Priority Analysis for Personal Trait Competency of Construction Managers in Korea

[1]Bo-Sik Son, [2]Jung-Ho Yu
1. First Author *Bo-Sik Son, Dept. of Architectural Engineering, Namseoul University, bsson@nsu.ac.kr*
2. Corresponding Author *Jung-Ho Yu, Dept. of Architectural Engineering, Kwangwoon University, myazure@kw.ac.kr*

Abstract

Construction management (CM) delivery system has played a significant role in Korean construction industry for the last sixteen years. The competency of construction managers is very crucial for construction projects to be successfully delivered by them. This research tries to identify priorities for the personal trait competency items of construction managers. For this, a construction manager's competency model has been established and verified through a statistical method, i.e. factor analysis. Then the priorities of each competency item are measured based on the absolute importance and relative weight of each item. The result shows that the three most important competency items of a construction manager are Capability of Problem-Solving, Capability of Decision-Making and Commitment to Expertise Development.

Keywords: *Construction Manager, Competency, Priority*

1. Introduction

In order to increase the efficiency and effectiveness of construction projects, construction management (CM) delivery system was introduced to Korea in 1996. Since then, hundreds of projects have been delivered by CM delivery system. Considering that this figure only counts officially registered projects, it is clear that there have been a large number of CM projects in Korea for the last 16 years. In this context, the emphasis on the construction manager's competency has also increased for successful implementation of construction projects, because the failure or success of a project largely depends on the competency of project managers and the role that they play in the project [1]. Besides, many other previous researches also discuss the importance of project mangers' competency as one of the project key success factors [2-11]

In general, construction managers' competency is divided into two categories; professional competency and personal competency [12]. Professional competency includes knowledge and skills that are required for the job, and it is relatively easy to develop such a kind of competency. On the other hand, personal competency relates to individuals' personality traits that enable them to become capable when they perform construction management job. Therefore, the personal competency of a person cannot be easily and shortly developed or improved through education and training. This means that the development of personal competency needs more careful approach and requires an objective analysis to determine priorities for improvement.

The goal of this research is to identify the priority of the personal competency items, which are required for competitive construction managers. With this priority order, companies or individuals can establish a more elaborate plan for personal competency improvement. The research process is as follows: (1) establishing a preliminary list of construction managers' personal competency based on the reviews on previous researches and related competency models; (2) finalizing the construction manager's personal competency model according to the results of reliability test and factor analysis, which are based on a survey against more than one hundred construction managers practicing in the field; (3) conducting another survey against several experts in construction management and analyzing the priority of the personal competency items using AHP (Analytic Hierarchy Process) technique.

In general, construction managers' personal competency can be divided into two categories; personal trait competency and interpersonal competency [12]. Personal trait competency is all about construction managers themselves, and interpersonal competency is about abilities among people or

interpersonal relationship. As the personal trait competency seems a more basic and fundamental one, this paper focuses on this competency.

2. Construction Managers' Personal Trait Competency Model

2.1 Preliminary List of Construction Managers' Personal Trait Competency

Based on the reviews on related previous research works, we have established a preliminary list of construction managers' personal trait competency, which consists of twenty-one competency items. (See Appendix 1). Each competency item along with its definition and range has been validated through an intensive interview with five experts who have more than 20-year experience in construction management.

2.2 Construction Managers' Personal Trait Competency Model

Based on the list, we have conducted a survey against construction managers, in which the importance of each competency item was rated on a 9-point Llikert scale. A total of 152 construction managers responded to the survey and 114 effective responses have been used for reliability test and factor analysis.

The Cronbach's α value higher than 0.7 is considered to be relatively more reliable. The result of the reliability test is 0.908. Therefore, this provides evidence that all the factors have a high internal consistency. For the Kaiser-Myer-Olkin(KMO) index of sampling adequacy, a value above 0.8 is required for good factor analysis; our value of 0.857 was satisfactory. For Bartlett's test of sphericity, a significant value of less than 0.05 ($p<0.05$) is required; ours was satisfactory. Therefore, the results of these tests confirm that the data were appropriate for factor analysis.

As shown in Table 1, the factor analysis identified four factors. These four factors with eigen value greater than 1.0 explain 64.8% of the variance. Since the percentage of variance explained is more than 60%, the validity of factor analysis is accepted. Each of the key factors belonged to only one of the groupings, with the value of factor loading exceeding 0.5.

Based on the result of factor analysis, the 14 items are grouped into four dimensions and named as; Information Processing, Situation Management, Expertise and Self-Management. To sum, the proposed Construction Managers' Personal Competency Model and the results are as follows.

Table 1. Factor Analysis Result

No.	Competency Items	Component				Competency Group
		1	2	3	4	
X08	Scale of Analytic Thinking	0.758	-0.059	0.292	0.174	Information Processing
X06	Information Seeking	0.719	0.274	0.016	0.173	
X10	Scale of Conceptual Thinking	0.696	-0.027	0.301	0.123	
X04	Timing of Initiative	0.689	0.398	-0.015	0.095	
X07	Complexity of Analytic Thinking	0.578	-0.111	0.398	0.206	
X15	Capability of Decision-Making	0.093	0.801	0.090	0.190	Situation Management
X16	Capability of Problem-Solving	-0.088	0.774	0.171	0.195	
X20	Breadth of Flexibility	0.287	0.621	0.223	-0.044	
X13	Commitment to Expertise Development	0.183	0.107	0.816	0.114	Expertise
X11	Technical Expertise	0.094	0.410	0.686	0.200	
X14	Extension of Expertise	0.404	0.237	0.597	0.101	
X17	Self-Control	0.103	-0.033	0.197	0.811	Self-Management
X18	Self-Confidence	0.179	0.268	0.154	0.772	
X19	Failure Management	0.377	0.310	-0.001	0.648	

3. Priority Analysis of Construction Managers' Personal Competency Items

3.1 Priority Analysis Method

In order to prioritize the competency items, we need to know the importance of each item and their weights of importance as well: the former was obtained through a survey against 152 construction managers, and the later were obtained using AHP for which 14 experts in construction management having average 17 years of experience were involved in the process. The result of weighting process using AHP is as follows.

Table 2. Weights of Competency Items

Competency Group	Weight of Group (A)	Competency Items	Weight of Items in Group (B)	Weight of Items (W)=(A)*(B)
Information Processing	0.159	X08. Scale of Analytic Thinking	0.090	0.014
		X06. Information Seeking	0.142	0.023
		X10. Scale of Conceptual Thinking	0.154	0.025
		X04. Timing of Initiative	0.294	0.047
		X07. Complexity of Analytic Thinking	0.319	0.051
Situation Management	0.410	X15. Capability of Decision-Making	0.334	0.137
		X16. Capability of Problem-Solving	0.553	0.227
		X20. Breadth of Flexibility	0.113	0.046
Expertise	0.310	X13. Commitment to Expertise Development	0.351	0.109
		X11. Technical Expertise	0.345	0.107
		X14. Extension of Expertise	0.304	0.094
Self-Management	0.120	X17. Self-Control	0.400	0.048
		X18. Self-Confidence	0.262	0.031
		X19. Failure Management	0.337	0.040

3.2 Priority Analysis Results

The priorities of competency items are analyzed based on the priority indexes of each item, which are calculated by multiplying the importance and the weight of importance of each competency item. The importance means an absolute importance of an item and the weight of importance means a relative weight of importance when one item is compared with the other items. The result of calculating the priority indexes and priority orders of each item are as follows.

Table 3. Priority of Competency Items

Competency Items	Weight of Items (W)	Importance of Items (I)	Priority Index (PI)=(W)*(I)	Priority Order
X08. Scale of Analytic Thinking	0.014	7.202	0.103	13
X06. Information Seeking	0.023	7.360	0.167	12
X10. Scale of Conceptual Thinking	0.025	6.947	0.170	11
X04. Timing of Initiative	0.047	7.474	0.349	8
X07. Complexity of Analytic Thinking	0.051	7.482	0.380	6
X15. Capability of Decision-Making	0.137	7.939	1.087	2
X16. Capability of Problem-Solving	0.227	8.079	1.832	1
X20. Breadth of Flexibility	0.046	7.526	0.349	9
X13. Commitment to Expertise Development	0.109	7.675	0.835	3
X11. Technical Expertise	0.107	7.702	0.824	4
X14. Extension of Expertise	0.094	7.263	0.684	5
X17. Self-Control	0.048	7.667	0.368	7
X18. Self-Confidence	0.031	7.474	0.235	10
X19. Failure Management	0.040	7.500	0.304	9

As shown in the table, Capability of Problem-Solving and Capability of Decision-Making are the most important competency items among others. Besides, Commitment to Expertise Development and Technical Expertise are also rated as important competency for a construction manager.

4. Conclusion

This research tried to identify the importance of competency of construction managers, and especially focused on the personal trait competency. A personal trait competency model has been established based on factor analysis using the result of survey against 152 construction managers. Then, the relative weight of importance of the selected competency items were measured using the AHP technique relying on the result of survey against 14 experts. The priorities of each competency items are calculated by multiplying the absolute importance and relative weight of each item. The result shows that the three most important competency items of a construction manager are Capability of Problem-Solving, Capability of Decision-Making and Commitment to Expertise Development.

The result of this research may be used to establish a career development plan for construction managers in CM firms. It can also be used when selecting a competitive construction manager for a construction project. Universities or colleges can also use the competency model when they prepare a curriculum for construction management program. However, this research deals with personal trait competency only and other competency factors should be addressed in the future researches.

Acknowledgement

Funding for this paper was provided by Namseoul University

References

[1] Ehsan, N., Waheed, K.Z., Asghar, U., Nawaz, M.T., Mirza, E., Sarwar, S.Z.: Effects of Project Manager's Competency on Project Success, 2010 Proceedings of IEEE International Conference on Management of Innovation and Technology (ICMIT), pp.107-112, 2010.
[2] Belassi, W., Tukel, O.I.: A new framework for determining critical success/failure factors in projects, International Journal of Project Management, vol.14, no.3, pp.141-151, 1996.
[3] Chua, D. K. H., Kog, Y. C., Loh, P. K.: Critical Success Factors for Different project Objective, Journal of Construction Engineering and management, vol.125, no.3, pp.142-150, 1999.
[4] Chan, A.P.C., Scott, D., Chan, A.P.L.: Factors Affecting the Success of a Construction Project, Journal of Construction Engineering and management, vol.130, no.1, pp.153-155, 2004.
[5] Ling, F.Y.Y., Liu, M.: Using neural network to predict performance of design-build project in Singapore, Journal of Building and Environment, vol.39, no.10, pp.1263-1274, 2004.
[6] Fortune, J., White, D.: Framing of project critical success factors by a systems model, International Journal of Project Management, pp.53-65, 2006.
[7] Hyun, C.T., Cho, K.M.: Key Success Factors for the Fast-Track in Public Design-Build Project, Journal of Architectural Institute of Korea, vol.23, no.1, pp.129-136, 2007.
[8] Kang, D.B., Moe, T.L.: Success Criteria and Factors for International Development Project: A Life-Cycle-Based Framework, Project Management Journal, vol.39, no.1, pp.72-84, 2008.
[9] Lam, E.W.M., Chan, A.P.C., Chan, D.W.M.: Determinants of Successful Design-Build Project, Journal of Construction Engineering and management, vol.134, no.5, pp.333-341, 2008.
[10] Saqib, M., Farooqui, R.U., Lodi, S.H.: Assessment of Critical Success Factors for Construction Projects in Pakistan, First International Conference on Construction in Developing Countries, pp.392-404, 2008.
[11] Lim, C.S., Mohamed, M.Z.: Criteria of project success: an exploratory re-examination, International Journal of Project Management, vol.17, no.4, pp.243-248, 1999.
[12] Lee, H.L., Yu, J.H.: Personal Competency Analysis of Construction Managers by Position. Journal of Architectural Institute of Korea, vol. 27, no.11, pp.151-158, 2011.

Appendix 1: Preliminary List of Construction Managers' Personal Trait Competency

No.	Competency Items	Definition & Range	Source
X01	Achievement-Motivated Action	- The intensity of interest or desire to achieve well on an appointed task - <Uninterested in one's duties> ~ <Working entrepreneurially with a drive to do well on work>	Spencer(1993), Lee(2009)
X02	Effect of Achievement-Motivated Action	- The degree of ripple effect caused by interest or desire to achieve well upon others - <Him/herself> ~ <The effect on the whole corporation>	Spencer (1993)
X03	Concern for Quality and Accuracy	- An internal desire to reduce a given task's uncertainty - <A problem occurs by a disorderly job performance>~ <Check the project's progress, find out wrong or left out data and correct them>	Spencer (1993)
X04	Timing of Initiative	- Showing which point of view(past, present, future) an individual is using as a standard to perform actively - <Does not show activeness being obsessed on the past> ~<Foresee the future and act in a scrupulous manner>	Spencer (1993)
X05	Self-Motivated Initiative	- Showing the degree of an individual's effort beyond demand to accomplish a task - <An act to avoid a given task> ~ <Working to get the job done despite risk to oneself>	Spencer (1993)
X06	Information Seeking	- The degree of not "accepting" the situation and trying to gather more information - <Does not gather information at all> ~ <Using one's own way to gather information such as regularly calling unofficial meetings>.	Spencer (1993), Dainty (2004), Lee (2009)
X07	Complexity of Analytic Thinking	- Showing complex things such as cause, effect, action that are inherent in an analytical process - <Only roughly dealing with immediate tasks> ~ <Make a complex plan and use various skills to analyze systematically>	Spencer (1993), PMI (2007), Dainty (2004)
X08	Scale of Analytic Thinking	- Showing the scope, namely scale, of a problem that is the object of an analytical thinking - <Only interested in a couple of people's performance> ~ <Considering long-term job performance in a complex environment that effects a given task>	Spencer (1993)
X09	Complexity and Creativity of Conceptual Thinking	- Showing how creatively one can apply a complicated concept - <Thinking concretely without using abstract or complicated concepts> ~ <Complexly grasping problems what others may not have realized or even understanding problems that are beyond acquired knowledge or experience and creating a new idea>	Spencer(1993), Lee(2009), PMI(2007), Dainty(2004),
X10	Scale of Conceptual Thinking	- Showing the scope or scale of a problem that is an object of conceptual thinking - <Only interested in a couple of people's performance> ~ <Considering long-term job performance in a complex environment that effects a given task>	Spencer (1993)
X11	Technical Expertise	- Showing the level of knowledge related with job performance - <An elementary level performing simple and repetitive tasks> ~<Recognized one's authority in a very complex area of expertise both domestically and foreignly>	Spencer (1993),PMI (2007), Edum-Fotwe (2000)

X12	Managerial Expertise	- The professionality of a manager needed to manage, adjust, and integrate various human resources, organizational function, and department unit - <Under no liability to adjust or manage other people's work> ~ <managing >	Spencer (1993),PMI (2007),
X13	Commitment to Expertise Development	- The degree of effort invested into maintaining and acquiring professionalism - <Closed minded attitude towards new information> ~ <Put great effort into obtaining new information or skills and gain new knowledge or other types of information>	Spencer (1993),
X14	Extension of Expertise	- The ripple effect towards surroundings by the completion level of an appointed task by a technical expert - <Not opening technical knowledge and make it die out> ~ <Support and supply new technology>	Spencer (1993),
X15	Capability of Decision-Making	- The ability to collect, analyze facts related to the problem and choosing a desirable way or an answer - <Unable to make decisions by oneself> ~ <Propose an acceptable conclusion through an accurate analysis>	Edum-Fotwe(2000), Lee(2009) PMI (2007), Kim (2005)
X16	Capability of Problem-Solving	- The ability to confirm and analyze an alternative to solve a problem through problem definition - <Avoiding the issue when a problem occurs> ~ <Define a problem with certainty and through decision making and solve the problem efficiently and effectively>	PMI (2007), Ahadzie (2008), Lee (2009)
X17	Self-Control	- The ability to control and refrain emotions despite a desire to act negatively when faced with hostile response or stress from work - <Losing control owing to external conditions> ~ <Control strong emotions or stress and treat with the source of a problem in a constructive manner>	Spencer (1993), PMI (2007), Ahadzie (2008),Dainty (2004)
X18	Self-Confidence	- The ability to respond challenges or threats with confidence - <Overtly showing helplessness> ~ <Show an interest in taking on difficult assignments and take on challenges by choice>	Spencer (1993), PMI (2007), Dainty (2004),Lee (2009)
X19	Failure Management	- The ability of an individual to take on responsibility and react to a given situation where the source of the problem can be corrected - <Always blaming oneself for failures> ~ <Admit one's mistakes to others and take actions to correct them>	Spencer (1993), PMI (2007)
X20	Breadth of Flexibility	- The ability to adapt himself to various situations - <Always insisting upon procedures> ~ <Adjust plan/strategy/goal to suit a given situation thereby carrying out tasks efficiently and effectively>	Spencer (1993),PMI (2007), Dainty (2004)
X21	Speed of Flexibility	- The amount of time needed to shift a task to action - <Slow change taking more than a month due to excessive examination and planning> ~ <Fast change through immediate action or decision to act>	Spencer (1993)