National Competency Standards and Construction Industry Skills Council in Korea

Kyoung-youn Na, Ph.D. in Economics/Researcher of the CERIK

I. National Competency Standards (NCS) and Index of Construction Engineer's Competency (ICEC)

1. Outline of NCS

As a part of the policy to create a competency-oriented society in which people are employed awarded and promoted based not on academic credentials and backgrounds but on competency, the Ministry of Employment and Labor developed the National Competency Standards and then have had many public institutions use NCS since 2015. NCS is the systematization of knowledge, technology, and intelligence required to perform their duties in industrial settings by the Korean government according to industrial sectors and levels and means the standardization of competencies (knowledge, technology, attitude) required to successfully perform duties in industrial settings at the national level (Development Manual for NCS, 2015).

According to the job types, NCS consists of Major Groups (24), Sub-Major Groups (80), Minor Groups (226), and Unit Groups (880). Job means Unit Groups in the NCS classification system, and the standards were developed by Minor Group (job). The competency unit is the basic element of NCS as a sub-unit of the NCS classification system and includes the competency unit elements, application ranges, work status, assessment guidelines, and basic job skills. Moreover, the competency unit elements mean important core sub-competencies composing competency units and consist of the performance criteria for individual performance standards and knowledge, technology, and attitude.

In addition, NCS systematized the job performance level at industrial sites by establishing a level system. NCS also developed a total of eight stages of the level system

ranging from Level 1[1] to Level 8[2].

2. Index of Construction Engineer's Competency (ICEC)

The Ministry of Land, Infrastructure and Transport rates construction managers according to technical level (Special, High, Intermediate, Beginner) using the Index of Construction Engineer's Competency (ICEC) in order to systematically manage construction technical personnel according to the Construction Technology Promotion Act. For construction engineers who finished their reports according to Paragraph 1 of Article 21 of the Construction Technology Promotion Act, ICEC scores their career (40 points), qualification (40 points), academic background (20 points), and education training (3 points). The calculation formula is as shown in Equation (1). Additionally, construction managers are rated according to ICEC calculated by this formula and the standards in the following Table 1.

ICEC = Career Index (40 points) + Qualification (40 points) + Academic Background (20 points) + Education (0 to 3 points) ----- Eq. (1)

<Table 1> Technique level standard

Division	Construction technician to perform construction management services
Special level	ICEC above 80 points
Advanced level	ICEC above 70 points and less than 80 points
Intermediate level	ICEC above 60 points and less than 70 points
Elementary level	ICEC above 40 points and less than 60 points

Source: Jung, S. and J. Yu (2017), Analysis of Factors Affecting Job Competency of Quality Management for a Construction Manager, *Korean Journal of Construction Engineering and Management*, p.68.

1 a level to perform simple and repetitive tasks using basic general knowledge such as literacy and numeracy with specific instructions and under the thorough supervision

2 a level capable of creating a new theory using a super-advanced theory and knowledge of related fields, performing a wide range of technical tasks with the highest proficiency, and being authorized and responsible for overall organization and duties

3. Detailed Items of ICEC

According to the experiences that construction engineers actually performed construction works, the career index is calculated by job and area of expertise. The calculation is performed according to Equation (2). N is the value obtained by multiplying the total career days by the correction coefficient ranging from 0.8 to 1.3 and then by being divided by 365 according to the responsibility level of the construction work. N is 1 when the total approved days by area of expertise are less than 365 days.

$$\text{Career Index} = (\text{Log}N/\text{Log}40)\times 100\times 0.4 \text{ ----- Eq. (2)}$$

The qualification index is approved by job area of the obtained national qualification. When more than two national qualifications are obtained in the same job area, it is according to the score of the qualification with a higher score. The scores by qualification subjects are shown in Table 2.

<Table 2> Score per license

License type	Score
Professional engineers / architect qualification	40
Engineer / Master Craftsperson	30
Industrial Engineer	20
Craftsperson	15
Other	10

Source: The Construction Technology Promotion Act

In addition, the educational background index is approved by job area of the departments that construction engineers graduated or took. When construction engineers graduated or took more than two departments in the same job area, it is according to the score of the academic background with a higher score. The scores by academic background are shown in Table 3.

<Table 3> Score per level of education

Education Level	Score
Bachelor's degree or higher	20
Associate degree (3 years)	19
Associate degree (2 years)	18
High school diploma	15
Completed training course established by Ministry of Land, Infrastructure and Transport	12
Less than high school diploma	10

Source: The Construction Technology Promotion Act

The education index is shown according to Paragraph 3 of Article 42 of Enforcement Decree of the Construction Technology Promotion Act. 1 point is given every 35 hours limited to education training held in agencies of education training in accordance with Paragraph 1 of Article 43 of the act. These points are valid for three years after taking the education training and can be summed up to 3 points during the period.

4. Questionnaire Analysis

A correlation analysis and two-sample t-test were performed to examine whether construction managers' career, qualification, and academic background affect actual quality control job competency. The results can be summarized as follows (Table 4):

i) Differences in competency level between foundation degree groups and advanced degree groups do not exist.

ii) Differences in competency level between groups with qualified engineers and architects and groups without them exist.

iii) Experiences related to construction positively affect quality control job competency.

<Table 4> Summary questionnaire of correlation analysis results

Investigation period	July 1, 2016 ~ August 20, 2016
Object of investigation	Construction Manager
Survey method	Questionnaire investigation (E-mail)
Contents of investigation	Diagnostic competencies items in NCS , ICEC
Number of responses	118

Division	Level of education	License	Work experience	
			Construction	CM
Effect	×	○	○	○

Source: Jung, S. and J. Yu (2017), Analysis of Factors Affecting Job Competency of Quality Management for a Construction Manager, *Korean Journal of Construction Engineering and Management*, p.71.

II. Construction Industry Skills Council

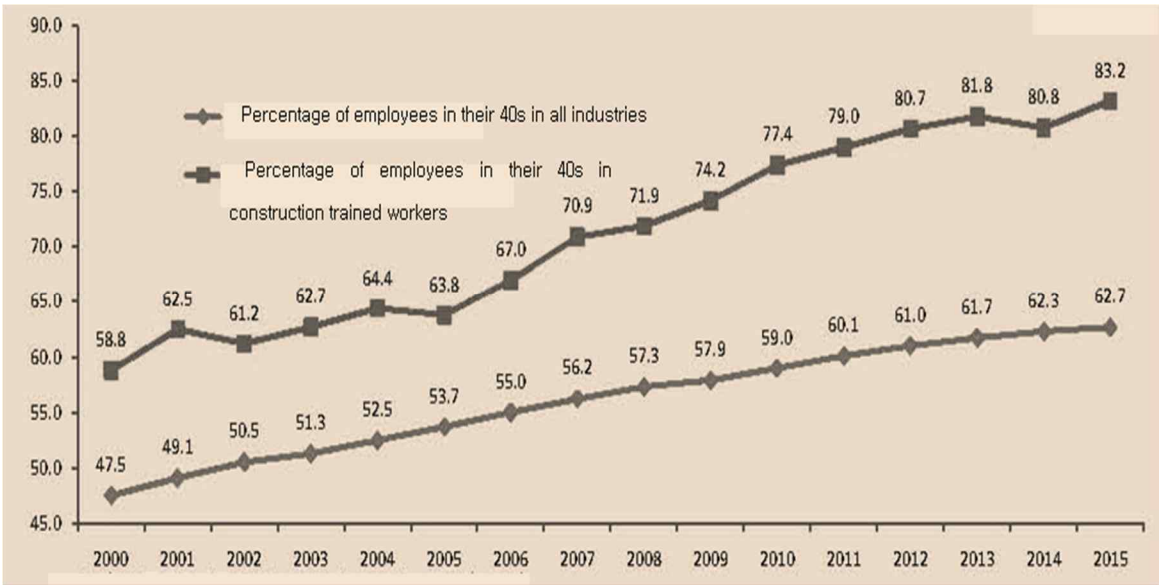
1. Current Status of Manpower Supply and Demand

As of December in 2015, the percentage of employees in their 40s accounts for 62.7% of all employees. However, that of construction trained workers accounts for 83.2% in a serious situation. Although the percentage of employees in their 40s has increased by 15.2%p in all employees during the past 16 years, that has increased by 24.4%p in construction trained workers during the same period.

On the basis of responses from construction companies about supply and demand of Korean workforce, the shortage of skilled workforce reached 78.1% in a serious situation. Although 76 thousands skilled workers short in demand and supply in 2016. And 140 thousands skilled workers will be short in 2019.

<Figure 1> Aging of construction trained workers

(Unit: percent)



Source: Bank of Korea (2015)

<Table 5> Outlook for medium term supply and demand

(Unit: persons)

Year	Skill level	Workforce demand (A)	Korean workforce supply	Difference in supply and demand for Korean workforce (B-A)
2016	Skilled workers	730,297	654,078	-76,219
	Unskilled workers	657,914	589,250	-68,665
2017	Skilled workers	731,689	636,300	-95,390
	Unskilled workers	659,169	573,234	-85,935
2018	Skilled workers	733,093	618,081	-115,012
	Unskilled workers	660,433	556,821	-103,612
2019	Skilled workers	734,507	593,711	-140,795
	Unskilled workers	661,707	534,867	-126,841

Note: Negative numbers (-) in the differences in workforce supply and demand mean the shortage of labor supply.

Source: Shim, K. et al. (2015), Survey of Construction Workforce Supply and Demand

2. Policy Implications

i) A need to establish a response system for sustainable growth of construction industry

The influx of young Korean generations show a decreasing trend due to the shortage and aging of skilled workforce and influx of foreign manpower. Problems of transferring techniques and skills have occurred. There is a need to collaboratively respond to information exchange, system improvement, and policy proposal about workforce issues.

ii) A need to actively respond to workforce issues such as reorganization of NCS based education training system

A pursuit of developing systematic trained workforce by designing education training courses by job based on complement and spread of NCS. That is efforts to improve the work environment in construction industry by operating Working and Learning Dual System reflecting industrial characteristics. The Industry Skills Council (ISC) has been introduced to develop and use systematic human resources and enhance the national competitiveness in the construction industry.

3. Outline of Construction ISC

ISC is tasked to support the development, management, and application of private-sector-led construction workforce such as collaborative organizations, companies, and workers' organizations in the construction industry and to perform core projects such as NCS and Working and Learning Dual System.

Construction ISC consists for construction project owner organizations, workers' organizations, construction companies, and Academia etc.[3] Roles and expected effects of participatory companies in ISC are follows.

i) Provision of information on industrial market (participation/consultation of ISC)

3 Representative institution: Construction Workers Mutual Aid Association, Participation of collaborative organizations (Construction Association of Korea (CAK), Korean Specialty Construction Association (KOSCA), and Korea Construction Institute of Plant (KCIP)) and workers' organizations, Participatory companies (a total of 14 companies such as Daewoo E&C)

ii) Participation in determining criteria and training to develop practical workforce

iii) Participation in core and development projects of ISC (supplement of NSC development, NCS consulting, development of Working and Learning Dual programs)

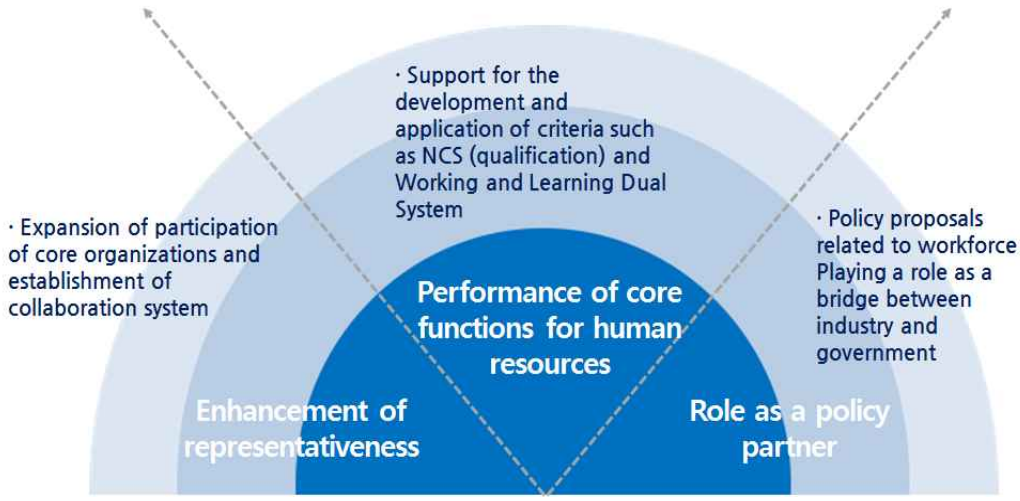
<Table 6> Relevant fields (NCS Classifications)

Major Group	Sub-Major Group	Minor Groups
14. Construction	3. Architecture	1. Architectural design / supervision
		2. Building construction
		3. Design and construction of building equipment

III. Conclusion

The Construction Industry Skills Council's basic directions are follows.

<Figure 2> Basic directions



i) Enhancement of industrial representativeness - Expansion of the participation of core organizations and leading companies in the construction industry by

collaborating with construction project owner organizations.

ii) Establishment of governance for human resources in the construction industry - Progress of projects such as complement and spread of NCS (qualification) and development of Working and Learning Dual System programs to develop and apply skilled manpower in the construction industry with a focus on ISC.

And expected effects of participatory companies are follows.

i) Capable of expanding NCS company activities such as reorganizing personnel management system and employment procedures by participating in projects to spread ISC

ii) Capable of developing human resources for various participatory companies and sharing information on new technologies in related industry

iii) Capable of expressing opinions about difficulties in industries and proposing policies through ISC activities

iv) Capable of receiving support infrastructure and training costs in participating in Working and Learning Dual System and of developing the required training process