ANALYSIS OF CONSTRUCTION MANAGER COMPETENCIES FOR QUALITY MANAGEMENT

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Abstract- A construction manager (CM) in the construction industry performs construction management work with stakeholders and is involved in each stage of the construction project life cycle. As such, the competency of a construction manager is an important factor that directly affects the success of the construction work.
In Korea, construction manager competencies are evaluated thru a qualification-oriented process. A limitation of this approach is that it only measures knowledge. Thus, this criteria is operated apart from asking about the completeness of a person's skill sets or job experience as it applies to construction management. Therefore, in order to ensure that the production process meets the required standards, it is necessary to introduce a rating system to evaluate the competency of a construction manager.
In this study evaluates the competency level of a construction manager through these elements. Current competencies evaluation methods are utilized to analyze the relation between competency level and the identified elements (years of experience, education and license) of the construction managers through survey analysis. The results of this paper may help in the development of a competency management system for construction managers.

Index Terms- Construction Manager, Competency, Human Resource Management, Quality Management

I. INTRODUCTION

A. Background and Objective

Recently, many researchers have identified that key knowledge, skills and competency held by an individual is necessary to achieve superior business results and focus resources for optimal human resource management. In construction today, it is increasingly necessary to have managers that can properly manage construction projects that have gradually grown in size and diversification. In particular, the construction industry involves a long production period compared to other industries, and has a tendency to rely on subcontractors, thus increasing the importance of competence.

A construction manager (CM) in the construction industry performs construction management work with stakeholders and is involved in each stage of the construction project life cycle. As such, the competency of a construction manager is an important factor that directly affects the success of the construction work. Currently, construction manager competencies are evaluated in Korea thru a qualification-oriented process. In other words, if a construction manager obtains required degrees, diplomas, etc., they are regarded as a competent construction manager.

A limitation of this approach is that it only measures knowledge. Thus, this criteria is operated apart from asking about the completeness of a person's skill sets or job experience as it applies to construction management. The construction industry is characterized by a situation where the quality of service is classified as a final product that depends on the management of the production process. In order to ensure that the production process meets the required standards, it is necessary to introduce a rating system to evaluate the competency of a construction manager.

Research related to competencies in the construction industry is lacking. As such, the competency elements that are required for a construction manager to perform successfully have not been properly identified. To address this deficiency, this study identifies required competency elements for a construction manager. In addition, this study evaluates the competency level of a construction manager through these elements. Current competencies evaluation methods are utilized to analyze the relation between competency level and the identified elements (years of experience, education and license) of the construction managers through survey analysis. The results of this paper may help in the development of a competency management system for construction managers.

B. Scope and Methodology

In this study, a survey was conducted to identify elements affecting the business performance of a construction manager. The survey was limited to quality management among the various administrative tasks of a construction manager. Quality management is the most basic task of construction management and this task has a direct impact on project success. The methodology of this study is described below.

a. The survey analyzed theories and research trends related to analysis of construction manager competencies through national and international literature surveys.
b. Construction management competencies of quality management as defined by Korea National Competency Standards (NCS) and survey contents based on NCS were examined.
c. A survey targeting construction managers was done.
d. Nonparametric statistical techniques (Mann-Whitney test, Kruskal-Wallis test) were utilized to determine the connection between level of competency and elements (years of experience, education and license).

II. OVERVIEW OF COMPETENCY EVALUATION METHODS

Difference between the competency evaluation method for construction engineers in South Korea and in the U.S. are shown in Table 1 below.

Table 1. Difference between competency evaluation methods for construction engineers in South Korea versus the U.S.

Division	Competency evaluation methods
Korea	-Only quantitative analysis (Years of experience, education and license, etc.) -Technical Competency Evaluation methods and procedures do not exist -Qualitative assessment inadequate
U.S.	-License should not be evaluated as an individual's technical competence -Holding the license is recognized as a minimum requirement for work performed -Individual education, experience, career is evaluated qualitatively

III. SURVEY AND ANALYSIS RESULTS

A. Survey summary

The connection between level of competency and elements (Years of experience, education and license) was done through analysis of a survey. Table 2 provides a survey summary.

B. Survey composition and analysis method

The survey contents included level of competency about quality management, years of experience, education (degree) and license (Professional Engineer Architectural Execution). Questions related to competencies totaled 75 questions. This was a quantitative survey using a 5-point scale. There were 43 surveys returned. The number of responses was insufficient to use parametric statistical methods. As such, this paper utilized nonparametric statistical methods.

C. Research hypothesis

This study established the following three research hypotheses:

a. A construction manager with a master's degree will have a higher level of competency than a construction manager with a bachelor's degree.

Table 2. Survey Summary

Survey period	July 1, 2016 ~ July 15, 2016
Survey target	Construction Manager in Korea
Investigation method	Questionnaire survey analysis
Survey contents	Level of competency for quality management: years of experience, education (degree), license (Professional Engineer Architectural Execution)
Survey responses	43
Number of questions	80 questions

b. A construction manager with Professional Engineer Architectural Executions license will have a higher level of competency than a construction manager without the license.

c. The more experience, the higher level of competency.

D. Connection between level of competency and elements

1) Connection between level of competency and education

In the survey, there were 30 respondents with a bachelor's degree and 13 respondents had a master's degree. A Mann-Whitney test was done to determine whether the level of competencies differed between the education levels. The results were as follows.

Table 3. Connection between level of competency and education

Division		N	Mean rank	U	Z	p
Education	Bachelor's degree	30	23.15	160.500	-.913	.361
	Master's degree	13	19.35			

According to Table 3, Z is -0.913, and the significance probability is 0.361. In other words, there was no significant difference between competence with a master's degree and competence with a bachelor's degree. There was no difference in ability between a master's degree and a bachelor's degree.

2) Connection between level of competency and license

In the survey, there were 32 respondents with a Professional Engineer Architectural Execution words, there w 11 respondents without the license. A Mann-Whitney test was done to determine whether the level of competencies differed between license status. The results were as follows.

Table 4. Connection between level of competency and license

Division		N	Mean rank	U	Z	p
License	With license	32	18.00	73.500	-2.854	0.004
	Without license	11	31.32			

According to Table 4, Z is -2.854, and the significance probability is 0.004. In other words, there was a significant difference between a construction manager's competencies with the license and construction manager's competencies without the license.

3) Connection between level of competency and years of experience

A Kruskal-Wallis test was done to determine whether the level of competencies differed between years of experience. The results were as follows.

Table 5. Connection between level of competency and years of experience

Division		N	Mean rank	χ^2	p
Years of CM experience	0~2 years	5	10.00	14.748	0.011
	3~4 years	20	17.88		
	5~6 years	8	30.88		
	7~8 years	6	26.33		
	9~10 years	1	35.00		
	11~12 years	3	32.83		

According to Table 5, $\chi 2$ is 14.748 and the significance probability is 0.011. In other words, there was significant difference between years of experience.

CONCLUSION

This study analyzed level of competencies and differences in education, licensing, and years of experience using nonparametric statistical methods. There was no difference in ability between a master's degree and a bachelor's degree. There was a significant difference in ability between construction manager competencies with a license and without a license. There was also a significant difference in competency and years of experience.

This study had several limitations. The number of respondents was small. However, re-analysis after obtaining a larger set of respondents may be complementary. The results of this study will be used as the basis for the development of a competency management system to systematically manage construction manager competency within a human resource plan.

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