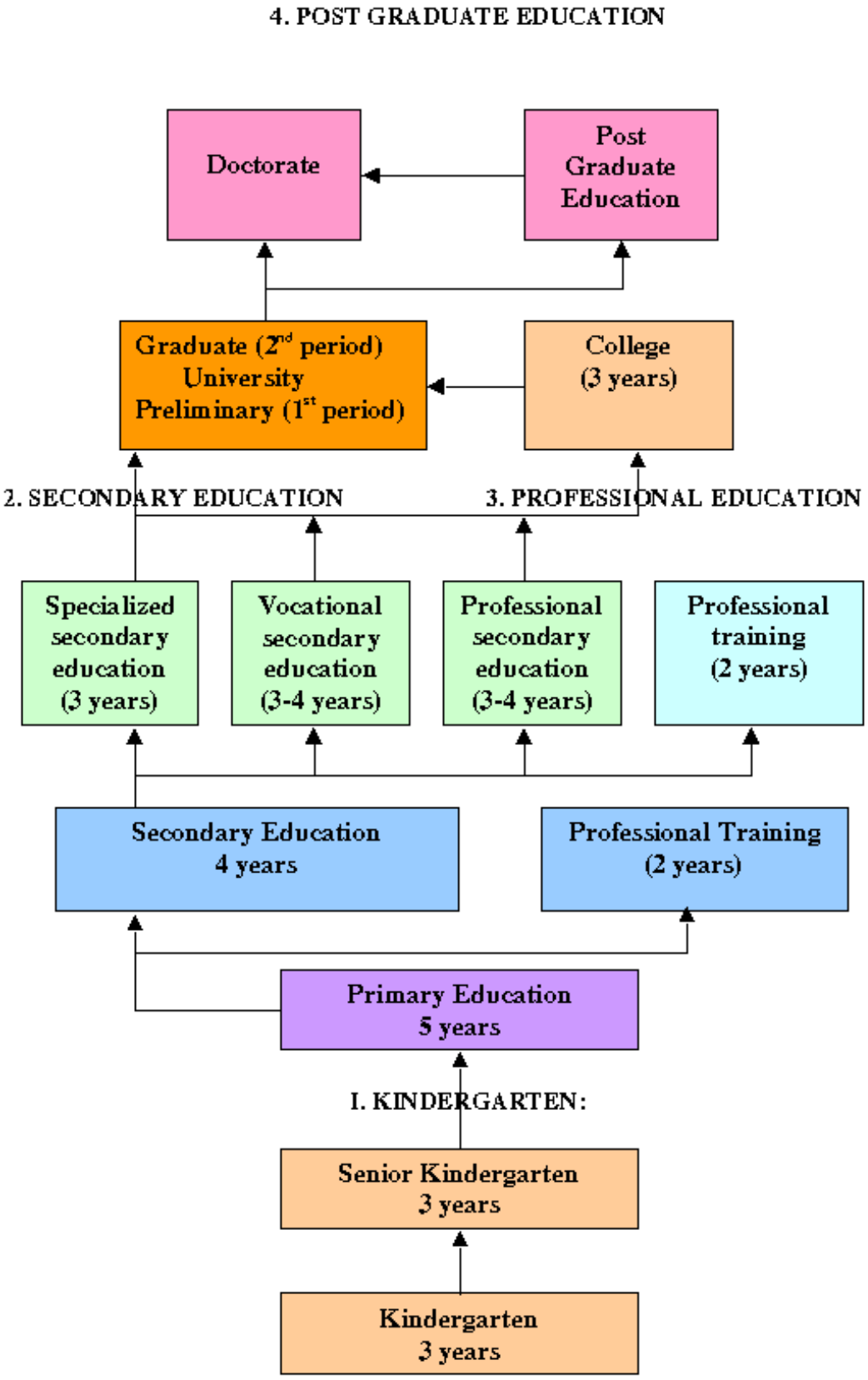

Fig4 CTE/TVET System of Thailand

Strength

1 There is good image about quality of vocational education.

2 There are adaptation of learning, teaching and assessment methods (Integrated learning and authentic assessment).

3 There are development of occupational standard, vocational qualification system, vocational standard and competency-based curriculum with enterprises.

4 There are establishment of networking system and participation of enterprises and communities in organizing vocational education including cooperation within the economy and abroad.

5 There are quality assurances for outputs, outcomes and vocational services.

6 There are extension of deal vocational training system with enterprises and communities.

3.6 CTE/VTET System of Philippines

Philippines
The education in the Philippines is closely related to the American mode of education but differs in the number of school years. It consists of 6 years basic education 4 years secondary education while other Asian countries have 12 years. Since 1994, the educational system is handled by three government agencies namely: Department of Education (DepEd) for elementary and secondary education, Technical Education and Skills Development Authority (TESDA) for the post-secondary education or technical vocational education and training (TVET), and Commission on Higher Education (CHED) for tertiary education TVET, essentially, in the Philippines performs a dual role. One, it provides education and training opportunities to prepare students and other clients for employment. Second, it addresses the skills training requirements of those who are already in the labor market and would need to upgrade or develop new competencies to enhance employability and improve productivity.

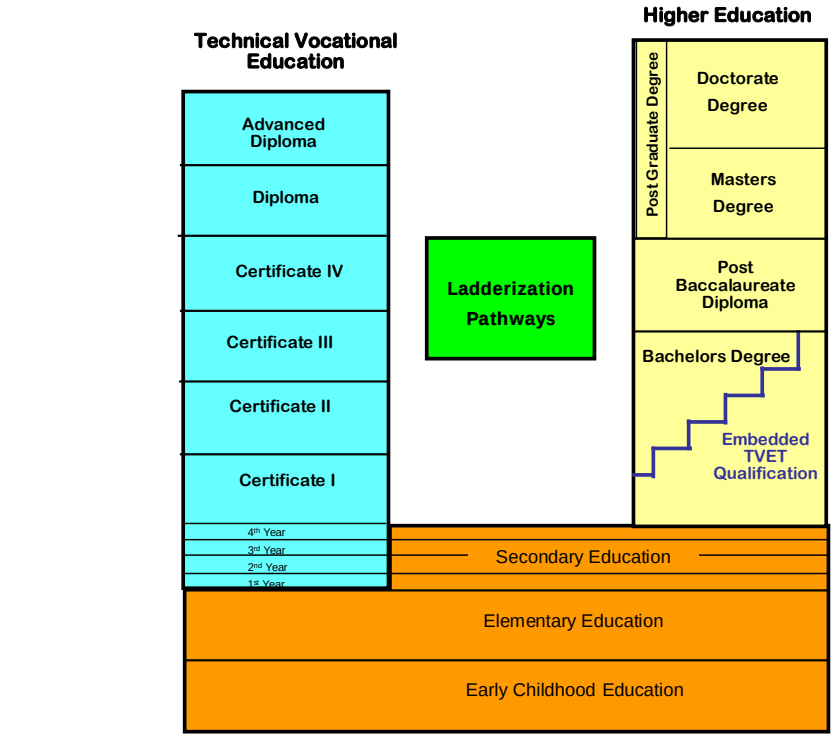

Fig 5 CTE/VTET System of Philippines

The PNQF has been developed to establish a coherent domestic and internationally benchmarked structure for all qualifications awarded in the Philippines. It covers all levels of formal education from the completion of the high school diploma; to certificates for initial entry to the workplace through to doctoral degrees. All qualifications listed on the PNQF are quality assured so that there may be domestic and international confidence not only in their academic and skill standards, and their vocational relevance, but also in the quality of teaching, assessment and the valid awarding of the officially recognized Philippine national qualification.

Among the many qualifications in the TVET sector is an increasing number of competency based National Qualifications (NQ) giving national recognition to the attainment of knowledge, skills, attitudes and values in the middle-level skilled occupations. These national qualifications are based on competency standards defined by industry and professional bodies and are brought together in the Philippine TVET Qualifications Framework (PTQF).

Strength

1 The competency-based learning will be based on competency standards.

2 The system will give emphasis on the skills, knowledge and attitude required to gain qualification rather than the type and length of training programs.

3 The entire system is operationalized within a quality management system to ensure continual improvement.

4 Stakeholders consultation, standards development and promulgation, registration and accreditation of training programs, competency assessment and certification of graduates and workers ensure that the TESD System is relevant, efficient, accessible, comprehensive and quality.

5 Training regulations are the package of competency standards, training standards and assessment and certification arrangements.

6 Quality management review committees at field and economy's levels ensure that continuous improvement is implemented.

7 Assessment and certification ensure that the TVET graduates and skilled workers have the necessary competence to perform the tasks consistent with the required standards in the workplace.

8 The PNQF has been developed to establish a coherent domestic and internationally benchmarked structure for all qualifications awarded in the Philippines.

9 There is a variety of linkages among school, work-based, vocational and academic qualifications.

Opportunity

1 Consistent with the state policy to provide relevant, accessible, high-quality and efficient technical education and skills development in support of the development of high quality middle-level manpower responsive to and in accordance with Philippine development goals and priorities.

2 TVET is seen as an investment that leads people to jobs and enables them to earn income to become economically productive. TVET has proven to be a strategic option because it is rapid, flexible, and jobs-oriented and competency based.

3 The network of public and private TVET institutions provides massive training opportunities, particularly in the light of local and global demand for qualified and highly skilled workers for enhancing productivity and global competitiveness of industries as well as in addressing displacements of workers.

Threat

1 There is a continuing pressure on the technical vocational education and training sector to develop skills more efficiently in the face of globalization, the fast pace of technology change and the need to effectively address the issue of jobs and skills mismatch.

2 The continuing challenge to the TVET sector is to address both skills demand-supply mismatches and the need to enhance the quality productivity and global competitiveness of the Filipino workforce.

Strategy

1 Strengthen linkage of industry-TVET, address enterprise-based training.

2 Improve Labor Market Information.

3 Expand of TVET opportunities in available Jobs.

4 Address the labor demand and supply gaps and matching problems.

5 Institutionalize the system of skills/ qualification progression/ career shifts.

6 Benchmark and align competencies towards international standards.

7 Continue improve in TVET provision.

8 Establish a coherent, domestic and internationally-benchmarked structure of all qualifications awarded in the Philippines.

9 Clearly identify all quality-assured qualifications in the Philippines.

10 Ensure that all qualifications are determined and competencies are arranged for job platforms.

11 Enhance and build on the international recognition of Philippine Qualifications and to support the mobility of skilled workers through the comparability and mutual recognition of skills and qualifications across countries.

3.7 CTE/TVET System of Brunei

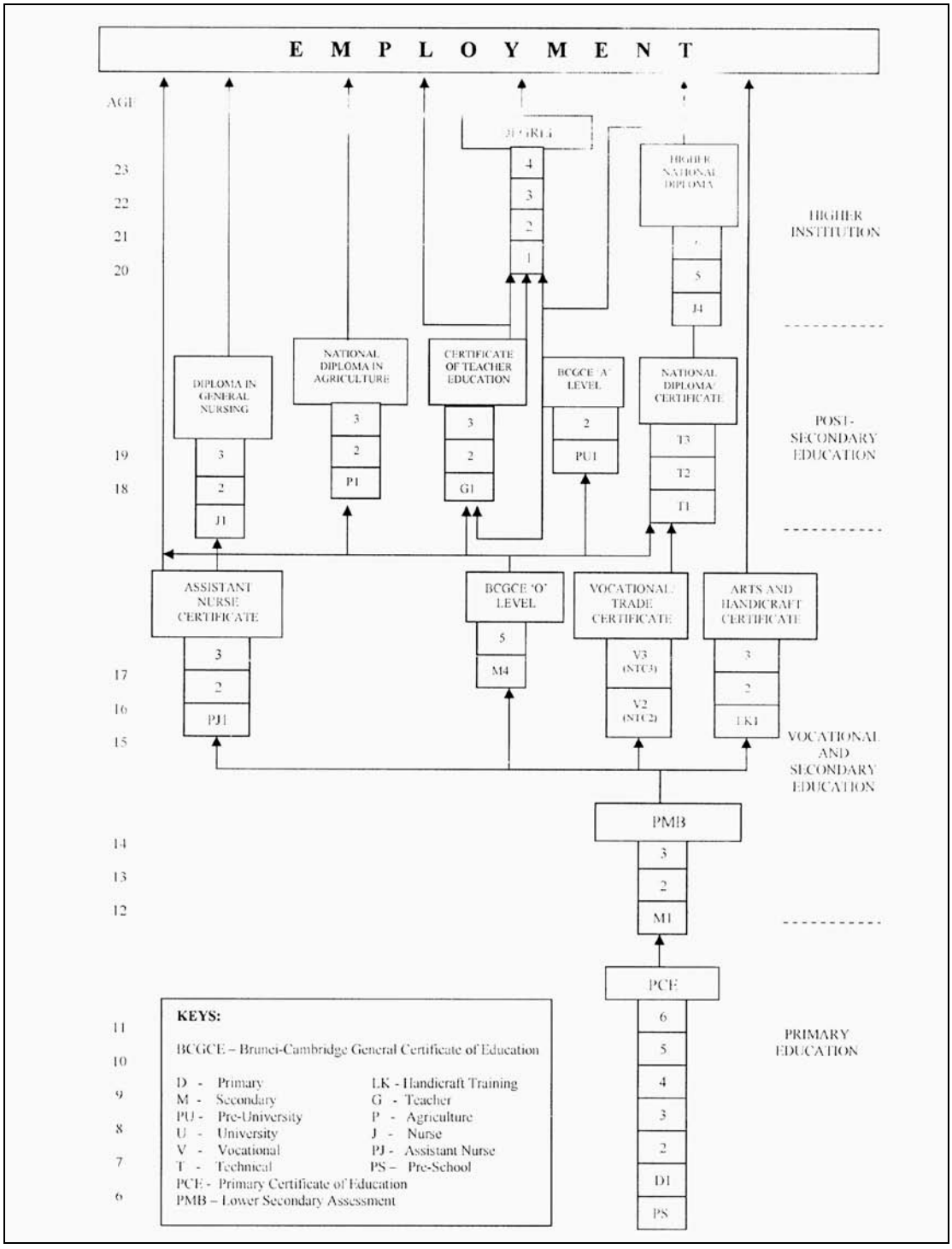

Fig6 CTE/TVET System of Brunei

Strength

1 Prepare for students with the relevant knowledge, skills, values and attitudes to meet the changing needs of a forward looking economy.

2 Provide multiple pathways to higher education.

3 Ensure that students are given suitable learning timeframe to have in depth knowledge and high level of competency.

4 Consolidate and streamline the existing system.

Weakness

There are a distinct lack of coherence and a rather fragmented nature of the domestic system that recognize the various qualifications in the economy.

Opportunity

1 Brunei Darussalam National Qualification Framework will incorporate and recognize qualifications that represent learning outcomes from various learning processes and settings, as well as integrating and recognizing those qualifications obtained via the process of lifelong learning.

2 Brunei Darussalam National Qualification Framework will contribute to policy goals such as lifelong learning, recognition of skills acquired formally or informally, and the improvement to the quality of education and training in the economy.

Strategy

1 Incorporate and recognize qualifications that represent learning outcomes from various learning processes and settings, as well as integrating and recognizing those qualifications obtained via the process of lifelong learning.

2 Contribute to policy goals such as lifelong learning, recognition of skills acquired formally or informally, and the improvement to the quality of education and training in the economy.

3.8 CTE/TVET System of New Zealand

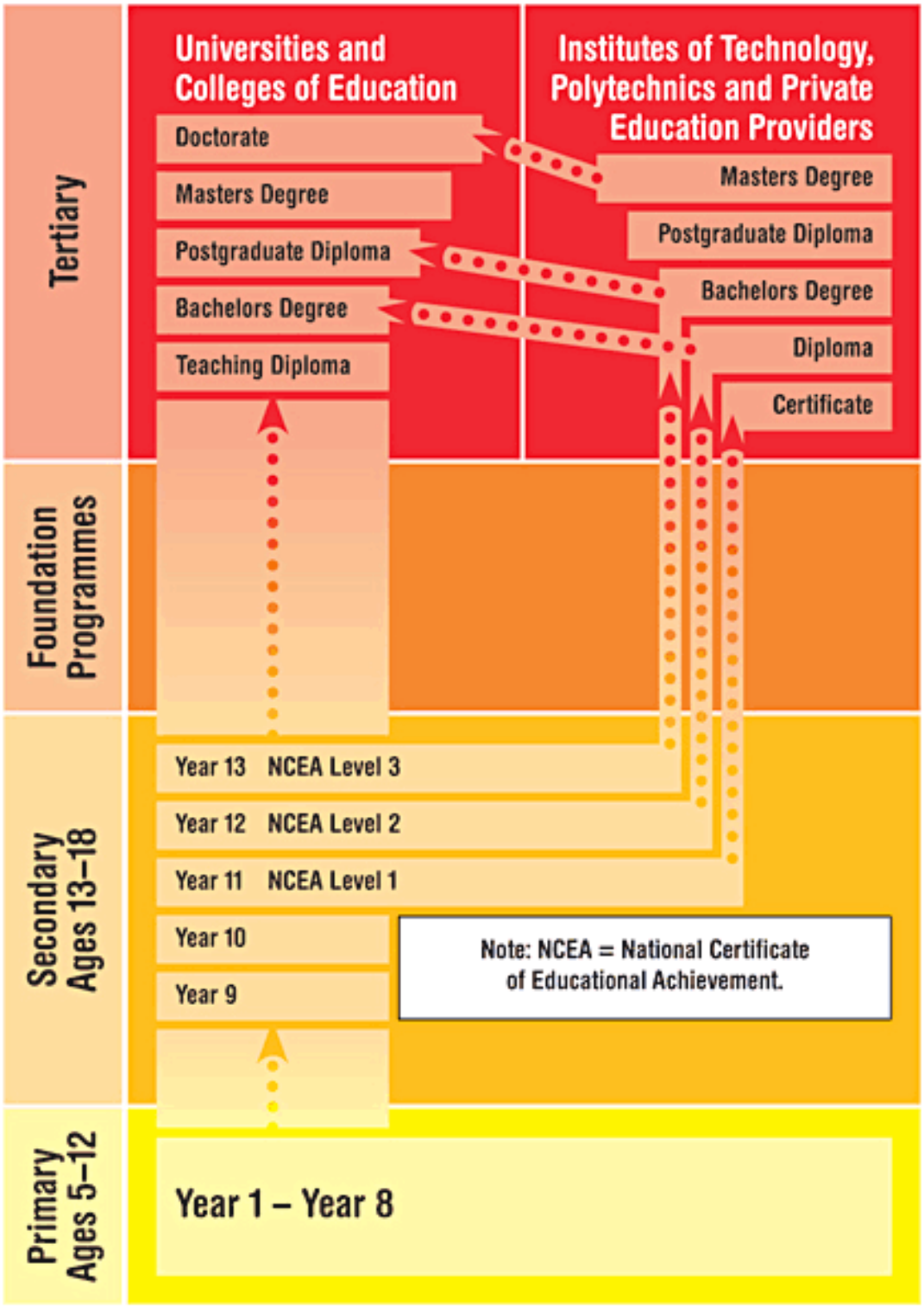

Fig7 CTE/TVET System of New Zealand

Strength

1 Tertiary education providers offer courses which range from transition (school to work) programs.

2 Investment plans take into account student demand, labor market conditions, the skills employers say they need and the government's economic transformation agenda.

3 Allow students to take a course to begin work related learning beyond the range of the traditional school curriculum while remaining enrolled at school.

4 Tertiary education providers include both government and privately owned organizations.

5 There are high teaching hours in a practical environment like studios, laboratories, hospitals and other workplaces.

6 Professional, applied degrees are informed by applied research.

7 Many qualifications have integrated work experience, known as internships, cooperative learning or On-Job Training.

8 The most common qualifications ITPs award are certificates and diplomas to encourage students to build from lower qualifications to higher ones.

9 Programmers respond to the needs of their own communities and economies.

10 Qualifications are highly accessible to students living outside the main cities.

11 Qualifications are domestically and internationally recognized.

12 They facilitate on-job training and contract with training providers to offer off-job training and courses.

13 All qualifications, including university qualifications and all other quality assured local qualifications, are represented on the Register in terms of title, level, credits, outcome statements, and subject classification.

14 The NQF is built on a process of consensus around fitness for purpose. National standards and qualifications are developed by expert groups (engineers for engineering standards, geographers for geography standards etc).

Weakness

There are no fixed divisions between the types of courses offered by each sort of provider.

Opportunity

1 The New Zealand government partly funds state tertiary institutions. New Zealand students contribute about 30 percent of the cost of their courses.

2 Government policies seek to further improve participation and achievement in under-represented population groups.

3 New Zealand also has 11 government agencies recognized as government training establishments (GTEs) because they provide education and training for significant numbers of their employees.

4 New Zealand and Australia have declared mutual recognition of vocational education and training qualifications.

5 Industry training organizations develop standards and national qualifications for specific industries and professions.

6 The KiwiQuals website is the public face of the New Zealand Register of Quality Assured Qualifications, a database list of all quality assured qualifications in New Zealand.

Strategy

1 New Zealand is now embarking on a strategic development to strengthen the original intent of the NQF: remove incentives for unnecessary duplication; reduce proliferation; ensure the Framework is more easily understood and friendly as possible; further strengthen alignment with industry.

2 Develop a unified New Zealand Qualifications Framework: integrate the Register and the existing NQF.

3 Change the design rules for National and New Zealand qualifications to allow for more inclusion of local components - 30%.

4 Major consultations are under way.

5 Introduce a mandatory pre-development assessment stage.

6 Strengthen and standardize qualification outcome statement requirements.

7 Strengthen recognized industry involvement in qualification development.

8 Clearly identify all quality assured qualifications in New Zealand.

9 Ensure that all qualifications have a purpose and relation to each other that students and the public can understand.

10 Maintain and enhance learners' ability to transfer credit by the establishment of a common system of credit.

11 Build on the international recognition of New Zealand qualifications.

3.9 CTE/TVET System of Indonesia

Strength

1 Several government institutions, as well as state-owned companies, provide special courses in different vocational and non-vocational areas.

2 The Dual-track Educational system (DTES) as an innovation in the vocational secondary education includes on the job trainings and apprenticeship in industries into the teaching and learning process.

3 A demand-driven system in Vocational Education and Training guided by labor market signals.

4 An education and training system delivering competencies in accordance with standards recognized by the economy.

5 An education and training system with multiple entry/exit points and flexible delivery.

6 There is a full integration of education and training from a cognitive science perspective.

7 There is a decentralized system of management.

Weakness

Universities, institutes and colleges are allowed to grant academic degrees and diplomas, while polytechnics and academies are allowed to grant only non-degrees diplomas.

Opportunity

1 Trained skill labors meet the industry necessity are needed.

2 Indonesian government has given a substantial attention to the development of technical and vocational education and training (TVET).

3 All spectrum of TVET have been developed in every 5 years also the economy's objectives have developed every year. New vocational schools were built, curriculum updated regularly, textbooks, educational materials and workshop equipment is supplied until now.

4 The future prospect of the vocational school is as conductor of regular training program that organizes a flexible and short time vocational competence trainings, service and production and advanced trainings.

Threat

1 There is lack of structure and infrastructure and cheap equipment.

2 There is lack of quantity and quality of the teachers.

3 There are technology developments.

4 There are changing of work patterns.

5 Population growths are outstanding.

6 Most of labors do not meet the need of industry standard.

Strategy

1. Cooperate with local/international industries in providing spare part and assemble for Vocational Secondary School (VSS).

2. Develop teaching factory in VSS.

3. Direct the student practical to produce spare part.

4 Develop broadening access distribution of qualified vocational school.

5 Develop the quality of vocational school through practicing of discipline attitude, glorious nature mind, environment oriented and contextual student learning focused based on Information and Communication Technology.

6 Empower the vocational school to produce the school leavers with entrepreneurship and skill competency through the development of cooperation with industry and other relevant business entity in form "teaching industry".

7 Produce the flexible school leavers can react/cope within dynamic technology and business transformation in either domestic or international dimension through strengthening aspects of applied sciences, ICT and international languages.

8 Strengthen vocational school management through the implementation of quality management system based on ISO 9001:2008

9 Build good image of the vocational school through communication mass media.

3.10 CTE/TVET System of Chile

Strength

1 the National Training and Employment Service (SENCE) aims to increase the competitiveness of companies and the employability of people, through the enforcement of public policies and instruments for the market of training and labor intermediation leading to the development of a process of life-long training.

2 Through National Training Fund (FONCAP) State covers the expenses of training and education for young poor people, unemployed or those searching for employment for the first time, dependent and independent workers with little or no labor qualification.

3 The private subsidized schools attract middle-class families and the municipal schools cater for the poorer families of society.

4 Most of Chile's professional and technical tertiary institutions (IPs and CFTs) have understood the need for their graduates to have marketable skills and be employable; have established links with employers; and take employers' views into account in designing and developing their courses.

5 VT policy based on an individual bonus for workers who could use it to develop the competences they consider useful for their career development.

Weakness

1 Disjointed system provides LLL and training opportunities.

2 There are Inadequate LLL public funding mechanisms (i.e. current tax incentive for training).

3 Lack of a shared vision about among ministries relevant for LLL: education, labors & social affairs, economic development.

4 The tertiary education system is so segmented; students have significantly different academic and career opportunities depending on their secondary education background, family income level, gender and geographical location.

5 The lack of articulation and pathways between technical training centers, professional institutes and universities compounds these issues and makes upward professional mobility extremely difficult for those entering non-university tertiary educations.

6 At present in Chile some of this information about the right choices of institutions, courses and careerists are limited, biased, and difficult for the average student to analyze.

Opportunity

1 Chilean Ministries of Labor and Education have agreed on the need and potential of a Qualification Framework to improve innovation capacity and productivity in the economy.

2 Chilecalifica provides new opportunities for developing a lifelong learning and training system by building capacity in companies linked to educational institutions.

Threat

1 There is a low quality of learning outcomes across the education system.

2 There are uneven distributions of opportunities in higher education and training.

3 There are low female participation in the labor market.

4 Public consensuses on insufficient human capital is a crucial bottleneck for economic growth.

5 Adult education, technical-vocational education, workforce training and career guidance systems are missing pieces in the 90's reforms.

6 There are two clear identified vulnerable groups: women and young people. The challenge is to raise their low skills, including literacy and numeric skills.

7 There is a majority group of workers unable to capture the opportunities to be better prepared and they have to accept precarious jobs for short periods of time or with low salaries.

8 The importance of vocational and continuous on-the-job training is neglected.

Strategy

1 National Competency System piloted with strategic economic clusters (skills standard development, external certification, CBT).

2 Concern about the quality and relevance of VET.

3 Technical training institutes should be upgraded, to serve greater number of young people.

4 The Framework should be designed to make access to tertiary institutions easier for students from all backgrounds, including vocational secondary schooling, work and previous tertiary study, and to facilitate transfer between institutions and progression from lower to higher level degrees within the tertiary system, by including arrangements for credit accumulation and transfer.

5 Institutional and legal barriers to progress through the tertiary education system should be eliminated, and new pathways through the system created.

6 Qualifications should be based on outcomes and competencies achieved, instead of on time/hours of study put in.

7 Credits from all tertiary education institutions should be made compatible.

3.11 CTE/TVET System of Australia

Strength

1 VET competencies and qualifications cover around 80 percent of occupations in Australia.

2 Entry of non-public providers has been encouraged, and employers and their apprentices are able to select the provider and type of delivery for public funding of training.

3 VET provides an entry-level pathway from school towards a skilled job.

4 Vocational education and training also focuses on assisting disadvantaged learners. It provides a supportive environment in which to learn practical skills for those who may not be confident learners.

5 A strong qualifications framework build confidence in qualification outcomes, improve student pathways both within and between the education sectors and the workplace, enhance the mobility of graduates through increased recognition of the value of Australian qualifications and enable Australian qualifications to be mapped against those of other countries.

6 There are many pathways that connect schools, vocational education and training, universities, community education and employers.

7 The National Skills Framework provides the basis for high quality, flexible, domestically consistent vocational education and training that meets industry needs and which employers can trust.

8 Training packages are the major national quality training product. They are integrated sets of nationally endorsed units of competency, Australian Qualifications Framework (AQF) qualifications and assessment guidelines, designed for a specific industry, industry sector or enterprise.

Opportunity

1 The Australian Government's policy priorities in vocational education and training are to increase investment in vocational education and training places.

2 The Government has implemented systemic reform in the education and training sectors.

3 The Australian Government is supporting retrenched workers, apprentices and young people, through a range of training and employment initiatives, to help them continue to develop their skills and be work ready when the economy recovers.

4 The Australian Government will continue to focus on keeping Australia connected to the labor market until employment rises again.

5 The Australian Government has the ability to balance the short-term needs of responding to the global financial crisis and economic downturn while maintaining a focus on longer term systemic reform in the tertiary sector.

6 During this time the proportion of working age population with vocational qualifications has risen and the workforce has adapted to Australia's changing economic circumstances, such as increased global trade and industry restructuring.

7 An equally large number of students are already working and take up training to improve their career, in response from an employer who wishes to upgrade the productive capacity of their workers.

8 The Australian Government is continuing to reform the training system to be more demand driven, where industry decides what competencies they want in each qualification and these are delivered and recognized by the economy.

9 An open training market which operates in Australia also allows industry to develop responses for their workforces through their own registered training organizations.

10 The Government has implemented systemic reform in the education and training sectors.

11 Education and training as an industry sector are also expected to expand.

12 Australia's future productivity will depend heavily on the knowledge and skills of its workforce.

13 By supporting workers with low literacy levels, the Government is making a strong contribution to lifting the skill base of individuals vulnerable during the global recession.

Threat

1 There is a changing industry profile.

2 Highlight trainings for sustainability (green skills).

3 VET-trained workers are needed in the Australian economy both to replace retiring skilled workers and to assist the Australian economy to move into higher value-added areas.

4 The workforce of VET trainers in training providers are ageing, and trainers' knowledge of the modern workplace is sometimes inadequate.

5 A challenge in an increasingly demand driven system will be how to match student expectations with industries skills needs.

6 Existing workers will be required to up-skill in new green skills to meet emerging consumer demand for sustainable goods and services.

7 Adults (15-74) in Australia had poor or very poor skills in literacy.

Strategy

1 Lift the Year 12 or equivalent attainment rate to 90 percent by 2015.

2 Halve the proportion of Australian aged 20–64 without qualifications at Certificate III and above by 2020.

3 Double the number of higher qualification completions (Diploma and Advanced Diploma) by 2020.

4 40 percent of all 25-34 year olds attain a higher education qualification by 2025.

3.12 Strength, Weakness, Opportunities and Challenges in Common

Among APEC members, we could find we have some common strengths and opportunities, also we face some common challenges.

Strength in common

1 There are qualified instructional resources、administrative system and regular teaching order in the APEC economies.

2 CTE/TVET has been adjusted continuously to meet the needs of various kinds of workforces in the APEC economies.

3 There are internal and external effectiveness on CTE/TVET in the APEC economies.

4 Current CTE/TVET standards have been developed in compliance with the requirements of manufacturing and technology innovation.

Weakness in common

1 The quality、relevant level and internal efficiency of CTE/TVET are still low.

2 CTE/TVET system、mechanism and modes are not suitable for the requirements of labor market、economic and social development.

Opportunities in common

1 Facing trends of global competition and cooperation, governments in the APEC economies have implemented systemic reforms or new policies on CTE/TVET in recent years.

2 CTE/TVET systems and qualification frameworks have been in a gradual transition from the planning-directed mode to a more market-oriented approach in the APEC economies.

3 The CTE/TVET systems are playing a major role in providing lifelong learning opportunities for the people in the APEC economies.

4 Well trained skill labors meeting the industry necessity in the CTE/TVET systems are urgently needed in the APEC economies.

Challenges in common

1 There are lack of quantity and quality of teachers and administrators in the CTE/TVET systems.

2 The general public have misconceptions about the quality、increased rigor and relevance of the CET/TVET programs in the APEC economies.

3 The existing workers in the APEC economies are inadequate to up-skill in new green skills to meet the demand of sustained economic development.

Strategy in common

1 Raise the awareness and increase the understanding of CTE/TVET in the APEC economies.

2 Innovate in the CTE/TVET system and mechanism in the APEC economies.

4. Overview of Survey Results

The growth of economy has increased the interest in comparing qualifications among economies. Qualification is the combination of knowledge, skill and aptitude. One could pursue corresponding job if he/she acquires qualification certification. Qualification is a formal certificate issued by an official agency, in recognition that an individual has been assessed as achieving learning outcomes or competencies to the standard specified for the qualification title. With qualification standard, when employers hire workers, they could have clear understanding about workers' skills and aptitude. For individuals, if their qualifications and skills are recognized, it's helpful for entry into working field or further study.

National qualifications framework (NQF) is an instrument for the development and classification of qualifications according to a set of criteria for levels of learning achieved. National qualifications framework is gathering of qualifications which has its own structure. Qualification certification and quality assurance are integral parts of NQFs. Effective qualifications framework could benefit for workers to master the skills and aptitude needed by industry.

Survey questionnaire was adopted in the project. Following a number of planning meetings among APEC economies, the first draft of the survey questionnaire was established. After many rounds of discussion and adjustment on the questionnaire by experts, the final version of questionnaire was decided. The surveyed questions could be categorized into two styles, which are multiple-choice questions and essay questions. The former is to ask the respondents to confirm yes or no or choose options, the latter is to ask the respondents to explain the issue at length. Economies with NQFs are required to respond all questions in the questionnaire. Economies without NQFs only respond the questions about competency/skill standards and certification and quality assurance. The questionnaire was distributed among APEC economies in 2010. Of the APEC economies 11 responded to the questionnaire until October 2010.

The survey was primarily designed to know about national qualification system, competency/skill standards and certification, quality assurance mechanisms, welding qualifications in APEC economies. Responses to the surveyed questions shall provide detailed information on the existing qualification frameworks being adopted by the APEC member economies as basis for comparability and benchmarking. Mapping of competencies for workers in the welding sector has also been generated from the survey responses. This is a prerequisite for developing training material and training plan.

This section gives general result about the survey of "Comparability and Benchmarking of Competencies and Qualification Frameworks in APEC Region (Pilot Area: Construction/Welding)". The survey result is composed of the following points.

4.1 The structure of national qualifications framework

National Qualifications framework is popular in most surveyed APEC economies. Of the economies without national qualifications framework, industry standards are adopted in some economies (such as USA), provincial qualification is operated in other economies (such as Canada).

Of the economies with national qualifications framework, the applicability of national qualification framework is different. Most economies with NQFs have unified framework for all education and training sectors. However, two independent qualifications frameworks in education sector and training sector are adopted in China.

The structures of the surveyed economies' qualifications frameworks are almost similar. Levels of qualifications are usually listed in NQFs. The components of each qualification are approximately common which include guidance on titling qualifications, qualification descriptors, and descriptors for units within qualifications and competency levels. The details of qualification descriptors are different among surveyed APEC economies. Qualifications in some economies signify achievement in collection/cluster of units/ duties and tasks. In other economies, besides work and job requirements, knowledge and work moral are needed when a qualification is certified.

4.2 Qualification certification

In the surveyed APEC economies with NQFs, the ways of qualification recognition are various. The main approaches of qualification recognition are education and training, competency assessment, education and training plus competency assessment.

During qualification certification, issues like prior learning recognition and credit transfer are usually considered. The recognition of prior learning is a mechanism to recognize individual knowledge and skills which learned from formal or informal education and training, working experience. Credit transfer is a mechanism to recognize all kinds of units or modules of TVET and college achievement, then convert it into credit needed in qualification recognition. Most economies recognize learners' prior learning and carry out credit transfer mechanism in practice. Some economies are now in the process of developing such mechanism (e.g. Indonesia and Malaysia). Some economies have no such mechanisms at all.

4.3 Competency/skill standards and certification

All the economies returned questionnaire have competency/skill standards. However, the formats of competency/skill standards are diverse. The organizations which issue the standards or certify qualifications are different among surveyed economies. Actually government plays important roles in issuing and maintaining

these standards. The agencies responsible for qualification certification are usually government, industry association or training institutions.

4.4 Quality assurance

National qualifications framework, backed by quality assurance, would contribute to the goal of cultivating labors needed by APEC economies. Due to the difference of social system and administration in APEC economies, the organization taking responsibility for quality assurance and the mechanism of quality assurance differ greatly.

5. Survey Results

5.1 Results-Description of the economy's qualification system

Q1-Do you have a national qualifications framework?
Table 1:

	Yes	No	No response
Canada		No	
China	Yes		
Chinese Taipei	Yes		
Hong Kong, China			No response
Indonesia	Yes		
Japan		No	
Korea	Yes		
Malaysia	Yes		
Philippine	Yes		
New Zealand	Yes		
United States of America		No	
Total	7	3	1

All respondents were asked whether there is a national qualifications framework in their economies. As shown in Table 1, the returned surveys indicated that seven of the economies who answered the question report there is a national qualifications framework in their economies. Three economies who answered the question report there isn't a national qualifications framework in their economies.

Although Hong Kong, China didn't make any choice, a note in its questionnaire shows it has a qualifications framework which is a seven-level hierarchy that orders and supports qualifications of academic, vocational and continuing education.

In Korea, unified NQF is on the way of discussing and preparing. Series of results on NQF were introduced by KRIVET (Korea Research Institute for Vocational Education and Training). One of recent research result is the eight levels of NQF.

From literature survey, we know that most NQFs are usually presented with a diagram which is a multilevel qualification hierarchy.

Additionally, China, New Zealand and Philippine introduced their national qualifications framework briefly in their returned questionnaire. The qualifications framework of one economy is different from that of other economies. Some economies adopt unified qualifications framework in vocational education and

general education, while others have two different qualifications frameworks (eg. China).

In China both National Education Qualification Framework and Occupation qualification are adopted. National Education Qualification Framework is a five-level framework which includes primary school diploma, junior school diploma, high school and secondary vocational school diploma, university diploma and degree certificate (College, higher vocational institute diploma), Post-graduate diploma and degree certificate. Occupation qualification is also a five-level qualification which covers primary (Occupational Qualification V), intermediate (Occupational Qualification IV), senior (Occupational Qualification III), technician (Occupational Qualification II), senior Technician (Occupational Qualification I).

New Zealand offers a broad range of academic and vocational qualifications at both secondary and post-secondary levels. New Zealand Qualifications Framework (NZQF) has ten levels of qualification. The requirements of result and credit are needed by each qualification at different level. The qualification of each level is described in terms of process, learning demand and responsibility.

The Philippine National Qualifications Framework (PNQF) covers all levels of formal education from the pre-school levels to doctoral degrees. In general terms, the PNQF has 3 broad components that correspond to the 3 sectors of Philippine education: basic education, technical-vocational education and higher education. The PNQF makes provision for credit transfer among the qualifications in basic education, in technical vocational education and training and in higher education. Quality assurance is mentioned in Philippine questionnaire. Three important measures of quality assurance are: validation of qualifications and/or standards; accreditation and audit of education and training institutions; and quality assurance of assessment leading to the award of qualifications.

Q2- In your economy, how does a worker get recognition for a qualification?
Table 2:

	Education and training	Competency assessment	Both education and training plus competency assessment	Others
China			Yes	
Chinese Taipei			Yes	
Hong Kong, China	Yes	Yes		
Indonesia			Yes	
Korea			Yes	
Malaysia			Yes	
Philippines	Yes	Yes		
New Zealand			Yes	
Total	2	2	6	

In order to find out the ways of getting recognition for a qualification in an economy, the item was designed. As shown in table 2, six of seven economies adopt the way of education and training plus competency assessment to get recognition for a qualification. Either education and training or competency assessment is used in Hong Kong, China and the Philippines.

As for how to implement the way of education and training plus competency assessment to get recognition for a qualification, related examples are given by China and New Zealand. There are two examples in the questionnaire of China. Both examples indicate that learners should complete the learning achievements of certain credit hours and pass corresponding evaluation, and then they would get corresponding certificate or diploma.

In New Zealand a worker involved in industry training may undertake a combination of on-job or off-job training. The assessment will occur through work-place competency assessment or through a tertiary education provider. For example, the National Certificate in Carpentry (Level 4) includes education and training through a tertiary education provider and also includes competency assessments in workplace.

Q3- What agency/ies are in-charge of establishing and maintaining the National Qualifications Framework (NQF)? Specify the mandate and specific roles.

Due to the difference of social systems and administration styles among APEC economies with NQFs, the organizations or agencies responsible for establishing and maintaining the national qualifications framework are different. The details are listed as below:

- In China, the former Ministry of Labor originally established the National Qualification Framework in 1999. Ministry of Education originally established a diploma system after the founding of new China in 1949 and established degree certificate system in1982. Ministry of Labor and Social Security Occupation Skill Testing Center organized various industries to establish occupational standards and compiled national occupation standards into a book. The Office of Academic Degrees Committee of the State Council of the People's Republic of China established degree qualification framework (1982). The Ministry of Education authorized schools to issue diplomas with printed their own school name respectively; in addition, informal educational institutions independently issue their own diplomas.
- In Chinese Taipei, Council of Labor Affairs of Executive Yuan is in charge of establishing and maintaining the National Qualifications Framework.
- In Hong Kong, China, the Education Bureau of the Government of HKSAR, with the support of a secretariat (QF Secretariat), is the subject policy bureau on the development of the HKQF.

- Ministry of Man Power and Transmigration, Ministry of national Education and Ministry of Industry are in charge of establishing and maintaining the National Qualifications Framework in Indonesia. According to the legislation, Ministry of Man Power and Transmigration has duty to develop the national qualification framework with input from Ministry of National Education and Ministry of Industry. The national qualification framework will be endorsed by the President.
- Korean government is the only responsible entity for establishing and maintaining the NQF by relevant law (Framework Act on Qualifications). Especially, Ministry of Education, Science and Technology (MEST) has the authority to do that.
- In Malaysia, Department of Skills Development (DSD) is responsible for skills qualification and Malaysian Qualification Agency (MQA) is responsible for academic qualification.
- In Philippine, Technical Education and Skills Development Authority (TESDA) is for technical/vocational education and training, competency assessment and certification; Commission on Higher Education (CHED) is for higher education (baccalaureate, master, doctoral levels); and Professional Regulation Commission(PRC) is for examination and licensing of professionals.
- New Zealand Qualification Authority (NZQA) is responsible for establishing and maintaining the NZQF. However NZQA designates quality assurance responsibilities to independent organizations. For example the institute of Technology and Polytechnics Quality (ITPQ) has a designated authority to quality assurance courses and qualifications developed by Institutes of Technology and Polytechnics.

Q4- How is the NQF structured in your economy?
Table3:

	Single/unified framework for all education and training sectors	For some sectors only
China		Yes
Chinese Taipei	Yes	
Hong Kong, China	Yes	
Indonesia	Yes	
Korea		Yes
Malaysia	Yes	
Philippine	Yes	
New Zealand	Yes	
Total	6	2

According to application area, NQF is categorized into two styles. One is a unified framework for all education and training sectors, and the other is framework

for some sectors only. All surveyed economies that have NQFs were asked to identify how the NQF is structured. As shown in table 3, Six out of seven economies adopt single/unified framework for all education and training sectors. Only China and Korea chose the option “for some sectors only”.

In China, national education qualifications framework is applied in educational sectors; national occupation qualifications framework is valid in training sectors. Graduates from vocational institutes need to participate in the examination held by Vocational Skill Identification Center to obtain occupation credentials.

In Korea, NQF is structured typically 3 types which are educational qualification system, vocational qualification system and credit bank system. In the Vocational Qualifications sector, National Technical Qualifications (NTQ) , a five level framework, is a typical frame for NQF. Credit bank system is one of the ways to fulfill the desires of people who pursue lifelong learning. In a credit bank system, credits obtained through earning certificates are recognized by the government. The credits secured via these channels also can be accumulated for an academic credential and a diploma. Holders of National Technical Qualification can get credits by each level; Professional Engineers 45, Master Craftsman 30, Engineers 20 and Industrial Engineers 16 credits. The credits for National Qualifications and Authorized Private Qualifications are depending on its equivalency with academic achievement.

There are five questions in this part. These questions are designed to identify the structure of NQF and qualification in APEC economies with NQFs. All respondents are asked to identify whether their NQF includes guidance on titling qualifications, qualifications descriptors, and descriptors for units within qualifications, competency levels to indicate complexity of the process, responsibility and application.

Q5.1- Does the NQF include guidance on titling qualifications?
Table4:

	Yes	No
China	Yes	
Chinese Taipei	Yes	
Hong Kong, China	Yes	
Indonesia	Yes	
Korea		No
Malaysia	Yes	
The Philippines	Yes	
New Zealand	Yes	
Total	7	1

As shown in table 4, NQF of most surveyed APEC economies includes guidance on titling qualifications. However, there is no guidance on titling qualifications in Korea. Most economies agreed that guidance on titling qualifications has been a component of national qualifications framework.

China explained the guidance on titling qualifications in its questionnaire. Guidance on titling qualifications is the definition of occupation. Occupation means the social work category which employees are engaged in to acquire the main source of livelihood. The guideline of naming occupational qualification is based on the identity of work nature. For example, Electric welders are staffs who are engaged in operating welding equipments and gas cutting equipments and operating metal parts welding or cut-based shaping.

Additionally, at present, guidance on titling qualifications is only limited to the courses which are developed based on the Specifications of Competency Standards in Hong Kong, China.

Q5.2- Does the NQF include qualifications descriptors?
Table5:

	Yes	No
China	Yes	
Chinese Taipei	Yes	
Hong Kong, China		No
Indonesia	Yes	
Korea	Yes	
Malaysia	Yes	
The Philippines	Yes	
New Zealand	Yes	
Total	7	1

As shown in table 5, there are seven economies whose NQF includes qualifications descriptors. These economies are China, Chinese Taipei, Indonesia, Korea, Malaysia, Philippine and New Zealand. HKQF has no qualifications descriptors.

In China, the qualification descriptor of National vocational standards includes occupation summaries, basic requirements, job requirements, proportion table of different requirements and so on. The scope of occupation activities, job contents, skills requirements and knowledge levels are clearly specified in qualification descriptor. For example, junior welders should meet correspondent requirements of theoretical knowledge and operational skills.

Q5.3- Does the NQF include descriptors for units within qualifications?
Table6:

	Yes	No
China	Yes	
Chinese Taipei	Yes	
Hong Kong, China		No
Indonesia	Yes	
Korea	Yes	
Malaysia	Yes	
Philippine	Yes	
New Zealand	Yes	
Total	7	1

As shown in table 6, NQFs of seven economies include descriptors for units within qualifications. These economies are China, Chinese Taipei, Indonesia, Korea, Malaysia, Philippine and New Zealand. There are no descriptors for units in HKQF.

In the annex returned from Philippine, welding trade is taken as an example. Welding competencies are composed of basic competency, common competency and core competency. Basic component is described in unit title, level and unit descriptors. Qualification title, level, competency title and descriptors are listed in core competency.

In the annex returned from China, taking senior welders' occupational function as an example. The work of welding involves pre-welding preparation, welding and post-welding inspection. Each occupational phase is described in work content, skill requirements and related knowledge.

Q5.4- Whether qualifications signify achievement in broad area or collection/cluster of units/ duties and tasks?
Table7:

	Broad area	collection/cluster of units/ duties and tasks
China	Yes	
Chinese Taipei	Yes	
Hong Kong, China	Yes	Yes
Indonesia	Yes	
Korea	Yes	
Malaysia		Yes
The Philippines		Yes
New Zealand	Yes	Yes
Total	6	4

As shown in table 7, the mode of achievement in broad area is used in four economies (China, Chinese Taipei, Indonesia and Korea). Qualification achievement of Malaysia and the Philippines NQFs focuses on collection of units/duties and tasks. Qualification achievements in broad area and collection of units/duties and tasks are both emphasized in Hong Kong, China and New Zealand.

In China, besides work requirements, knowledge and work moral are also the requirements of a qualification. In New Zealand, an example of a broad area qualification is the National Diploma in Business, which could include a range of areas for achievement. An example of a qualification with more specificity is the National Diploma in Agribusiness Management.

Q5.5- Does the NQF include competency levels to indicate complexity of the process, responsibility and application?

The returned surveys indicated that NQFs in all economies with NQFs include competency levels to indicate complexity of the process, responsibility and application. That means qualifications in NQFs are classified by competency level.

Q6- Guidelines for determining competency for particular qualification
Table8:

	Yes	No
China	Yes	
Chinese Taipei	Yes	
Hong Kong, China		No
Indonesia		No
Korea	Yes	
Malaysia	Yes	
The Philippines	Yes	
New Zealand	Yes	
Total	6	2

As shown in table 8, most economies with NQF set guidelines for determining competency for qualification. These economies are China, Chinese Taipei, Korea, Malaysia, Philippine and New Zealand. There is no such guideline to determine qualification competency in Hong Kong, China and Indonesia.

In China, these guidelines to determine qualification competency are usually the definition of corresponding terms related to occupation classification. Occupation classification is to systematically divide and to classify community occupation on the guidance of identical work nature. The so-called work nature can be recognized as the fundamental nature through which we can distinguish one work from others. The work nature is generally reflected from some difference existing in occupational activities objects and work style etc. Take occupation skill standards of construction industry as an example. Occupation skill standards of construction industry:

occupation skill standards of construction engineering implementation, occupation skill standards of construction engineering installation (including requirements of occupation skill level to welders) and occupation skill standards of architectural decoration.

In Philippine, Guidelines for determining competency for particular qualification refer to the explanation of technique which used to identify qualification competency. The competencies for a particular qualification are determined by the panel of experts from industry association or group of companies relevant to the sector or qualification. This is usually done through the method of functional analysis. The entry point of functional analysis (FA) is the formulation of the industry's key purpose. Answering the question follows a statement-format VERB-OBJECT-CONDITION (Construct vertical and horizontal infrastructures). Since FA is a deductive process, the key purpose is then deduced into major functions. The major functions are actually the sub-area of performance required to achieve the key purpose. Each major function has its own sub-area of performance and which can still be further deduced. The third level of analysis will yield the minor functions. These minor functions will have corresponding sub-area of performance that can be considered individual work function.

Q7- the recognition of prior learning, recognition of current competency and credit transfer between qualifications and sectors

Table9:

	Yes	No
China		No
Chinese Taipei	Yes	
Hong Kong, China		No
Indonesia	Yes	
Korea	Yes	
Malaysia	Yes	
The Philippines	Yes	
New Zealand	Yes	
Total	6	2

The question focuses on detail information about the recognition of prior learning, recognition of current competency and credit transfer in NQFs. The economies which recognize prior learning and current competency are Chinese Taipei, Indonesia, Korea, Malaysia, Philippine and New Zealand. Both Indonesia and Malaysia are still in the process of developing thus mechanism.

In Korea, National Technical Qualification system asks for a minimum requirement for application for the test by each level. It includes education, workplace experience, holding certificate, etc. In the reviewing of applicants' eligibility for the test, recognition of prior learning might be considered as a various forms, typical case

is exemption from test. According to Credit Bank System, holders of National Technical Qualification can get credits by each level; Professional Engineers 45, Master Craftsman 30, Engineers 20 and Industrial Engineers 16 credits. The credits for National Qualifications and Authorized Private Qualifications are depending on its equivalency with academic achievement.

In China and Hong Kong, China, there is no such mechanism. But in Hong Kong, China, the mechanism of recognition of prior learning (RPL) has been implemented, on a pilot basis, for three industries for a period of two years with effect from 2008.

Q8- A credit framework for evaluating the quantity and complexity of a qualification
Table10:

	Yes	No
China	Yes	
Chinese Taipei	Yes	
Hong Kong, China		No
Indonesia	Yes	
Korea	Yes	
Malaysia		No
The Philippines		No
New Zealand	Yes	
Total	5	3

The question checks whether economies have credit framework in their NQFs. Survey shows that credit framework is implemented in China, Chinese Taipei, Indonesia, Korea and New Zealand. Credit framework in Indonesia is being developed at present. In Malaysia, Philippine and Hong Kong, China, there isn't credit framework for evaluating the quantity and complexity of a qualification. It is indicated in submitted questionnaire that Hong Kong, China is developing credit framework now. New Zealand and China give detailed information about their credit framework.

The NZQF contains information on the credit framework. For example, certificates can be registered at levels 1-7, and require a minimum of 40 credits at the level at which they are registered. Diplomas can be registered at levels 5-7 and must have a minimum of 120 credits from level 4 and above, with 72 credits at the level the qualification is registered.

Taking the proportion table of identification of occupation skill to welders as an example, China prescribes the proportion of theoretical knowledge and operational skill needed to acquire a qualification.

5.2 Results-Competency/ Skill Standards and Certification

Table11:
Q1- Which format of Occupational Standards is used in your economy?

	Occupational Skills standards	Competency Standards	Specific Industry standards	Others
Canada	Yes	Yes		
China	Yes			
Chinese Taipei		Yes		
Hong Kong, China		Yes		
Indonesia		Yes		
Japan	Yes	Yes		Yes
Korea		Yes		
Malaysia	Yes			
Philippine		Yes		
New Zealand	Yes	Yes	Yes	Yes
United States			Yes	
Total	5	8	2	2

As shown in table 11, occupational standard is widely used in every surveyed economy .The formats of occupational standards are various in all surveyed economies. Three economies adopt more than one format of occupational standard. These economies are Canada, Japan and New Zealand.

Occupational skill standards, competency standards and other formats are used in Japanese Occupational Standards. However, it doesn't specify what the option "others" means. Both occupational skill standards and competency standards are adopted in Canada. In USA, specific industry standards are popular formats.

Q2-What organization issues and maintains these standards?
Table12:

	government	industry association	enterprise	training institution	other organization
Canada					Yes
China	Yes				
Chinese Taipei	Yes				
Hong Kong, China					Yes
Indonesia	Yes				
Japan	Yes	Yes			

Korea	Yes				
Malaysia	Yes				
Philippine	Yes	Yes			Yes
New Zealand	Yes				
United States		Yes			
Total	8	3			3

As shown in table 12, the organizations or agencies that are responsible for issuing and maintaining qualification standards are mainly government, industry association or other organizations. In most surveyed economies, government takes the full responsibility to issue and maintain standards. These economies are China, Chinese Taipei, Indonesia, Korea, Malaysia and New Zealand.

In New Zealand, industry training organizations, the Ministry of Education and NZQA develop assessment standards. NZQA is the government agency that quality assures and registers the standard. NZQA also records individual learner achievement on a central database.

Other organization issues and maintains standards in Canada and Hong Kong, China. In Canada, the Canadian council of directors of apprenticeship (CCDA) maintains these standards by consulting closely with industry partners and stakeholders. CCDA is a body made up of federal, provincial and territorial apprenticeship authorities in partnership with industry. In Hong Kong, China, the industries, with the assistance of the QF Secretariat, set up Industry Training Advisory Committees (ITACs), which comprise key representatives of the employer associations, trade unions, professional bodies and relevant regulatory bodies in the industry concerned. The ITACs are tasked to draw up competency standard for the relevant sectors, which set out the skills, knowledge and outcome standards required of employees in different functional areas of the respective sectors, and provide a basis for course providers to design training courses to meet the needs of the sectors.

In USA, qualification standard is issued and maintained by industry association.

More than one organization issue and maintain standards in Japan and the Philippines. In Japan, government and industry association jointly complete the task. In the Philippines, the organizations or agencies issuing and maintaining standards are government (promulgates and manages utilization), industry association (develops and recommends to government) and other organization (such as owners, vendors of proprietary standards).

Q3- What organization certifies the achievement of qualifications?
Table13:

	government	industry association	enterprise	training institution	other organization
Canada	Yes				
China	Yes				
Chinese Taipei	Yes	Yes		Yes	

Hong Kong, China					Yes
Indonesia					Yes
Japan		Yes			
Korea	Yes				
Malaysia	Yes				
The Philippines	Yes	Yes		Yes	Yes
New Zealand	Yes			Yes	
United States		Yes			
Total	7	4		3	3

As shown in table 13, certification organizations in surveyed economies are diverse. Government, industry association, training institution and other organization play important roles in qualification certification.

Industry association is the qualification certification organization in USA and Japan.

Qualification certification is governed by government in Canada, China, Korea and Malaysia.

In Chinese Taipei, government, industry association and training institution are the qualification certification organizations.

In Hong Kong, China, the relevant education and training providers, as well as the RPL assessment agencies under the HKQF is responsible for qualification certification. In Indonesia, Indonesian Professional Certification Authority (IPCA) gives license to a number of authorized certification bodies according to sectors based on accreditation system to do their respective competency certification.

Government and training institution are responsible for qualification certification in New Zealand. Various organizations in New Zealand are accredited to assess against the standards contained within qualifications. For national certificates and diplomas, NZQA certifies the achievement of the qualification. For provider developed qualifications, the individual provider certifies the achievement of qualifications.

In the Philippines, government, industry association, training institution and other organization are all involved in qualification certification. Other organizations are owners, vendors of proprietary standards.

5.3 Results-Quality Assurance

Q- What Quality Assurance Mechanisms are implemented to ensure the effectiveness and reliability of the certification system?

The question focuses on quality assurance mechanisms applied in all APEC economies. A qualification framework is only as strong as the quality assurance system supporting it. Quality assurance mechanism is implemented to ensure the

effectiveness and reliability of the certification system. The returned survey shows the quality assurance mechanism in an economy differs from each other. There is no explanation on quality assurance mechanism in Chinese Taipei questionnaire. Here is the detailed information about quality assurance mechanisms in the surveyed economies.

Service Standards are maintained which ensure that standards and examinations are kept up-to-date and that their development is both timely and fully collaborative. ------Canada

There is no quality assurance mechanism at federal government level in United States. Quality assurance mechanism, if any, is implemented by industry associations. ------USA

The Japan Accreditation Board for Conformity Assessment (JAB) has been established to authorize certification/qualification bodies, such as JWES, which assess and qualify companies and personnel under ISO standards. JAB always audits qualification bodies. ------Japan

There are government supervision (by system) and public supervision (by network) in China. If any organization who certifies the achievement of qualifications is not passing the supervision, it will be warned even disqualified. ------China

Certification System is carried out under a economy's certification body called Indonesia Professional Certification Authority (IPCA). The economy's body with 15 people from industry and 10 people from government ex officio is an independent body reporting to the president of Indonesia. The national certification system's philosophy is: "Education and Training Based on Competency is development of competency while competency certification system ensures and maintains competency." ------ Indonesia

In the NTQ system, there are committees on its quality of management and operation. Each committee has a responsibility for review of relevance and reliability of NTQ system. To meet the needs of industry for human resources, entrust the testing service to relevant organizations/institutions. ------Korea

The Quality Assured Technical Education and Skills Development (TESD) system is the framework by which secondary school graduates, school leavers, disadvantaged groups and currently employed workers are put through a process that enables them to get employment and productivity enhancement. The process ensures that the TESD System is relevant, efficient, accessible, comprehensive and quality assured by focusing on stakeholders' consultation, standards development and promulgation, registration and accreditation of training programs, competency assessment and certification of graduates and workers. ------ The Philippines

The HKQF is underpinned by a robust quality assurance mechanism and was formally launched in May 2008, when the Accreditation of Academic and Vocational Qualifications Ordinance commenced full operation. The Hong Kong, China Council for Accreditation of Academic and Vocational Qualifications (HKCAAVQ) is specified as the Accreditation Authority and the Qualifications Register Authority under the Accreditation of Academic and Vocational Qualifications Ordinance, and

tasked with the responsibility of assuring the quality of qualifications recognized under the QF. ------ Hong Kong, China

There are various quality assurance mechanisms in place to ensure that the provider, as well as the qualification, is quality assured throughout delivery of qualifications. In tertiary education area, quality assurance mechanism is ensured through registration and accreditation, course approval and accreditation, self-assessment and external evaluation and review. As for quality assurance of assessment standards and qualification, NZQA quality assures and registers assessment standards and qualification, to ensure that only credible, robust, consistent standards and qualification are listed on the Directory of Assessment Standards (DAS) and NZQF respectively. ------New Zealand

5.4 Comparability of Welding Qualifications

Qualification titles in welding

Using the International Standard Classification of Occupations (ISCO) as reference, the respondent-member-economies specified equivalent qualification titles in the welding trades. The following economies indicated qualifications framework for welding : Canada, China, Chinese Taipei, Hongkong SAR, Indonesia, Japan, Malaysia, New Zealand, the Philippines, Korea and the United States of America.

Though it is not explicitly stated in the responses given by some respondent-economies, we can safely assume all the respondent-economies have existing qualifications along shielded-metal arc welding (SMAW), considering this is the most commonly-used welding process. At least four (4) economies—Philippines, Malaysia, Indonesia and Chinese Taipei—have explicit qualifications defined for SMAW. The Philippines has four (4) qualification levels specifically along SMAW, Malaysia has three (3), Indonesia has two (2) and Taipei has one level/category of qualification covering 42 welding positions. The other respondent-economies have qualifications covering two or more welding processes including SMAW.

The welding entry-level qualifications vary economies with existing welding qualifications. For the Indonesia, Malaysia and the Philippines, the entry level or lowest qualification level for welders is at the first level in the NQF (National Certificate Level I in the Philippines, Malaysian Skills Certificate I, and Level I in Indonesia). In New Zealand, this is at Certificate Level 2, in the Republic of Korea it is at Craftsman level, and in Canada welders are at journeyperson level under its Red-Seal program.

The Philippines, Malaysia, Indonesia and Japan defined explicit levels of welding qualifications for the various welding processes using various materials or metals. The entry or lowest levels generally cover carbon-steel or mild-steel plate

welding, with the higher qualification levels covering stainless steel and alloy metals for plates, butts and pipes.

The welding qualification levels defined in the Philippines, Indonesia, Taipei, New Zealand and Canada cover only those for middle-level workers or those falling under technical and vocational education and training (TVET). Those for Malaysia, Japan, and Republic of Korea extend up to the welding-engineer level.

As a general case, we can see that progression of welders in the NQF begins at performance of manual welding processes using low-carbon steel and basic welding positions for plate and butt welding. Then it progresses to use of alloys and other special materials covering plates, butts and pipes in both basic and more difficult positions.

Welding competencies/skills

Following the qualification titles specified, the respondent-economies then proceeded to list or identify the units of competency, skills or duties as the case may be for each qualification specified. Please refer again to the attached comparison matrix.

Data from the member-economies which responded to this question show that the core competencies or specialist skills in welding were fundamentally the same across the economies. Progression is from entry-level basic welding skills to advanced welding competencies for the higher qualification levels.

There is some variation in the extent of integration of basic and common competencies in the welding qualifications. Basic competencies referred to here are what other economies may term as key competencies, essential skills or employability skills or core work skills along the areas of communication, team work, problem-solving, and health-safety-environmental concerns. Common competencies are industry-wide or sector-wide skills such as competencies on the bench work, fitting up and repair of welds for the welding sector.

Most respondents included, in addition to the specialist welding skills, competencies along safety practices, drawing and blueprint/chart reading, bench work, fabrication, measurements and calculations. .

Communication skills were explicitly mentioned only in the case of the Philippines and Indonesia, though there is reason to suppose this would be an enabling or underpinning skill in the welding competencies listed by the other economies. In the case of the Canada Red-Seal program for Welder occupation, for example, such skill is included as a sub-task under the overall task of *Organize work*.

Japan has a detailed specification of specialist competencies defined by welding process, materials and positions, closer to what are known as welder performance qualifications (WPQs) which are based on welding procedures and specifications (WPS).

Summary

The survey gives a good indicator of the commonality of welding competencies and qualifications across the member-economies and makes a good point for proceeding with the mutual recognition of skills and qualifications along the welding trades.

Renowned welding standards promulgated and used by some economy's welding societies and associations in the APEC region are used by employers in that economy and acknowledged and used in other economies. It is recommended that welding societies and associations within the APEC region be convened to discuss the commonalities shown here and confer if the welding societies and organizations would parenthetically agree to acknowledging the comparability according to a common reference, e.g ISO or one member economy's welding standards. The welding societies and organizations can also discuss a mechanism by which the certificates issued in the name of the different standards can be compared and acknowledged elsewhere in the region.

(Please see Annex A for the Comparability Matrix)

6. Discussion and Recommendations

This section provides conclusions in relation to regional qualifications framework in the APEC region including the feasibility of establishing an Asia-Pacific Qualifications Framework. Issues, needs and possible future areas of collaboration and cooperation in the field of qualifications framework should be identified. Welding qualification is taken as an example to compare and benchmark the qualification titles, levels, and competencies/skills/duties and tasks among APEC economies. Proposal on establishing an APEC regional qualifications framework would be given in this section.

1. The feasibility of establishing an APEC regional qualifications framework

APEC economies that have NQFs and return this survey show some common understanding on qualifications framework.

- The purpose of NQFs

Unified NQFs are beneficial to improving the quality, accessibility, linkages and public or labor market recognition of qualification. Unified regional qualifications framework would be a basis for education and training on relative qualification. Students and workers can take up international study and employment opportunities if their skills and qualifications are recognized. This makes labor mobility and education equity possible.

- Foundations of NQFs

National Qualifications Framework

A qualification framework is an instrument for the classification of qualifications according to a set of criteria for levels of learning outcomes achieved. NQFs are usually composed of many levels of qualifications. They are usually described with diagrams giving the levels of qualifications. Each level in NQFs is involved in qualifications of many industries. A qualification is in recognition that an individual has been assessed as achieving learning outcomes or competencies to the standard specified for the qualification, usually a type of certificate, diploma or degree.

Not only is the description of qualification levels included in NQFs, certification of qualification and quality assurance of qualification are more important parts in NQFs.

NQFs of APEC economies always associate with three sectors in education and training area. They are school education (usually secondary education), technical and vocational education, and tertiary education. Also NQFs have close relationship with the department of labor or industry.

Qualification

The components of a qualification are general descriptor of qualification (usually the general information about knowledge, skill or competency needed by the qualification), the units of qualification and descriptors for qualification units. A qualification could be certified by education and training or/plus competency assessment. When acquiring a qualification, individual prior learning relevant to the

qualification could be recognized in most economies that have NQFs. Mechanisms of credit transfer and quality assurance are popular in most economies with NQFs.

Competency/skill standards

No matter whether there is a national qualifications framework in APEC economies, competency/skill standards are popular in all APEC economies returned survey result. Organizations of issuing and maintaining competency standards are established accordingly. Agencies of certifying the achievements of qualification are set up as well.

All economies with NQFs have interested in sharing their details and experience on NQFs. Actually economies without NQFs is familiar with qualification. For example, there is probably certain industry qualification in USA, while provincial qualification is established in Canada.

The common interest in NQFs of most economies and similarity of NQFs make it possible to establish a reference qualifications framework for the region.

- The distinctions of NQFs

Although similarities of NQFs in APEC economies exist, there are considerable differences in NQFs that have adopted them. Such differences are listed below.

The number of NQFs levels in all economies is various. Some economies adopt a NQF with 8 levels; others take a NQF with 10 levels. Level one is the highest qualification in some economies, while level ten is the highest qualification in other economies. The level arrangement is the result of long-term implementation of NQFs in individual economy. It's tough to change levels of NQFs and level arrangement of individual economy.

NOF in Some APEC economies involves qualifications for all education and training areas. However, others just include some sectors and qualifications in their economies. This would make against mutual understanding on qualifications among APEC economies.

The structure of qualification units is different from each other. In some economies, qualification units are divided according to the flow of corresponding tasks within the qualification. The requirements of qualification units are related to the operation demands and knowledge needed by the tasks. In other economies, qualification units are divided based on competency types, such as basic competency, common competency and core competency. The cost of identifying qualification units is high. Now it is impossible to accomplish it.

Although recognition of prior learning, the mechanism of credit transfer and credit framework are set up in most APEC economies with NQFs, the elaborate information of how to recognize the prior learning, how to transfer credit between different education and training sectors, how to implement credit framework is not expounded thoroughly. These issues are needed to identify firstly when regional qualification framework is established.

NQFs, backed by a system of quality assurance, can contribute to improvement in matching workers to industry needs and of individual to education and training over their working lives. Quality assurance is possibly the most central part of NQFs. Usually quality assurance functions are located in certain agency responsible for the

NQF or distributed to other agencies across the sectors. The quality assurance of qualification includes meeting the requirements of the descriptor in the framework. Quality assurance of qualifications typically involves three regulatory elements: accreditation, awarding and monitoring of providers. All economies returned survey result show quality assurance has been an important part of their qualifications. However, the method or procedure of quality assurance is not mentioned in the returned survey result. Also the agencies responsible for quality assurance in APEC economies are quite different. This doesn't help to establish and maintain regional qualification framework.

The establishment of regional qualifications framework should meet the needs of labor mobility among APEC economies. Furthermore, APEC economies should share common understanding of qualification and qualifications framework. Also certain indispensable prerequisites are needed to establish regional qualifications framework, such as common legal foundation, shared cultural foundation, institutions responsible for regional qualifications framework, and common momentum of regional qualifications framework development. In addition, it is important to fund the establishment and maintenance of regional qualifications framework. All these prerequisites are not available in APEC region. Some economies without NQFs have little interest in establishment of regional qualifications framework.

All economies with NQFs have developed researches on NQFs and had some practice in NQFs, they have shown certain interest in research on NQFs as well. However, it isn't appropriate to establish regional qualifications framework at present due to survey result and status quo.

2．Comparability and benchmarking of competencies in welding industry

Compare research on welding competencies of all surveyed economies has been done in this research. This would help all surveyed economies share common understanding on welding qualification levels, competencies/skills/duties and tasks of welding qualification on different level. Educational and training material on welding qualification would be developed based on this common understanding. Thus the training on workers would meet the needs of market demand. Employees' mobility among APEC economies would come true.

3. Cooperation issues

Identify the parallel of different levels of NQFs among APEC economies.

The APEC economies should work together to develop and identify the knowledge, skills, and competencies of each level of qualification.

The APEC economies should make collaboration on the research of credit framework and credit transfer mechanism.

4. Recommendations

Qualifications usually relate to education and training areas and certain industry. In order to meet the requirements of qualification, government should play an important role to coordinate relationships relevant to NQFs.

The APEC economies should work together to analyze the existing regional qualifications framework (such as EU's qualifications framework). Effective reference would be obtained from this analysis to lay foundations for establishing regional qualifications framework.

Economies with NQFs should share their critical experience in developing a national qualifications framework.

APEC should use the survey result and the lessons provided by economies with NQFs to facilitate ongoing dialogue between member economies and other Asia-Pacific economies on national qualifications frameworks. The dialogue includes the following topics: the differences of NQFs among APEC economies, the advantages to be gained from understanding these differences; issues on quality assurance and qualification certification.

On the basis of research and practice, a proposal for a voluntary regional qualification framework should be developed and disseminated amongst member economies for comment.

References

APEC Human Resources Development Working Group (2009), Mapping Qualifications Frameworks across APEC Economies, http:// www.apec.org (accessed September 2010).

David Lythe, 2009, Developing Qualifications Frameworks: Imperatives for Comparability and Benchmarking, report, unpublished.

Annex A

Questionnaire
COMPARABILITY AND BENCHMARKING OF COMPETENCIES AND QUALIFICATION FRAMEWORKS IN APEC REGION
(Pilot Area: Construction/Welding)

Part II: Describe the economy's qualification system

1. Do you have a national qualifications framework?
   - ❑ Yes
   - ❑ No

   If yes, please attach the framework to indicate levels and descriptors.
   If no, please proceed to Part III.

2. In your economy, how does a worker get recognition for a qualification?
   - ❑ Education and training
   - ❑ Competency assessment
   - ❑ Both education and training plus competency assessment
   - ❑ Others, pls. specify _____

3. What agency/ies are in-charge of establishing and maintaining the National Qualifications Framework (NQF)? Specify the mandate and specific roles.

4. How is the NQF structured in your economy?
   - ❑ Single/unified framework for all education and training sectors
   - ❑ For some sectors only. Please indicate the sectors.

5. Does the NQF include:
   5.1. Guidance on titling qualifications
      - ❑ Yes
      - ❑ No

      If Yes, please attach guidelines.

   5.2 Qualifications descriptors
      - ❑ Yes
      - ❑ No

      If Yes, please attach descriptors for all welding qualifications.

   5.3 Descriptors for units within qualifications
      - ❑ Yes
      - ❑ No

      If Yes, please attach descriptors for all welding competencies.

5.4 Whether qualifications signify achievement in:

- ❑ broad area
- ❑ collection/cluster of units/ duties and tasks

5.5 Competency levels to indicate complexity of the process, responsibility and application.

- ❑ Yes
- ❑ No

6. Guidelines for determining competency for particular qualification
   - ❑ Yes
   - ❑ No

   If Yes, please attach guidelines.

7. The recognition of prior learning, recognition of current competency and credit transfer between qualifications and sectors
   - ❑ Yes
   - ❑ No

   If Yes, please attach system of recognition of prior learning.

8. A credit framework for evaluating the quantity and complexity of a qualification
   - ❑ Yes
   - ❑ No

Part III: Competency/ Skill Standards and Certification

Competency/Skills Standards

1. Which format of Occupational Standards is used in your economy?
   - ❑ Occupational Skills standards
   - ❑ Competency Standards
   - ❑ Specific Industry standards
   - ❑ Others, Please specify

2. What organization issues and maintains these standards?
   - ❑ Government
   - ❑ industry association
   - ❑ Enterprise
   - ❑ training institution
   - ❑ other organization. Please specify_____

3. What organization certifies the achievement of qualifications?
   - ❑ Government
   - ❑ industry association
   - ❑ training institution

- ❑ enterprise
- ❑ other organization. Pls. specify _____

Part IV: Quality Assurance

In your economy, what Quality Assurance Mechanisms are implemented to ensure the effectiveness and reliability of the certification system?

Please attach Quality Assurance Mechanisms.

Part V : Comparability of Welding Qualifications

A. Using the International Standard Classification of Occupations (ISCO) as reference, please specify the equivalent qualification titles in WELDING.

ISCO Classification	Economy's equivalent qualification title	Level
Metal Moulders, Welders, Sheet-Metal Workers, Structural Metal Preparers and Related Trades Workers	• Welders, Production • Welders and Cutters • Welder-Fitters • Welding Machine Setters and Set-up Operators • Welding Machine Operators and Tenders	The United States Government does not have levels or certifications. Any certification is determined by industry associations.
❑ Welders and flamecutters		

Example: (Philippines)

ISCO Classification	Economy's equivalent qualification title	Level
Welders and Flamecutters	*Shielded Metal Arc Welding (SMAW)*	*National Certificate I, II, III, IV*
	Gas Metal Arc Welding (GMAW)	*National Certificate I, II, III*
	Flux Cored Arc Welding (FCAW)	*National Certificate I, II, III*
	Gas Tungsten Arc Welding (GTAW)	*National Certificate II, IV*

	Submerged Arc Welding (SAW)	*National Certificate I, II*
	Gas Welding	*National Certificate I, II*

B. Welding Competency/Skills

Based on your Economy's equivalent qualification title, please enumerate the units of competencies/skills/duties and tasks performed by the workers in the qualification:

Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
1.	a.
	b.
	c.
	d.
2.	a.
	b.
	c.
	d.
3.	a.
	b.
	c.
	d.

Example: (Philippines)

Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
Shielded Metal Arc Welding (SMAW) NC II	*Participate in Workplace Communication*
	Work in a Team Environment
	Practice career professionalism
	Practice occupational health and safety procedures
	Apply Safety Practices
	Interpret Drawings and Sketches
	Perform Industry Calculations
	Contribute to Quality System
	Use hand Tools
	Prepare Weld Materials
	Set-up Welding Equipment
	Fit up Weld Materials
	Repair Welds
	Carbon Steel Plates and Pipes Using SMAW

Annex B

Comparability of Welding Qualifications

A. Using the International Standard Classification of Occupations (ISCO) as reference, the member economies specified the equivalent qualification titles in WELDING as follows:

ISCO Classification	Philippines		Malaysia		Indonesia		Taipei	
	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level
Welders and Flame cutters	Shielded Metal Arc Welding (SMAW)	National Certificate I, II, III, IV	Shielded Metal Arc Welder (Carbon Steel)	Malaysian skills Certificate I, II, III	SMAW (MMAW) Welder	Level I	Shielded Metal Arc Welding (SMAW)	National Certificate Single Class (42 positions)
			Shielded Metal Arc Welder (Carbon Steel & Stainless Steel)	Malaysian skills Certificate II	SMAW (MMAW) Welder	Level II		
			Shielded Metal Arc Welding Technician (Carbon Steel & Stainless Steel)	Malaysian Skills Certificate III				
			Shielded Metal Arc Welding Technician (Carbon Steel & Stainless Steel & Aluminium)	Malaysian Skills Certificate III				
			Shielded Metal Arc Welder (Carbon Steel)	Malaysian Skills Certificate I				
	Gas Metal Arc Welding (GMAW)	National Certificate I, II, III	Gas Metal Arc Welder(Carbon Steel, Stainless Steel & Aluminium)	Malaysian Skills Certificate II			Gas Metal Arc Welding (GMAW)	National Certificate Single Class (35 positions)
			Gas Metal Arc Welding Technician (Carbon Steel, Stainless Steel & Aluminium)	Malaysian Skills Certificate III				

ISCO Classification	Philippines		Malaysia		Indonesia		Taipei	
	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level
	Flux Cored Arc Welding (FCAW)	National Certificate I, II, III	Flux Cored Arc Welding Technician (Carbon Steel)	Malaysian Skills Certificate III			Flux Cored Arc Welding (FCAW)	National Certificate Single Class (included in GMAW)
	Gas Tungsten Arc Welding (GTAW)	National Certificate II, IV	Gas Tungsten Arc & Shielded Metal Arc Welding Technician (Carbon Steel & Stainless Steel)	Malaysian Skills Certificate III			Gas Tungsten Arc Welding (GTAW)	National Certificate Single Class (46 positions)
			Gas Tungsten Arc Welder (Carbon Steel & Stainless Steel)	Malaysian skills Certificate II				
	Submerged Arc Welding (SAW)	National Certificate I, II	Submerged Arc Welding Operator (Carbon Steel)	Malaysian Skills Certificate II				
			Submerged Arc Welding Technician (Carbon Steel)	Malaysian Skills Certificate III				
	Gas Welding	National Certificate I, II	Gas Welder	Malaysian skills Certificate I, II, III			Gas Welding	National Certificate Single Class (10 positions)
			Non Ferrous Metal Welding Technician	Malaysian Skills Certificate III				
			Non Ferrous Metal Welder	Malaysian skills Certificate II				
			Assistant Welding Engineer (Fabrication)	Malaysian Skills Diploma (Level IV)				
			Welding Engineer (Fabrication)	Malaysian Skills Advanced Diploma				

ISCO Classification	Philippines		Malaysia		Indonesia		Taipei	
	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level
				(Level V)				
			Welding Inspector	Malaysian skills Certificate I, II, III				
			Steel Structure Erector & Fabricator	Malaysian skills Certificate I, II, III				
			Sheet Metal Fabricator	Malaysian skills Certificate I, II, III				

A. Using the International Standard Classification of Occupations (ISCO) as reference, the member economies specified the equivalent qualification titles in WELDING as follows:

ISCO Classification	New Zealand		Japan		Korea		Canada	
	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level
Welders and Flame cutters	MIT Certificate in Manual Metal Arc & Gas Metal Arc Welding (Level 3)	Certificate Level 3	Manual welding for carbon steels (SMAW, GTAW, OFW)		Welding	National Technical Qualification Professional Engineer, Engineer, Master Craftsman, Industrial Engineer, Craftsman	Welder	Red Seal (fully qualified journeyperson)
			SMAW, GMAW, and GTAW for stainless steels					
			GTAW and GMAW for titanium and its alloys					
	Certificate in Advanced Welding (Level 4)	Certificate Level 4	Semi-automatic welding for carbon steels (GMAW, FCAW)					
	Certificate in Welding (Level 4)	Certificate Level 4	Oxy-Fuel Gas Brazing for copper, carbon steels and stainless steels (Silver brazing)					
	Certificate in Welding (Level 3)	Certificate Level 3	Manual Hot Gas Welding for plastics					
	Certificate in Welding & Fabrication Skills (Level 3)	Certificate Level 3	Welding coordination personnel (Welding engineers)					
	Certificate in Welding and Fabrication (Level 3)	Certificate Level 3						
	Certificate in Welding and Fabrication (Level 4)	Certificate Level 4						
	Certificate in Engineering Fitting and Welding (Level 2)	Certificate Level 2						

	Certificate in Engineering (Welding and Structural Steel (Level 3)	Certificate Level 3						
	Certificate in Fabrication and Welding (Level 3)	Certificate Level 3						
	Certificate in Mechanical Engineering and Welding (Level 2)	Certificate Level 2						
	MIT Diploma in Applied Engineering Welding (Level 5)	Certificate Level 5						
	National Certificate in Mechanical Engineering (Level 5)	National Certificate Level 5						
	National Certificate in Engineering Fabrication (Level 4)	National Certificate Level 4						

A. Using the International Standard Classification of Occupations (ISCO) as reference, the member economies specified the equivalent qualification titles in WELDING as follows:

ISCO Classification	USA		CHINA		Hong Kong, China			
	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level	Economy's equivalent qualification title	Level
Welders and Flame cutters	Welders, Production		Shielded Metal Arc Welding (SMAW) Gas Metal Arc Welding (GMAW) Rail Welding Automobile Welding Titanium equipment Welding Gas Welding Hand Gus Cutting Plasma Cutting	National Occupational Qualification Level V to Level I				
	Welders and Cutters							
	Welder-Fitters							
	Welding Machine Setters and Set-up Operators							
	Welding Machine Operators and Tenders							

B. Welding Competency/Skills

Based on the specified equivalent qualification title, please enumerate the units of competencies/skills/duties and tasks performed by the workers in the qualification were enumerated as follows:

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
Shielded Metal Arc Welding (SMAW) NC I	Receive and respond to workplace communication			SMAW (MMAW) Welder	Communicate in the workplace	Shielded Metal Arc Welding (SMAW) Single Class (Carbon Steel Plates and Pipes Weld)	Basic preparation and reading of welding charts
	Work with others				Implement Occupation Health and Safety in the workplace		Bench work procedures
	Demonstrate work values				Measure using simple basic measurement instrument		Use of measurement instruments
	Practice basic housekeeping procedures				Read simple and basic technical drawing		Practice occupational health and safety procedures
	Apply Safety Practices				Using hand and basic power tools		Use hand Tools
	Interpret Drawings and Sketches				Carry out mechanical cutting		Prepare Weld Materials
	Perform Industry Calculations				Carry out flame cutting		Set-up Welding Equipment
	Contribute to Quality System				Carry out basic welding process by using shield metal arc welding equipment		Fit up Weld Materials
	Use Hand Tools				Carry out down hand position welding by using shield metal arc welding equipment		Quality Control and Evaluation of Welds
	Prepare Weld Materials				Carry out horizontal position welding by using shield metal arc welding equipment		
	Setup Welding Equipment				Make a report		
	Fit up Weld Materials				Carry out basic calculation related to the welding job		
	Repair Welds						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	Weld Carbon Steel Plates Using SMAW						
Shielded Metal Arc Welding (SMAW) NC II	Participate in Workplace Communication			SMAW (MMAW) Welder 2	Working in a team		
	Work in a Team Environment				Implement Occupation Health and Safety in the workplace		
	Practice career professionalism				Measure using precision measurement instruments		
	Practice occupational health and safety procedures				Read technical and welding symbol		
	Apply Safety Practices				Carry out vertical position welding by using shield metal arc welding equipment		
	Interpret Drawings and Sketches				Weld piping construction down hand position using shield metal arc welding equipment		
	Perform Industry Calculations				Weld piping construction vertical and rotation position using shield metal arc welding equipment		
	Contribute to Quality System				Interprate instruction and manual in English		
	Use hand Tools				Operate Computer		
	Prepare Weld Materials			SMAW (MMAW) Welder 3	Implement Quality Management System		
	Set-up Welding Equipment				Plan routine jobs		
	Fit up Weld Materials				Weld piping construction vertical and unrotation position using shield metal arc welding equipment		
	Repair Welds				Weld piping construction inclined and unrotation position using shield metal arc welding equipment		
	Weld Carbon Steel Plates and Pipes Using SMAW				Weld sheet metal and piping all position using gas tungsten arc welding and shied metal		

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
					arc welding equipment		
Shielded Metal Arc Welding (SMAW) NC III	Lead workplace communication				Implement handling material		
	Lead small teams				Identify and use properly welding materials		
	Develop and practice negotiation skills				Maintain and repaire welding equipment and its accesories		
	Solve problems related to work activities				Implement welding metallurgy		
	Use mathematical concepts and techniques						
	Use relevant technologies						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use hand Tools						
	Prepare Weld Materials						
	Set-up Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Weld Alloy Steel Plates Using SMAW						
Shielded Metal Arc Welding (SMAW) NC IV	Utilize specialized communication skills						
	Develop teams and individuals						
	Apply problem solving techniques in the workplace						
	Collect, analyze and organize information						
	Plan and organize work						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	Promote environmental protection						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use hand Tools						
	Prepare Weld Materials						
	Set-up Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Weld Alloy Steel Pipes Using SMAW						
Gas Metal Arc Welding (GMAW) NC I	Receive and respond to workplace communication					Gas Metal Arc Welding (GMAW) Single Class (Carbon Steel Plates and Pipes Weld)	Basic preparation and reading of welding charts
	Work with others						Bench work procedures
	Demonstrate work values						Use of measurement instruments
	Practice basic housekeeping procedures						Practice occupational health and safety procedures
	Apply Safety Practices						Use hand Tools
	Interpret Drawings and Sketches						Prepare Weld Materials
	Perform Industry Calculations						Set-up Welding Equipment
	Contribute to Quality System						Fit up Weld Materials
	Use Hand Tools						Quality Control and Evaluation of Welds
	Prepare Weld Materials						
	Setup Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	Weld Carbon Steel Plates Using GMAW						
Gas Metal Arc Welding (GMAW) NC II	Participate in Workplace Communication						
	Work in a Team Environment						
	Practice career professionalism						
	Practice occupational health and safety procedures						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use hand Tools						
	Prepare Weld Materials						
	Set-up Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Weld Carbon Steel Pipes Using GMAW						
Gas Metal Arc Welding (GMAW) NC III	Lead workplace communication						
	Lead small teams						
	Develop and practice negotiation skills						
	Solve problems related to work activities						
	Use mathematical concepts and techniques						
	Use relevant technologies						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use hand Tools						
	Prepare Weld Materials						
	Set-up Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Weld Alloy Steel Plates Using GMAW						
	Weld Alloy Steel Pipes Using GMAW						
Flux Cored Arc Welding (FCAW) NC I	Receive and respond to workplace communication						
	Work with others						
	Demonstrate work values						
	Practice basic housekeeping procedures						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use Hand Tools						
	Prepare Weld Materials						
	Setup Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Weld Carbon Steel Plates Using FCAW						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
Flux Cored Arc Welding (FCAW) NC II	Participate in Workplace Communication						
	Work in a Team Environment						
	Practice career professionalism						
	Practice occupational health and safety procedures						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use hand Tools						
	Prepare Weld Materials						
	Set-up Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Weld Carbon Steel Pipes Using FCAW						
Flux Cored Arc Welding (FCAW) NC III	Lead workplace communication						
	Lead small teams						
	Develop and practice negotiation skills						
	Solve problems related to work activities						
	Use mathematical concepts						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	and techniques						
	Use relevant technologies						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use hand Tools						
	Prepare Weld Materials						
	Set-up Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Weld Alloy Steel Plates Using FCAW						
	Weld Alloy Steel Pipes Using FCAW						
Gas Tungsten Arc Welding (GTAW) NC II	Participate in Workplace Communication					Gas Tungsten Arc Welding (GTAW) Four Materials: (Carbon Steel, Low-alloy, Stainless Steel and Aluminum Plates and Pipes Weld)	Basic preparation and reading of welding charts
	Work in a Team Environment						Bench work procedures
	Practice career professionalism						Use of measurement instruments
	Practice occupational health and safety procedures						Practice occupational health and safety procedures
	Apply Safety Practices						Use hand Tools
	Interpret Drawings and Sketches						Prepare Weld Materials
	Perform Industry Calculations						Set-up Welding Equipment
	Contribute to Quality System						Fit up Weld Materials
	Use hand Tools						Quality Control and Evaluation of Welds
	Prepare Weld Materials						
	Set-up Welding Equipment						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	Fit up Weld Materials						
	Repair Welds						
	Weld Carbon Steel Plates Using GTAW						
	Weld Carbon Steel Pipes Using GTAW						
Gas Tungsten Arc Welding (GTAW) NC IV	Utilize specialized communication skills						
	Develop teams and individuals						
	Apply problem solving techniques in the workplace						
	Collect, analyze and organize information						
	Plan and organize work						
	Promote environmental protection						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use hand Tools						
	Prepare Weld Materials						
	Set-up Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Weld Alloy Steel Plates Using GTAW						
	Weld Alloy Steel Pipes Using GTAW						
Submerged Arc Welding (SAW) NC I	Receive and respond to workplace communication						
	Work with others						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	Demonstrate work values						
	Practice basic housekeeping procedures						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use Hand Tools						
	Prepare Weld Materials						
	Setup Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Weld Plates Using SAW						
Submerged Arc Welding (SAW) NC II	Participate in Workplace Communication						
	Work in a Team Environment						
	Practice career professionalism						
	Practice occupational health and safety procedures						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use hand Tools						
	Prepare Weld Materials						
	Set-up Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	Weld Pipes Using SAW						
Gas Welding NC I	Receive and respond to workplace communication					Gas Welding (Carbon Steel Plates and Pipes Weld)	Basic preparation and reading of welding charts
	Work with others						Bench work procedures
	Demonstrate work values						Use of measurement instruments
	Practice basic housekeeping procedures						Practice occupational health and safety procedures
	Apply Safety Practices						Use hand Tools
	Interpret Drawings and Sketches						Prepare Weld Materials
	Perform Industry Calculations						Set-up Welding Equipment
	Contribute to Quality System						Fit up Weld Materials
	Use Hand Tools						Quality Control and Evaluation of Welds
	Prepare Weld Materials						
	Setup Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Perform Gas Welding in Carbon Steel Plates and Tubes						
Gas Welding NC II	Participate in Workplace Communication						
	Work in a Team Environment						
	Practice career						

Philippines		Malaysia		Indonesia		Taipei	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	professionalism						
	Practice occupational health and safety procedures						
	Apply Safety Practices						
	Interpret Drawings and Sketches						
	Perform Industry Calculations						
	Contribute to Quality System						
	Use hand Tools						
	Prepare Weld Materials						
	Set-up Welding Equipment						
	Fit up Weld Materials						
	Repair Welds						
	Perform Gas Welding in Alloy Steel Plates and Tubes						

Other Comments/ Suggestions about comparability/benchmarking of welding qualifications.

B. Welding Competency/Skills

Based on the specified equivalent qualification title, please enumerate the units of competencies/skills/duties and tasks performed by the workers in the qualification were enumerated as follows:

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
National Certificate in Engineering-Fabrication (Level 4)	First aid			Craftsman Inert Gas Arc Welding	Welding general	Welder	Maintains and uses tools and equipment.
	Occupational health and safety				Welding material		Organizes work.
	Measurements				Machinery drawing (none cutting section)		Performs quality control.
	Tools				Special welding practice		Performs routine trade activities.
	Materials and metals			Engineer Welding	Machinery manufacturing		Handles materials.
	Engineering sketching and drawing				Mechanics of materials		Performs layout.
	Trade calculations				Welding Metallurgy		Fabricates components.
	Welding processes				Welding structure design		Uses mechanical and power tools for cutting and grinding.
	Fitting				Safety management		Uses oxy-fuel gas cutting process (OFC) for cutting and gouging.
	Assembly				Welding practice		Uses plasma arc cutting process (PAC) for cutting and gouging.
	Scaffolding			Professional Engineer Welding	Welding methods		Uses air carbon arc cutting (CAC-A) gouging process.
	Basic fabrication operations				Welding metallurgy		Welds using oxy-acetylene welding process.
	Forces and stresses				Welding materials		Welds using shielded metal arc welding process (SMAW).
	Pressure vessels				Welding structure design		Welds using flux cored arc welding process (FCAW), metal core arc welding process (MCAW) and gas metal

New Zealand		Japan		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
							arc welding process (GMAW).
	Pattern development				Welding construction management		Welds using gas tungsten arc welding process (GTAW).
	Computer numerical control				Welding relevant equipment		Welds using submerged arc welding process (SAW).
	Job costing				Safety and hygiene		Welds using other processes.
	Demonstrate and apply knowledge of safe procedures under supervision				Inspection of welding part		
					Rule and standards on welding		
					Machinery system		
					Production management		
Certificate in Engineering Welding and Structural steel (Level 3)	Select, use and care for simple measuring devices used in engineering						
	Assemble and mechanically join plate and sheet under supervision						
	Demonstrate and apply knowledge of safe welding procedures under supervision						
	Mechanically cut fabrication materials under supervision						
	Shift loads in engineering installation, maintenance and fabrication work						
	Cut metals using manual thermal process						
	Manage first aid in emergency situations						
	Weld steel structures with the gas metal arc welding process in downhand positions						
	Weld steel to a general purpose industry standard with the gas metal arc welding						

New Zealand		Japan		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	process						
	Weld steel to a general purpose industry standard with the manual metal arc welding process						
	Weld structural steelwork with the manual metal arc welding processes in downhand positions						
Certificate in Welding (Level 4)	Structural Manual Metal Arc Welding	Manual welding for carbon steels (SMAW, GTAW, OFW)	Knowledge (According to WES 8201) >General knowledge in welding >Structure of welding power sources and operation >Steels and welding consumables >Welding processes >Testing & inspection of weld >Safety in welding				
	Structural Gas Metal Arc Welding		Skill (SMAW, SMA Welding for carbon steel of; >thin steel sheet (Designation: 1) >medium thickness plate (Designation: 2) >thick steel plate (Designation: 3) >without backing plate (Designation: N) >with backing plate (Designation: A) in; >flat position				

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
			(Designation: F) >vertical position (Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with horizontally/vertically fixed pipe (Designation: P)				
	Aluminum Gas Tungsten Arc Welding		Skill (GTAW, GTA Welding (Designation: T) for carbon steel of; >thin steel sheet (Designation: 1) without baking plate in; >flat position (Designation: F) >vertical position (Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with horizontally/vertically fixed pipe (Designation: P)				
	Stainless Gas Tungsten Arc Welding		Skill (Combined welding process such as GTAW plus SMAW, Combined Welding for carbon steel of; >medium thickness plate (Designation: 2) >thick steel plate				

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
			(Designation: 3) without backing plate in; >flat position (Designation: F) >vertical position (Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with horizontally/vertically fixed pipe (Designation: P)				
	Pressure Pipe Welding		Skill (OFW, Oxy-Fuel Gas Welding for carbon steel of ; >thin steel sheet (Designation: 1) without backing plate in; >flat position (Designation: F) >vertical position (Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with horizontally/vertically fixed pipe (Designation: P)				
	Pipe Manual Metal Arc Welding	SMAW, GMAW and GTAW for Stainless Steels	Knowledge (According to WES 8211) >Classification and				

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
			properties of stainless steels >Welding consumables for stainless steels >Welding processes >Testing & inspection of weld >Safety in welding				
	Health and safety		Skill (SMAW, SMA Welding for stainless steel of; >without backing plate (Designation: N) >with backing plate (Designation: A) in; >flat position (Designation: F) >vertical position (Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with horizontally/vertically fixed pipe (Designation: P)				
Certificate in Welding & Fabrication Skills (Level 3)	Manual Metal Arc (Stick)		Skill (GTAW, GTAW Welding for stainless steel in; >flat position (Designation: F) >vertical position				

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
			(Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with horizontally/vertically fixed pipe (Designation: P)				
	Gas Metal Arc (MIG)		Skill (GMAW, GMA Welding for stainless steel; >without backing plate (Designation: N) >with backing plate (Designation: A) in; >flat position (Designation: F) >vertical position (Designation: V) >horizontal position (Designation: H)				
	Gas Tungsten Arc Welding (TIG)	GTAW and GMAW for titanium and its alloys	Knowledge (According to WES 8205) >Classification and properties of titanium and its alloys >Welding consumables for titanium and its alloys >Welding processes of titanium and its alloys >Testing & inspection of weld >Safety in welding				
	Health & Safety		Skill (GTAW, GTAW Welding for titanium and its alloys without				

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
			backing plate in; >flat position (Designation: F) >vertical position (Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with horizontally/vertically fixed pipe (Designation: P)				
	Drawing interpretation		Skill (GMAW, GMA Welding (MIG) for titanium and its alloys with backing plate in; >flat position (Designation: F)				
	Marking out	Oxy-Fuel Gas Brazing (Silver brazing) for copper, carbon steels and stainless steels	Knowledge (According to WES 8291) > Fundamentals of silver brazing > Structure of brazing apparatus and operation > Filler metal > Properties of brazed joint > Testing and inspection of brazed joint > Safety in brazing				
	Gas and Plasma cutting		Skill Oxy-Fuel Gas Brazing for; > Copper				
	Arc Air and Plasma gouging						
	Workshop skills						

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	Communication skills		(Designation; Cu) > Steel (Designation; S) > Stainless steel (Designation; SUS) in; > Flat position (Designation; F) > pipe welding with horizontally fixed pipe				
		Manual Hot Gas Welding for plastics	Knowledge (According to WES 8231) >Fundamentals of plastics > Welding processes > Properties of weld > Testing and inspection, repairing > Safety in welding				
			Skill Manual hot gas welding for; > Polyvinyl chloride (Designation; PVC) > Polypropylene (Designation; PP) > Polyethylene (Designation; PE) in; > flat position (Designation: F) > vertical position (Designation: V) > horizontal position (Designation: H) > overhead position (Designation: O)				
		Semi-automatic	Knowledge (According to				

New Zealand		Japan		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
		welding for carbon steels (GMAW, FCAW)	8241) >General knowledge in welding >Structure of welding power sources and the operation >Steels and welding consumables >Welding processes >Testing & inspection of weld >Safety in welding				
			Skill (GMAW, GMA Welding for carbon steel of; >thin steel sheet (Designation: 1) >medium thickness plate (Designation: 2) >thick steel plate (Designation: 3) >without backing plate (Designation: N) >with backing plate (Designation: A) in; >flat position (Designation: F) >vertical position (Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with				

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
			horizontally/vertically fixed pipe (Designation: P)				
			Skill (Combined welding process such as GTAW plus GMAW, Combined Welding for carbon steel of; >medium thickness plate (Designation: 2) >thick steel plate (Designation: 3) without backing plate in; >flat position (Designation: F) >vertical position (Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with horizontally/vertically fixed pipe (Designation: P)				
			Skill (FCAW-S, Self shielded flux cored arc welding for; >medium thickness plate (Designation: 2) >thick steel plate (Designation: 3) without backing plate in; >flat position (Designation: F) >vertical position				

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
			(Designation: V) >horizontal position (Designation: H) >overhead position (Designation: O) >pipe welding with horizontally/vertically fixed pipe (Designation: P)				
		Welding Coordination Personnel	Comprehensive technical knowledge and Job competence for providing supervising welding production and control of welding fabrication at a top level				
			Specific technical knowledge and Job competence for providing executing welding production and procedure control				
			Basic technical knowledge and Job competence assisting welding procedure control				
Manukau Institute of Technology (MIT) Diploma in Applied Engineering Welding (Level 5)	Recognize and examine the need for budgeting and other management control concepts with a welding context						
	Supervise workplace operations within a welding context						
	Plan, organize and allocate work to achieve objects						
	Supervise welding activities						

New Zealand		**Japan**		Korea		Canada	
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
	Carry out repair welding techniques						
	Carry out steel pipe welding with cellulose and hydrogen controlled electrodes						
	Demonstrate a knowledge of welding metallurgy						
	Demonstrate a knowledge of welding technology						
	Assess a candidates performance						
	Carry out reflective practice on supervision activities						

B. Welding Competency/Skills

Based on the specified equivalent qualification title, please enumerate the units of competencies/skills/duties and tasks performed by the workers in the qualification were enumerated as follows:

USA		CHINA		Hong Kong, China			
Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/ Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks	Economy's equivalent qualification title	Competencies/Skills/Duties and Tasks
		Senior Welder	Be able to conduct safety inspection of sites, equipments and work fixtures				
			Be able to choose and use the correct welding rod and wire				
			Be able to prepare for the groove of cast iron, nonferrous metals, dissimilar metals				
			Be able to carry out the debugging of welding equipment				
			Be able to build test conditions of welded joints				
			Be able to conduct welding of gray cast iron				
			Be able conduct welding of aluminum and its alloys, to carry out welding of copper and its alloys, to carry out welding of titanium and its alloys				
			Be able to carry out double-sided molding with the single-sided welding of pearlite steel and austenite stainless steel, to carry out welding of low-carbon steel and low alloy steel				
			Be able to carry out				

			single-sided molding with double-sided welding of flat-panel butting with looking-up welding position				
			Be able to carry out double-sided molding with single-sided welding of level fixed position of pipe butting				
			Be able to carry out double-sided molding with single-sided welding of ride-sitting tube plate with looking-up welding position				
			Be able to carry out two-sided molding with single-sided welding of vertical fixed small-diameter pipe and level fixed obstacles				
			Be able to carry out double-sided molding with single-sided welding of 45◦ tilt fixed small-diameter tube				
			Be able to carry out welding of typical containers and structures				
			Be able to prevent welding defects of special materials				
			Be able to prevent the welding defects of typical containers and structures				
			Be able to carry out penetration test				
			Be able to carry out hydraulic test				

Other Comments/ Suggestions about comparability/benchmarking of welding qualifications.