Research Article
Necessary Competencies of Construction Managers in Iran as a Developing Country

Pejman Ghasemi Poor Sabet, Reza Ansari, Ali Bagheri Fard, Hamid Aadal and Kiyanoosh Golchin Raad
Department of Structure and Materials, Faculty of Civil Engineering, Universiti Teknologi Malaysia
(UTM), Johor Bahru, Johor, Malaysia

Abstract: One of the most significant obstacles in Iran as a developing country is related to non-productive investments or delay on productivity of construction projects. Following the development in the business world, the challenges for handling the businesses toward productivity raised as well. Construction industry plays an important role in the foundation of economy everywhere. Therefore, to undertake pushing and leading the projects through the challenges to achieve the productivity and the competitive business advantages, a proper leadership by a competent Construction Manager (CM) is essential. Necessary competencies and the importance of the competencies regarding the dominant challenges at working environment are the objectives of this study. In order to gather data, both quantitative and qualitative surveys were employed in the study. Interview for the first objective and questionnaire under Delphi method have been utilized to fulfill the objectives respectively. By the results of the survey, the projects' authorities can recognize the essential competencies and their priority needed for a CM to be involved in the projects.

Keywords: Competent construction manager, necessary competencies

INTRODUCTION

A developing country contains many construction projects everywhere in different sizes. Since, there are many important construction projects in the country; the role of a construction manager is one of the significant factors to push the projects towards productivity. Issue of untimely completion of a project can mean not to return investment and following that appearance of inflation in economy. It has been as a problem which countries have faced. In other words, the successful progress of a project can be on the duty of a construction manager related to the main requirements considered in design such as quality, schedule, cost and safety. Therefore, the role of construction manager is as the most significant factors on the economic foundation of countries due to the huge investment on construction project. At the early of 1990s, falling of construction demands caused severe competition leading to unexpected progress in the industry (Edum-Fotwe and McCaffer, 2000).

Nowadays, given construction complexities and increasing fast productivity demands cause a construction management system to be had to compatible with progress of technology and specialized tools to achieve such goals (Tucker, 1986). Awareness about how the project must be led and what method is suitable or how to do a job, need perfect plans and different knowledge especially with the complex management of construction projects associated with labor organizations with regard to labor laws and civil engineering machinery and increasing workshop costs. Today, managing project affairs have been emerged as a technology and science. Meaning that, just worker discipline cannot meet the solutions for the problems which are being faced in the construction sites (Klein, 2001).

Following the changes in the industry, project managers have to combine their roles with the aspects of technical, engineering, accuracy, reliability of quality and cost performance that some of them had not been included in their roles previously.

The talent of obtaining the highest quality and quantity of work progress with the least expenses is one of the most highlighted targets of a construction manager. In fact, awareness of the value of time and manpower, materials and machineries are the basic necessities for a construction manager to push the projects (Cheetham and Lewis, 2001). A CM must always seek the appropriate method and principle for organizing and carrying out the jobs on the best way to achieve the better benefits for the projects. For this purpose, there must be a manager with different specialization and significant characteristics.

To launch a construction project, the following five basic principles were offered by technical experts:
- Responsibility management

- Raw material management
- Human resources management
- Financial management
- Machines management

Mentioned items are known as five M of workshop management in expression (Clough *et al.*, 2000). Certainly this view requires the appropriate competency model of CM in the industry. Therefore, to identify the competencies and their prioritization are the most significant step towards employing a construction manager who are competent to achieve organizational goals.

The role of leaders has been seen as a precipitator toward the goals of the project. The most significant goals by a construction manager are timely completion, quality and cost control (Clough *et al.*, 2000). Thus, personality and specialization characteristics of a construction manager can play the essential role to achieve such objectives. It means that the personality and specialization pattern could affect hiring successful CMs. In other words, the lack of competencies pattern to predict a successful construction manager can cause deviation in leading projects. Following that, the employers may find later that their assessment of the construction manager employed would not be extracted during construction such as the way they expected. Therefore, recognition of competencies coming along their priorities and a predictor of competency level can lead to hire a suitable construction manager.

LITERATURE REVIEW

Nowadays, business environment in the world is a competitive environment. In order to survive in such challenging environment, the best companies in the world need to be qualified and possess some capabilities. For example, they have to possess enough information that firms need to have. They also need sufficient information about work forces, duties and expertise as well as training and instructions to play their role in business environment (Pfeffer, 1996). In the modern world, as technological growth is increasing, new courses of actions and missions are imposed to organizations in business environment. In other words, technological development has exposed the organizations to very quick alterations that make them more competitive (Davenport, 1993). This situation brings them more difficulties and obstacles. As an instance, what the employees expect now is not similar to what they hoped to have or happen a hundred years ago or before that. Also, the growth of technology affects demographic elements such as change in the population of children as well as decreasing the population of old people in the community or spending more money for health insurance and using the benefits of welfare (Markus and Robey, 1988).

In order to cope with such challenges, organizations should be able to improve their leadership potentials effectively and give a global attitude to their workforces. Moreover, these organizations should promote the competencies in their employees and also recognize the necessary competencies in order to select a competent person. Hence, in such a condition HR professionals are playing a noticeably harder, more challenging and more complicated role by focusing on the competencies (Tang and Liu, 2012).

Definitions of competency: The words of competence and competencies have been utilized by a big number of groups including management theorists, educational practitioners, HR managers and industrial psychologists (Brophy and Kiely, 2002). The term "competency" has been interpreted differently. They believed that a person who has competency is someone who is able to perform an occupational role in very various conditions in a long period of time (Koenigsfeld *et al.*, 2012). Competencies consist of expertise, information, capabilities, motivation and other necessary elements required for doing a job efficiently (Kormanik *et al.*, 2009). Competency is interpreted as a note and written description of personal expertise and work habits that are employed to reach the purpose of the work (Zingheim and Schuster, 2009).

The term competencies, applied in another book written by Ulrich *et al.* (2008), was considered as expertise, knowledge and manner that are demonstrated by people in their career. Indeed, the nature of competencies is technical and its orientation is social, whereas capabilities refer to a combination of capacities possessed by an organization (García-Barriocanal *et al.*, 2012). Competencies include two aspects: one aspect identifies the skills that are necessary for doing a job and the second aspect identifies the functions that are essential to do the job more efficiently. A study on 292 organizations revealed that practices were the foundation of 75% of competency. Based on the various definitions suggested for the term competency, it consists of individual skill, capacities, potentials, information, manners, propensity and judgment that are utilized to carry out what is required or necessary in order to fulfill the performance objectives of an organization (Cook and Bernthal, 1998). Competency is applied to achieve the objectives of an organization, to concentrate on business challenges and to bring more success and more achievements for the organization as well as to help the workers perform more efficiently and succeed simultaneously (Zingheim and Schuster, 2009).

Approaches on the comprehension of competencies: Competencies include two aspects: one aspect identifies the skills that are necessary for doing a job and the second aspect identifies the functions that are essential to do the job more efficiently. Three dissimilar approaches related to competencies have been proposed

in studies and literature since the early of 1970 to clarify the notion of competency. These approaches can be named as functional-standard approach, behavioral or personal competence approach and situational approaches (Koenigsfeld *et al*., 2012). Behavioral approach refers to some competencies which are common. This approach can address this question: "What competencies are influential in enhancing the effectiveness?" There are lots of subjects and possibilities in behavioral approach on which researchers can study. In general, the foundation of behavioral approach is the earlier period and on the subject of the quick alterations happening in business environment. However, this approach is based on the past and it is regarding the fast changes in business. No one can ensure that the competencies which were essential for organizations previously will be required in future (Koenigsfeld *et al*., 2012).

The second approach is standard approach. This approach was first proposed in England twenty years ago. The goal of standard approach is to determine the competencies that can influence behavior and achievements as well as positive criteria and constructive standards. According to standard approach, the most important factors and functions of an occupation should be initially identified and considered as satisfactory standards and criteria. Following that, this question is addressed: "In order to do the careers perfectly and enforce the determined standards, which competencies should be exercised? Standard approach, like the previous one ignored the significance of the influence that environment can have on the modification and alteration of competencies. Managers are not able to be isolated from their work atmosphere and have to work in a place with its specific environment and atmosphere. So the ignorance of the effect of environment is a shortcoming of standard approach (Koenigsfeld *et al*., 2012).

Situational approach is the last approach. This approach is not similar to the two other approaches. As researchers argue, organizations are usually influenced by situational as well as environmental elements. Situational approach discusses that all managers should possess some common competencies. Yet the kind of the competencies and the degree of their significance vary due to the variety of the nature of different organizations and the dissimilarity in jobs because these differences determine situational factors. It is cultural and environmental alterations, the features of work and the era of the society that determine the necessary competencies related to situational approach. The question addressed by this approach is: "In the present situation, which competencies are required to help organizations accomplish their strategic goals?" Every one of the three above mentioned approaches will be elaborated in the following subsections (Koenigsfeld *et al*., 2012).

Fig. 1: Competencies categories

In general, the competencies could be categorized into five groups including: Leadership and Management competencies, personal competencies, communication-Social competencies, Strategic competencies and lastly supplementary competencies (Rasli *et al*., Year). These categories could be extended for construction managers as well (Fig. 1).

Definition of the competencies categories:
Strategic competencies: Strategic competencies refers to the capabilities and proficiency needed to recognize the occasions that exist outside and also the potencies and shortcomings existing in a system to be harmonized so that the formula can be executed and the cross-functional decisions can be assessed so as to accomplish the objectives of the organization (Harrison and John, 2009).

Individual competencies: Individual competencies include individuals' capabilities and proficiency to manage them besides the capability to be imaginative and inventive to find the best solutions for problems and make the most useful choices (Martina *et al*., 2012).

Social and communication competencies: The capability and proficiency which help a person generate influential relationships and get in touch and communicate with other people (Martina *et al*., 2012).

Management and leadership competencies: It is utilized to refer to identifying opportunities, preparing appropriate plans and programs, systematizing the complex and monitoring the performances, that are some features of managers, to make them more beneficial, advantageous and favorable through competition and success (Tajaddini *et al*., 2010).

Complementary competencies: The competencies which make something else complete, total and perfect (Tajaddini *et al.*, 2010).

METHODOLOGY

Introduction: In this research, two major methods using different instruments were employed. In other words, sequential mixed method including both qualitative and quantitative methods was utilized. This study aimed to determine the crucial competencies and their importance. The instruments, questionnaire and interview have an important role in data collection and answering the research question.

Sequential mixed method: In mixed method, the data is collected and analyzed both qualitatively and quantitatively in a single and multiple researches (Tashakkori and Teddlie, 2010).

In mixed method, both qualitative and quantitative methods might be utilized as parallel and, at the same time, gradually or sequentially (Driscoll *et al.*, 2007). In a research based on Sequential Mixed Method, a single kind of data (qualitative or quantitative) is the basis for collecting a different kind of data and the analysis of both kinds of data helps the researcher with inferences (Tashakkori and Teddlie, 2010). According to the type of analysis done through Sequential Mixed Method, it can be categorized into two categories. The analysis in this method known as "two-phase sequential study" is either exploratory sequential Qual-Quan or Explanatory sequential Quan-Qual.

In the current research, the exploratory sequential (Qual-Quan) approach was employed while the Interviews (Qualitative) were used as the research instruments then the Delphi and questionnaire (Quantitative).

To determine competencies, three stages are recommended consisting of selecting highly experienced individuals and professionals with lots of knowledge about the role of their vocation and competencies that seem essential for specific jobs, determining a series of crucial competencies according to the professionals' ideas as well as organizing and prioritizing the constructs of competencies based on their significance(Moon, 2007).

Interview and the processes of Delphi: In the initial step of this study, some data related to the managers' competencies were collected through interview so as to determine their required competencies. Then Delphi study was utilized to identify the importance level of competencies as well as to cover the findings obtained by interview.

So far no specific number of participants has been determined to be sufficient for gathering understandable and acceptable qualitative data. Nine to twenty people are sufficient to participate in the qualitative part of a research and can give the best understanding of interviewees (Yang and Chan, 2008). Therefore, twenty five participants were chosen for interview and to participate in Delphi study about the competencies in construction managers working on construction projects.

A total number of 25 experienced professionals and expert informants such as site engineers, project managers, construction managers and supervisors who had over 7 years experiences in construction projects participated in the interview and Delphi study. The qualitative data were gathered through interview so as to identify the essential competencies of construction managers in five diverse groups. These groups include personal, Strategic, communication and social, Complementary and management and leadership competencies. Interviews included 5 open-ended questions, as major questions. Figure 2 indicates the outline of the questions in the interview according to
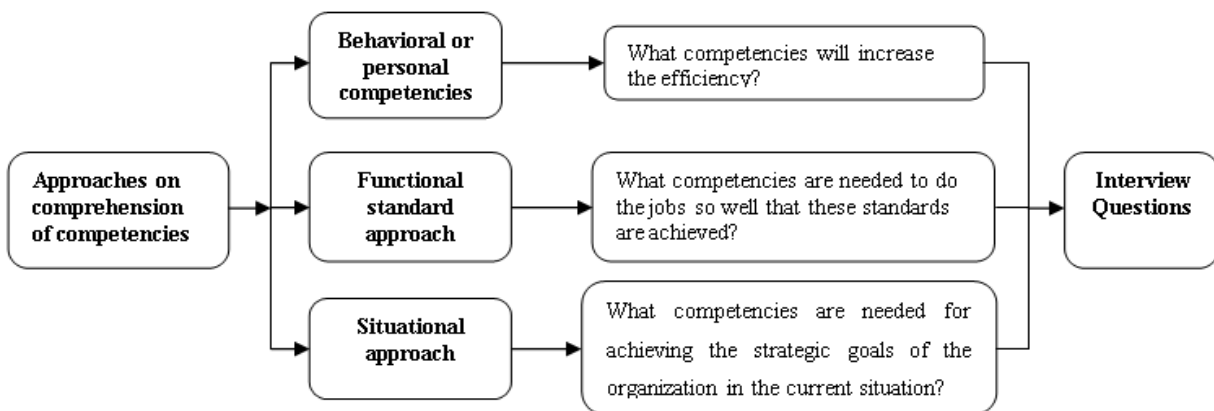

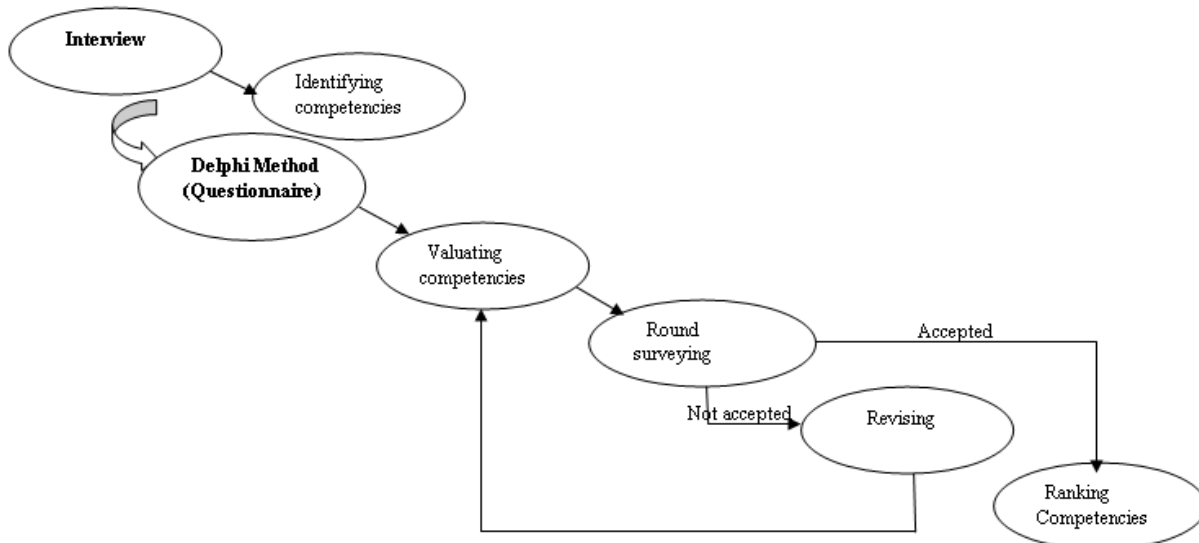Fig. 2: General feature for designing interview questions

Fig. 3: General feature of employing Delphi method

the understanding of competency approaches stated in this research.

The qualitative data were collected based on the interview. Then essential competencies of construction managers were resulted from the coded data. Then, the procedure of prioritizing began. Figure 3 illustrates the combination of the procedures mentioned before.

Delphi study: Delphi study originated from well-known Oracle by whom the future was forecasted based on Greek mythology. Delphi technique initially relied on emotions and perception that were considered as its basis. Later, it was improved as a scientific method. Late in 1950s, Delphi method was utilized for evaluating and exploring the ideas of specialists in army. Since the middle of 1960s up to now Delphi study has been known as a significant scientific technique (Savoia *et al.*, 2009).

Delphi is a process employed for reaching a scientific judgment or making scientific choices about a certain subject. Panel members are the body of specialists partaking in Delphi study known as panelists too (Hsu and Sandford, 2007). It is essential for the participants to be anonymous and their discussions and responses might not be accessed by any individuals in the panel. Moreover, another crucial thing is to prevent individuals in higher positions from impressing others such as their subordinates (Lee, 2009). In the current research, it was attempted to keep the respondents anonymous through utilizing certain codes. The researchers selecting Classical Delphi study usually carry it out in two or four rounds. But a number of researchers lead it in three rounds (Modified Delphi). The first round of this study starts with one or some questions that the researcher designed from different

resources consisting of the articles and papers written in past and discussion with chosen specialists and practitioners (Hsu and Sandford, 2007).

In the current research, following the results obtained from interview as the necessary competencies, those competencies were put together so that they could be as appropriate tools utilized in the Delphi study. Initially, the members of the panel ranked the significance of every individuals' competencies utilizing a 4-point scale whereby four is very considerable and one is least significant or through a 4-point scale ranging from number 1 that signified "somehow important", number 2 signifies "least important", 3 means important and number 4 indicating "very important" (Appendix B). In the next round, statistical method was used to analyses the collected data. In the second round and its following rounds, in order to keep the harmony and consistency of analysis, Kendall's Coefficient of concordance was employed. On condition that the results obtained in the first round would not consistent, the procedure should be continued by round two of Delphi and its following rounds (Appendix C).

Following stage 1, a questionnaire would be formed based on first stage that would be circulated by the researcher to gather the experts' opinion. The members of the panel would reconsider the numerical outline of preceding stage. In other words, they would be requested to look at the grades of central tendency and mean. They were also requested to find the similarities and differences between the findings and their own answers. This way they could conclude that if their responses and the findings were within the same range. In the case that the members of panel wanted, they could change the original rating. All opinions

would be gathered by the researcher one more time and the Kendall's coefficient would be measured again if there would not be an acceptable coefficient resulted from analyzing test.

Data collection: This research was done in two stages. The first stage was performed to recognize the important competencies and then determine their degree of importance. First stage was performed in two steps including Interview and Delphi study. The results of interviews were used as the foundation to perform Delphi study. In the first stage, both interview and Delphi study, respondents were experts and professionals in Construction affairs.

Gathering data from interview: In order to give a concept about the competencies, a list of competencies according to the literature review was prepared and offered. Following that the interviewees were asked about each category. In other words they were asked to determine the competencies they believe. They also were asked to suggest any items if needed. Five open-ended interview questions were asked based on comprehension approaches mentioned in literature review. An initial questionnaire consisting of five open-ended questions were designed according to the five categories of competencies shown at Fig. 1 (Appendix A).

Following the interview process, a questionnaire based on the interview results was constructed. In fact, the competencies introduced by the respondents were the questions. The respondents were asked to rank and evaluate the competencies as the questions.

Interviewees' background: Interviewees are the individuals who are project managers, construction managers, supervisor and construction site engineers who have more than 7 years of experience in construction projects. Six of the interviewees are project managers, six of them are construction managers, six of them are supervisors and 7 of them are construction site engineers. All of the interviewees were males.

RESULTS

In summary, 28 competencies were determined, based on the data obtained from the interview, which are significant in the organizations' success in reaching their objectives and their accomplishments. Table 1 shows a brief picture of CM competencies according to the respondents' opinions. The numbers in this table show the numbers of interviewees who pointed each competency.

According to the data obtained from interviewees, a questionnaire was designed which was completed by some specialists in order to achieve the second objective.

The specialists rated the significance of all every competency through a 4-point scale ranging from number 1 that signified "somehow important", number 2 signifies "least important", 3 means important ,and number 4 indicating "very important". The information that was obtained in the first step was processed and analyzed based on the statistical approaches. Then using the summarized information, a questionnaire was provided for round 2. The degree in which the specialists had common view and agreed on the suggested elements was estimated through Kendall's coefficient of Concordance (W). For measuring this degree, the specialists' responds to the questionnaire in rounds 1 and 2 of Delphi study were compared. The Kendall's coefficient of Concordance obtained in round 1 equaled 0.798 and the p-value (sig) for scored ranking

Table 1: Necessary competencies of a CM in a developing country based on the frequency

Individual competencies	Physical fitness and mental health	Meeting person	Problem solver	Self manager	Willing to change	Flexible and adaptable	Creative and innovative	Self-confidence	Stress controller	Risk taker
Number	21	18	16	15	13	14	16	15	18	8
Communication and social competencies	Team working and cooperating	Conflict manager	Sociable	Trust builder	Negotiation	Oral expression ability	*****	*****	*****	*****
Number	20	19	18	10	18	17				
Management and leadership competencies	Impact and influence	Proficient and technical	Empowering and delegating	Planning and organization	Judge and decision maker	*****	*****	*****	*****	*****
Number	19	19	15	22	12					
Strategically competencies	Knowledge manager	Strategic thinker	Predictor	Time manager	*****	*****	*****	*****	*****	*****
Number	14	11	16	23						
Complimentary competencies	Computer and IT knowledge	English language knowledge	Being up to date	*****	*****	*****	*****	*****	*****	*****
Number	19	10	16							

Table 2: Round 1 Delphi study results

	Competencies	Experts													
		A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Physical fitness and mental health	4	4	4	3	4	4	4	4	4	4	3	4	4	4
2	Meeting person	3	4	3	3	3	3	3	3	3	4	3	3	3	3
3	Problem solver	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	Stress controller	3	3	3	3	3	3	3	3	3	2	3	3	3	3
5	Risk taker	1	1	1	1	1	1	2	1	1	1	1	1	1	1
6	Self-confident	3	3	3	3	3	3	3	3	3	3	3	4	3	3
7	Self manger	2	2	2	2	3	2	2	3	2	3	2	2	2	2
8	Willingness to change	2	2	2	2	2	3	2	2	2	2	2	2	2	3
9	Creative and innovative	3	3	3	3	3	3	3	3	3	2	3	3	3	2
10	Adaptable and flexible	3	3	3	3	3	4	3	3	3	3	3	4	3	4
11	Sociable	4	4	4	4	4	4	4	4	4	3	3	4	4	4
12	Negotiator	3	3	3	3	3	3	3	4	3	3	4	3	4	3
13	Trust builder	2	2	2	2	2	1	2	1	2	2	2	2	2	2
14	Team maker and cooperator	4	4	3	4	4	3	4	4	3	3	3	4	3	3
15	Conflict manager	2	2	2	2	2	2	3	2	2	2	2	2	2	2
16	Oral expression ability	3	2	2	2	3	2	2	2	2	3	2	2	2	2
17	Impacting and influencing	3	3	3	3	3	3	4	3	3	3	3	3	3	3
18	Planner and organizer	3	4	3	3	4	4	4	4	4	4	3	4	4	4
19	Empowering and delegating	3	3	3	2	2	2	2	2	3	2	2	2	2	2
20	Judge and decision maker	2	2	2	2	2	2	3	2	2	3	2	2	2	2
21	Proficient and technical	4	4	3	4	4	4	3	4	4	3	3	4	4	3
22	Time manger	3	4	3	3	3	4	3	4	3	3	3	3	3	3
23	Predictor	2	3	3	3	2	2	2	2	2	3	2	2	2	2
24	Strategic thinker	2	2	2	2	2	2	2	2	2	2	2	2	2	1
25	Knowledge manager	3	3	3	2	2	3	2	2	2	3	2	3	3	2
26	Up to date	3	2	2	2	2	2	2	2	2	2	2	2	2	2
27	English language knowledge	1	1	2	1	1	1	2	1	1	1	1	2	1	1
28	Computer skills and IT	2	2	2	2	2	3	2	2	2	2	3	2	2	3

	Competencies	Experts											Mean	Group rank
		O	P	Q	R	S	T	U	V	W	X	Y		
1	Physical fitness and mental health	4	4	4	4	3	4	4	4	4	4	4	3.88	1
2	Meeting person	3	3	3	3	3	3	3	3	3	3	3	3.08	8
3	Problem solver	3	3	4	3	3	3	3	3	3	4	3	3.08	8
4	Stress controller	3	3	3	3	3	3	3	3	3	3	3	2.96	9
5	Risk taker	1	1	2	1	1	1	1	1	1	2	2	1.16	21
6	Self-confident	3	3	3	4	3	3	3	3	3	3	4	3.12	7
7	Self manger	2	2	2	2	2	2	3	2	2	2	2	2.16	15
8	Willingness to change	2	2	2	2	2	2	2	2	2	2	2	2.08	17
9	Creative and innovative	3	3	3	3	3	3	2	3	3	3	3	2.88	10
10	Adaptable and flexible	3	3	4	3	4	3	3	3	4	3	4	3.28	4
11	Sociable	3	3	4	4	4	4	4	3	3	3	4	3.72	2
12	Negotiator	4	4	3	4	3	3	3	3	4	3	3	3.28	4
13	Trust builder	2	2	1	2	2	2	2	1	2	2	2	1.84	19
14	Team maker and cooperator	4	4	4	4	4	3	4	4	4	4	3	3.64	3
15	Conflict manager	2	3	2	2	2	3	3	3	3	3	4	2.36	12
16	Oral expression ability	2	2	2	2	2	2	2	3	2	2	2	2.16	15
17	Impacting and influencing	3	3	4	3	3	4	4	3	3	3	3	3.16	6
18	Planner and organizer	2	4	4	4	4	4	3	4	4	4	4	3.72	2
19	Empowering and delegating	2	3	2	2	2	2	2	2	2	2	3	2.24	14
20	Judge and decision maker	2	2	2	2	2	2	2	3	2	2	2	2.12	16
21	Proficient and technical	4	4	3	4	4	4	4	3	4	4	4	3.72	2
22	Time manger	3	3	3	3	4	3	3	4	3	3	2	3.24	5
23	Predictor	2	3	2	3	2	2	3	2	2	2	2	2.28	13
24	Strategic thinker	2	2	1	2	2	2	2	2	2	2	2	1.92	18
25	Knowledge manager	2	2	2	3	2	3	2	2	3	2	2	2.40	11
26	Up to date	3	2	2	2	2	3	2	2	3	2	2	2.16	15
27	English language knowledge	1	1	2	1	1	1	1	1	1	1	2	1.20	20
28	Computer skills and IT	2	2	2	3	2	2	2	2	2	2	2	2.16	15

Kendall's W = 0.798; p-value = 0.000

equaled 0.00 (p-value < = 0) (Table 2). Delphi, in round 2, would show a stronger coefficient provided that the Kendall's coefficient in round 1 was not significant. The value of Kendall's Coefficient Concordance and

Table 3: Summary of competencies based on importance

	Competencies	Mean	Group rank
1	Physical fitness and mental health	3.88	1
2	Proficient and technical	3.72	2
3	Planning and organizer	3.72	2
4	Sociable	3.72	2
5	Team maker and cooperator	3.64	3
6	Adaptable and flexible	3.28	4
7	Negotiator	3.28	4
8	Time manager	3.24	5
9	Impacting and influencing	3.16	6
10	Self-confidence	3.12	7
11	Problem solver	3.08	8
12	Meeting person	3.08	8
13	Stress controller	2.96	9
14	Creative and innovative	2.88	10
15	Knowledge manager	2.40	11
16	Conflict manager	2.36	12
17	Predictor	2.28	13
18	Empowering and delegating	2.24	14
19	Self manager	2.16	15
20	Oral expression ability	2.16	15
21	Computer skills and IT	2.16	15
22	Up to date	2.16	15
23	Judge and decision maker	2.12	16
24	Willingness to change	2.08	17
25	Strategic thinker	1.92	18
26	Trust builder	1.84	19
27	English language knowledge	1.20	20
28	Risk taker	1.16	21

the p-value in the current research showed a statistical significance (p-value<0.05) and consistency with a satisfactory and up to standard Kendall's Coefficient.

Therefore, the summarized schedules of necessary competencies for construction managers in Iran as a developing country according to the importance prioritized by interviewees are as in (Table 3).

APPENDIX A

Interview protocol:

- Please introduce yourself and state that how long and how many projects have you involved in construction fields.
- What individual competencies are essential for a construction manager in projects in order to achieve organisational goals?
- What strategic competencies are essential for a construction manager in order to achieve organisational goals?
- What communication competencies are essential for a construction manager in order to achieve organisational goals?
- What methodological competencies are essential for a construction manager in order to achieve organisational goals?
- What complementary competencies can help a construction manager to be more effective in their work?

APPENDIX B

The questionnaire of Delphi (round one): Please rate how important the competencies identified for a construction manager in construction projects that could be effective to achieve success in project's goals remember your answer is your expert opinion as there are no right or wrong answers. Please allocate a number from 1 to 4 by placing a tick (√) in the cell that corresponds to your answer.

Neutral	1	2	3	4	Very important

1: Neutral; 4: Very important
Please place a tick (√) in the cell that corresponds to your ranking for each competency

No.	Competencies				
1	Physical fitness and mental health	1	2	3	4
2	Proficient and technical	1	2	3	4
3	Planner and organizer	1	2	3	4
4	Sociable	1	2	3	4
5	Team maker and cooperator	1	2	3	4
6	Adaptableand flexible	1	2	3	4
7	Negotiator	1	2	3	4
8	Time manager	1	2	3	4
9	Impacting and influencing	1	2	3	4
10	Self-confident	1	2	3	4
11	Problem solver	1	2	3	4
12	Meeting person	1	2	3	4
13	Stress controller	1	2	3	4
14	Creative and innovative	1	2	3	4
15	Knowledge manager	1	2	3	4
16	Conflict manager	1	2	3	4
17	Predictor	1	2	3	4
18	Empowering and delegating	1	2	3	4
19	Self manager	1	2	3	4
20	Oral expression ability	1	2	3	4
21	Computer skills and IT	1	2	3	4
22	Up to date	1	2	3	4
23	Judgeand decision maker	1	2	3	4
24	Willingness to change	1	2	3	4
25	Strategic thinker	1	2	3	4
26	Trust builder	1	2	3	4
27	English language knowledge	1	2	3	4
28	Risk taker	1	2	3	4

APPENDIX C

The questionnaire of Delphi (round two): We would like to thank you for taking time from your busy schedule to participate in this research. In round one of Delphi study you were asked to rank the competencies identified for construction managers in construction projects that could be effective to achieve success.

In this round (round two) you are being provided the results of round one and your responses. In some of the areas your response was different from the consensus opinion. Please consider your answers and decide whether you wish to agree with the consensus or maintain your original response. If you wish to agree with the consensus please indicate by identifying the factors and your new response. If you wish to support your previous response please write your reasons. Remember your responses are voluntary and strict confidentiality will be maintained. Please rate how important the competencies identified for construction managers in construction projects that could be effective to achieve success. Remember your answer is your expert opinion as there are no right or wrong answers.

Neutral	1	2	3	4	Very important

1: Neutral; 4: Very important

Please fill in your new ranking for each CM competency from 1 to 4, based on the above scale

No.	Competencies	Group rank based on mean	Your previous rank	Your new rank	Reasons
1	Physical fitness and mental health				
2	Proficient and technical				
3	Plannerand organizer				
4	Sociable				
5	Team maker and cooperator				

No.	Competencies	Group rank based on mean	Your previous rank	Your new rank	Reasons
6	Adaptable and flexible				
7	Negotiator				
8	Time manager				
9	Impacting and influencing				
10	Self-confident				
11	Problem solver				
12	Meeting person				
13	Stress controller				
14	Creative and innovative				
15	Knowledge manager				
16	Conflict manager				
17	Predictor				
18	Empowering and delegating				
19	Self manager				
20	Oral expression ability				
21	Computer skills and IT				
22	Up to date				
23	Judgeand decision maker				
24	Willingness to change				
25	Strategic thinker				
26	Trust builder				
27	English language knowledge				
28	Risk taker				

REFERENCES

Brophy, M. and T. Kiely, 2002. Competencies: A new sector. J. Eur. Ind. Training, 26(2-3-4): 165-176.

Cheetham, D.W. and J. Lewis, 2001. Productivity, buildability and constructability: Is work study the missing link? Proceeding of the 17th Annual ConferenceAssociation of Researchers in Construction Management, University of Salford, Salford, BRS.

Clough, R.H., G.A. Sears and S.K. Sears, 2000. Construction Project Management. Wiley, NY.

Cook, K.W. and P. Bernthal, 1998. Job/role competency practices survey report. Development Dimensions International, Bridgeville.

Davenport, T.H., 1993. Process Innovation: Reengineering Work Through Information Technology. Harvard Business School Press, Boston, Mass.

Driscoll, D.L., A. Appiah-Yeboah, P. Salib and D.J. Rupert, 2007. Merging qualitative and quantitative data in mixed methods research: How to and why not. Ecological and Environmental Anthropology, (University of Georgia): 18.

Edum-Fotwe, F. and R. McCaffer, 2000. Developing project management competency: Perspectives from the construction industry. Int. J. Proj. Manag., 18(2): 111-124.

García-Barriocanal, E., M.A. Sicilia and S. Sánchez-Alonso, 2012. Computing with competencies: Modelling organizational capacities. Expert Syst. Appl., 39(16): 12310-12318.

Harrison, J.S. and C.H.S. John, 2009. Foundations in Strategic Management. South-Western Publications, Cincinnati.

Hsu, C.C. and B.A. Sandford, 2007. Minimizing non-response in the Delphi process: How to respond to non-response. Pract. Assessment Res. Eval.,12(17): 62-78.

Klein, J.T., 2001. Transdisciplinarity: Joint Problem Solving Among Science, Technology and Society: An Effective Way for Managing Complexity. Verlag, Birkhauser, Basel.

Koenigsfeld, J.P., S. Kim, J. Cha, J. Perdue and R.F. Cichy, 2012. Developing a competency model for private club managers. Int. J. Hosp. Manag., 31(3): 633-641.

Kormanik, M.B., R.D. Lehner and T.A. Winnick, 2009. General competencies for the HRD scholar-practitioner: Perspectives from across the profession. Adv. Develop. Hum. Resour., 11(4): 486-506.

Lee, Y., 2009. Competencies needed by Korean HRD master's graduates: A comparison between the ASTD WLP competency model and the Korean study. Hum. Resour. Develop. Quart., 20(1): 107-133.

Markus, M.L. and D. Robey, 1988. Information technology and organizational change: Causal structure in theory and research. Manag. Sci., 34(5): 583-598.

Martina, K., U. Hana, F. Jiří, Ř. Iveta, A. Abraham, S. Jebapriya, M.A.A.A. Crivelenti, J.F. Alves, P.E. Guimarães and A.C. de Matos, 2012. Identification of managerial competencies in knowledge-based organizations. J. Competitiveness, 4(1): 129-142.

Moon, Y.L., 2007. Education reform and competency-based education. Asia Pac. Educ. Rev., 8(2): 337-341.

Pfeffer, J., 1996. Competitive Advantage Through People: Unleashing the Power of the Work Force. Harvard Business School Press, Boston.

Rasli, A., K.I. Khas, M.H.M. Jamshidi and S.A. bin Shuhel Ahmad, Year. HR Competencies of Managers and Professionals in Educational Organizations. Retrieved from: www. academia. edu/.../HR_ competencies_ of_ managers_ and_ professional.

Savoia, E., M.A. Testa, P.D. Biddinger, R.O. Cadigan, H. Koh, P. Campbell and M.A. Stoto, 2009. Assessing public health capabilities during emergency preparedness tabletop exercises: Reliability and validity of a measurement tool. Pub. Health Report, 124(1): 138.

Tajaddini, R., B.G. Mujtaba and M. Bandenezhad, 2010. Management skills of Iranians: A comparison of technical, human and conceptual differences based on gender, age and longevity in management ranks. Labour Manag. Develop., 10(2009).

Tang, T.L.P. and H. Liu, 2012. Love of money and unethical behavior intention: Does an authentic supervisor's personal integrity and character (ASPIRE) make a difference? J. Bus. Ethics, 107(3): 295-312.

Tashakkori, A. and C. Teddlie, 2010. Sage Handbook of Mixed Methods in Social and Behavioral Research. SAGE Publications, Incorporated.

Tucker, R.L., 1986. Management of construction productivity. J. Manag. Eng., 2(3): 148-156.

Yang, Y.T.C. and C.Y. Chan, 2008. Comprehensive evaluation criteria for English learning websites using expert validity surveys. Comput. Educ., 51(1): 403-422.

Zingheim, P.K. and J.R. Schuster, 2009. Competencies replacing jobs as the compensation/HR foundation. World Work J.,18(3): 6-20.