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Ranking the Most Important Competencies of the Project Managers Using Relative Importance Index Analysis

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Abstract: Project managers' competencies are critical factors for project success. However, the high range of studied competencies in the literature and standards may confuse the senior managers when hiring and developing their project managers. In order to reduce this confusion, this study identified 21 competencies and ranked them through Relative Importance Index Analysis. A conceptual framework is designed for the purpose of this study. The results showed 10 competencies as the most important competencies for the project managers. The first nine competencies are the competencies that are grouped as project management knowledge competency of the PMCD Framework. However, the tenth competency is managerial competency that is a competency element of the personal competencies of the same framework. Therefore, this study emphasizes the project managers to focus on these competencies to ensure successful projects.

Keywords:- *Project Manager; Competencies; Relative Importance Index Analysis.*

I. INTRODUCTION

Project-based organizations have become increasingly popular of late due to its effectiveness and competitiveness. One of the factors that influence project success is employing competent project managers. Nowadays, in a highly technological and high level of competitive environment, project managers play a critical role in projects' success. Their selection, assignment, and ongoing development are the critical key to a project's ultimate success. Pinto and Kharbanda (1995), argued that project management is a leader-intensive endeavor, and competent project managers can lead projects to success even in the face of substantial challenges. Additionally, Crawford (2000), pointed out that a competent project manager is a strong factor that affects project success or failure. Bedingfield and Thal (2008) pointed out that project success can be enhanced by selecting the most appropriate and competent project manager. Also, Cheng *et al.* (2005) indicated that there is a growing awareness of the relationship between project managers' competencies and achieving project success. However, the process of attracting and developing qualified project managers are difficult and expensive (Hashim, Talib and Alamen, 2014).

In order to survive in a competitive market, organizations today are looking for competitive advantages. One of these competitive advantages is having a competent team leading by competent project managers (Bratton and Gold, 1999; Dainty, Cheng and Moore, 2004). Authors such as Karpin (1995) and Smith, Carson and Alexander (1984) have assumed that if project teams are competent, they will perform their tasks effectively and this leads to successful projects and increase the competitive advantage of the organization. On the other hand, Pinto and Kharbanda (1995), pointed out that it is popular to project-based organizations to discover that they do not have a sufficient number of competent project managers who are the key factor behind the project success. The author added that despite the acknowledgment of senior managers about the way in which project managers acquire their skills, they are unsure what the best way to develop and provide well-trained project managers for the future.

A project manager must possess the core competencies that enable him to well manage the project and achieve its objectives and deliverables successfully. Recently, there has been a growing emphasis within researchers on the need to identify the core competencies of the project manager that improve his performance in order to meet the growing demand in the industry (Dainty, Cheng and Moore, 2004). Crowford (2000) stated that despite the project manager competencies are obviously a critical and vital factor for project success, it is still difficult to be quantified and based on the opinions of the project management practitioners. Also, Stevenson and Starkweather (2010) concluded that the project managers' competencies are the key factor that influences the eventual outcome of the project. Furthermore, the organizations' success depends on their competent employees (Brophy and Kiely, 2002). Additionally, a successful project manager is dependent on his competencies (Turner and Muller, 2006).

In order to design an effective framework to develop the competencies of project managers, there is a need to understand the way that these project managers consider in managing their projects. Hence, this study aims to rank the competencies and identify the most important competencies through the perception of the project managers in Malaysian construction companies.

II. PROJECT MANAGERS' COMPETENCIES

Nowadays, there is an increasing demand for competent project managers because projects become more complex and more non-project-based organizations move into management by projects (Crawford, 1997). Ruuska and Vartiainen (2003) revealed that the project manager competencies are the key aspect of a project's success. Due to the consensus acknowledgment of the important role of the competent project manager, most organizations recognize the importance of developing their managers and

employees to enhance their competitive capabilities (Bratton and Gold, 1999; Dainty, Cheng and Moore, 2004). Furthermore, Kerzner (1982) thinks that project management continues to become more challenging and emphasizes to pay special attention to the development of the project managers to be able of coping with jobs that range from small to mega projects.

The literature has shown that most of the previous researches focus on skills which are one element of the competency, while; only a few researchers have focused on the competency itself. According to Cartwright and Yinger (2007), the major components of competencies are abilities, attitudes, skills, behavior, knowledge, and personality. Also, it is obvious that there is no consensus about one category which can represent and describe the project managers' competencies and their skills. This can be in contrast or aligned in some aspects with standers that include what project manager is expected to know, such as PMBOK Guide (2000), the IPMA's Competence Baseline (2006), and the APMBoK (2006); and what project manager is able to do, such as the occupational or performance-based competency standards of Australia and the United Kingdom. Table 1 shows some previously studied competencies of the project manager.

No.	Author	Studied Competencies/ Skills
1	Katz (1974)	Technical skills, Human skills, and Conceptual skills.
2	Bowenkamp and Klenier (1987)	Problem-solving, administration, supervision and team management, interpersonal relationship, personal qualities.
3	Pettersen (1991)	Problem-solving, administration, supervision and team management, interpersonal relationship, personal qualities.
4	Strohmeier (1992)	Team building; Conflicts; Communications; and Influence and motivation.
5	Goodwin (1993)	Problem-solving, interpersonal relationship, knowledge.
6	Anderson and Tucker (1994)	Administration, supervision and team management, interpersonal relationship, knowledge, experience.
7	Pinto and Kharbanda (1995)	Problem-solving, administration, supervision and team management, interpersonal relationship, personal qualities, knowledge, experience.
8	Grant, Baumgardner and Shane (1997)	Knowledge, experience
9	Gushgari, Francis and Saklou (1997)	Communication; Listening; Project management; Decision making; Leadership and motivation; Problem-solving; Quality management; Organizing; Delegating; Planning; Result orientation; Financial management; Time management; Technical knowledge; Negotiation; Personal adaptability; Administration; Project acquisition; Creativity; and Risk-taking.
10	Crawford (1997)	Input competencies; Process competencies; and Output competencies.
11	Brugger, Gerrits and Pruitt (2000)	Problem-solving, administration, supervision and team management, interpersonal relationship, knowledge.
12	Crawford (2000)	Problem-solving, administration, supervision and team management, interpersonal relationship, knowledge
13	Edum and McCaer (2000)	Technical skills, managerial skills, financial skills, legal skills, communication skills, general skills, and IT skills.
14	Hauschildt (2000)	Problem-solving, supervision and team management, interpersonal relationship, personal qualities, knowledge.
15	Odusami (2002)	Problem-solving, administration, supervision and team management, interpersonal relationship, personal qualities.
16	Dainty, Cheng and Moore (2004)	Achievement orientation, initiative, information seeking, focus on client's needs, impact & influence, defectiveness, teamwork & co-operation, team leadership, analytical thinking, conceptual thinking, composure, and flexibility.
17	Mantel *et al*. (2005)	Communication, organizational, team building, leadership, coping, and technological skills.
18	Hyvari (2006)	Supervision and team management, knowledge.
19	Valencia (2007)	Leadership Ability, Communication Skill, Decision Making Skill, Administrative Skill, Coping Ability, Analytical Thinking, and Technical Competence.
20	Patanakul and Milosevic (2008)	Multiple-project managers' competencies; organizational experience; interdependency management; multitasking; simultaneous team management; and management of the inter-project process.
21	Crawford and Nahmias (2010)	Leadership, Team development/team selection, Stakeholder management, Communication, Decision-making and problem-solving, Planning (cost, time, risk, quality, scope), Governance, Contract management, Monitoring and controlling (cost, time, risk, quality, scope), Organization structure, Project definition, Administration, Transition management, Change control, and Closing.
22	Omidvar *et al*. (2011)	Job-competencies; Person-competencies; and Contextual competencies.

Table 1:- Studied Competencies in the Literature

Through the analysis of the studied competencies /skills from the literature, it can be concluded some important aspects and results as the following:

- The categorization of the project manager competencies is different from author or standard to another. Crawford (1997) has categorized them into three groups (input competencies, process competencies, and output competencies). PMCD Framework (2002) has categorized them as project management knowledge/performance competencies, and personal competencies. IPMA (2006) has categorized them into three dimensions (Technical competences, Behavioural competencies, and Contextual competences). While, Omidvar *et al.* (2011) have categorized them as personal-related competencies, job-related competencies, and contextual competencies.
- The naming or description of the competencies are varied, as some of them have been described as competencies, abilities, skills, or attitudes, e.g. Valencia (2007) has described them as attitudes.
- Most of the technical competency elements are similar to the project management knowledge-competency elements in the PMCD Framework, such as in IPMA (2006) and Edum and McCaer (2000). While this study defines the technical competencies that can reflect and represent the engineering aspects of the project.

Depending on the analysis results, this study adopted the project management knowledge competencies provided by PMCD Framework. The choice of the project management knowledge competencies is because these competencies reflect all project management areas in the PMI PMBOK Guide which are Project Integration Management, Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Human Resources Management, Project Communications Management, Project Risk Management, and Project Procurement Management. In the same way, Personal competencies have been adopted from the same framework because they reflect all personal characteristics needed for a project manager which are the achievement and action competence; helping and human service competence; impact and influence competence; managerial competence; cognitive competence; and personal effectiveness competence.

In order to represent the technical or engineering competencies, This study adopted the engineering competencies which are provided by Engineers Canada (2011) which are: applying engineering knowledge, methods and techniques competency; using engineering technology, tools and equipment competency; safeguarding public safety; recognizing the impacts of engineering on the environment, economy and society competency; managing engineering activities competency; and communicating engineering information competency. This choice is because that these competencies reflect the important parts of the engineering aspects of the project, as well as, they are very important not only for the project manager but also for any engineer. Figure 1 illustrates a conceptual project manager competencies framework that is developed for this study.

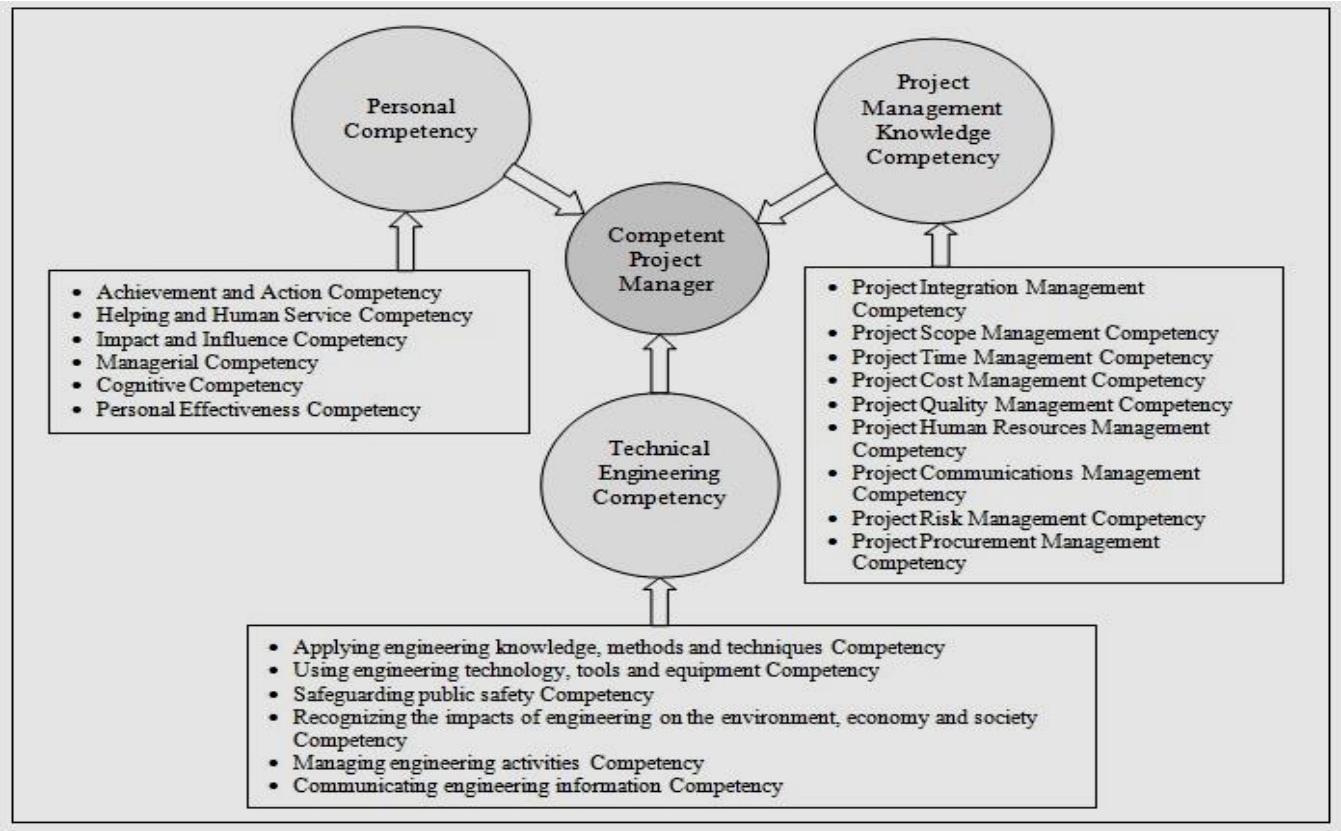

Fig 1:- Conceptual Framework

III. CONSTRUCTION INDUSTRY IN MALAYSIA

The Malaysian construction sector is closely related to the country's economic development because of its linkage with the other economic sectors. Although the declining global economic climate has affected the Malaysian economy, CIDB (2009) reported that the construction sector registered a solid growth of 5.7% in 2009 compared to 2.1% in 2008. This paradox is a result of various interacting forces i.e. the implementation of projects under the Nine Malaysian Plan (9MP) and the stability of construction materials prices. While the report showed that the new project investments had decreased. CIDB's record as at 31 December 2009 showed that projects with a total value of RM57.2 billion were awarded in 2009 compared to RM81.1 billion of projects awarded in 2008. The decrease in the value of projects was due to the decline in private investments, which was affected by the global economic crisis (CIDB, 2009).

In order to support a need for learning, information, and development for the construction industry, the Malaysian government has established the Construction Industry Development Board (CIDB) that represents a statutory board under the Ministry of Works. Also, this board aims to make the construction industry more dynamic enable it to be globally competitive. CIDB has categorized the construction companies into seven grades (from G1 to G7) depending on their capabilities and contributions to the industry. Each grade has specific limits in regard with the value of projects awarded (G1: not exceeding RM 200 thousand; G2: not exceeding RM 500 thousand; G3: not exceeding RM one million; G4: not exceeding RM 3 million; G5: not exceeding RM 5 million; G6: not exceeding RM 10 million; and G7: no limit). Also, each company has to be under the assessment each year to reactivate or upgrade its grade in CIDB (CIDB, 2012).

IV. METHODOLOGY

This descriptive study has been conducted in Malaysian construction companies. The target respondents are the project managers who manage construction projects of the construction companies as well as the senior managers who have experience in the project management and have executed construction projects in the past.

The questionnaire included 112 items that represent the 21 competencies of the conceptual framework as well as 12 questions for demographic information purpose. All the questionnaire items are developed through the competencies' descriptions of the theoretical frameworks and validated by experts. In order to reduce time and cost, this study used the online survey as a tool to distribute the research questionnaire.

In order to rank the project managers' competencies and identify the most important competencies in Malaysian construction companies, several statistical analysis techniques, typically including Relative Importance Index analysis (RII) and comparison of the means with the average value of all mean values. RII is calculated manually as in equation (1):

$$RII = \frac{\sum W}{A*N} \quad (1)$$

Where W = weights given to each factor by the respondents, A = highest weight (i.e. 5 in this case), and N = total number of respondents (94 in this case).

V. RESULTS AND DISCUSSION

The questionnaire has been validated and distributed to 265 construction companies. The data has been collected from 74 companies with 94 valid respondents during 4 months. 50 companies were under grade 7, with 62 respondents (65.9%); 15 companies were under grade 6, with 23 respondents (24.4%); 8 companies were under grade 5, with 8 respondents; and only one company was under grade 4 with one respondent. However, companies under grades 1, 2, and 3 did not respond to the questionnaire. Among these companies, only 5 governmental companies responded with 5 respondents (6.7%), while the rest respondents were collected from private companies.

The descriptive analysis of the respondents in regard with professional experience years, project management experience years, position, and membership in professional associations the results showed that: Professional experience: 10 respondents have more than 20 years' experience (21.2%); 29 respondents have experience from 15 to 20 years (30.8%); 38 respondents have experience from 10 to 15 years (40.4%), and 17 respondents have experience from 5 to 10 years (18.1%). While the experiences of the respondents in managing projects: only 1 respondent has more than 20 years' experience (1.06%); 8 respondents have experience from 15 to 20 years (8.5%); 36 respondents have experience from 10 to 15 years (38.3%); 39 respondents have experience from 5 to 10 years (41.4%); and 10 respondents have less than 5 years' experience in managing projects (10.6%).

In the respect of respondents' position, 11 respondents were managers of project managers (11.7%); 60 respondents were project managers (63.8%); 11 respondents were subordinate managers (11.7%), and 12 respondents were functional managers (12.7%).

In the respect of memberships in the professional associations of project management: only one respondent was an ASME member (1.06%); 5 respondents were SME members (5.3%); only one respondent was a member of IEEE (1.06%); 65 respondents were members of PMI (69.14%); 4 respondents were members of ASNE (4.25%); while 18 of the respondents were not members of any association (19.14%) as shown in Table 2.

Member	Frequency	%	Valid %	Cumulative %
No	18	19.1	19.1	19.1
ASME	1	1.1	1.1	20.2
SME	5	5.3	5.3	25.5
IEEE	1	1.1	1.1	26.6
PMI	65	69.1	69.1	95.7
ASNE	4	4.3	4.3	100.0
Total	94	100.0	100.0	

Table 2:- Memberships in the Professional Associations

The aim of this study is to rank the 21 competencies according to their importance by the perception of the project managers in Malaysian construction companies. The competencies are arranged in ascending of ranks, competency with highest RII or rank 1 indicates that it has the maximum priority to the project managers, while the competency with the lowest rank indicates that it has the lowest priority for the project managers.

Table. 3, illustrates the results of means and RII as well as the average value of all mean values. The results showed that project management cost competency has the highest priority for the project managers, while safeguard public safety competency has the lowest priority. However, it is noticeable that the values of the means and RII are very close together. This indicates that the project managers have almost the same priorities of these competencies with very small variation.

Competency	N	Maximum	Mean	∑W	RII	Rank
Project Cost Management Competency	94	5.00	4.3936	413	.8787	1
Project Integration Management Competency	94	5.000	4.37411	411.167	.8748	2
Project Scope Management Competency	94	5.00	4.3739	411.14	.8747	3
Project Time Management Competency	94	5.00	4.3471	408.63	.8694	4
Project Quality Management Competency	94	5.00	4.3404	408	.8680	5
Project Risk Management Competency	94	5.00	4.3357	407.56	.8671	6
Project Human Resources Management Competency	94	5.00	4.2766	402	.8553	7
Project Procurement Management Competency	94	5.00	4.2736	401.71	.8547	8
Project Communications Management Competency	94	5.00	4.2181	396.5	.8436	9
Managerial Competency	94	5.00	4.2074	395.5	.8414	10
Personal Effectiveness Competency	94	5.00	4.1676	391.75	.8335	11
Use engineering technology, tools, and equipment	94	5.00	4.0035	376.33	.8288	12
Achievement and Action Competency	94	5.00	4.1436	389.5	.8287	13
Impact and Influence Competency	94	5.00	4.1418	389.33	.8283	14
Helping and Human Service Competency	94	5.00	4.1383	389	.8276	15
Cognitive Competency	94	5.00	4.1117	386.5	.8223	16
Communicate engineering information	94	5.00	4.0142	377.33	.8028	17
Manage engineering activities	94	5.00	3.9830	374.4	.7965	18
Apply engineering knowledge, methods, and techniques	94	5.00	3.9681	373	.7936	19
Recognize the impacts of engineering on the environment, economy, and society	94	5.00	3.9521	371.5	.7904	20
Safeguard public safety	94	5.00	3.9229	368.75	.7845	21
Valid N (listwise)	94		4.1755		.8364	

Table 3:- Relative Importance Index analysis (RII) Results

In order to analyze the competencies with relatively high mean values, which indicate higher competencies for a competent project manager, a criterion is set in this paper for identification of the critical competencies. The competencies with mean values that are greater than the average value of all mean values (4.1755) are classified as the critical competencies for the project managers in construction companies in Malaysia. It can be seen that 10 competencies among the 21 competencies receive a mean value of greater than 4.1755, which are therefore determined as critical competencies. Also, it is noticeable the first nine competencies are the competencies that grouped as project management knowledge competency of the PMCD (2002) Framework. However, the tenth competency is managerial competency that is competency element of personal competencies of the same framework. While the other competencies that are out of the critical competencies indicate other important information that is competencies are ranked from 11 to 16 are the competencies which are grouped as personal competencies in PMCD (2002) Framework except for the competency of using engineering technology, tools and equipment which is a competency element of the technical engineering competencies of Engineers Canada Framework (2011). The competencies that are ranked from 17 to 21 are the competencies that are grouped as technical engineering competencies of Engineers Canada Framework (2011). These results can clearly indicate that project managers in Malaysian construction companies give more priority to the project management knowledge competencies, the second priority is the personal competencies, and the last priority is the technical engineering competencies.

VI. CONCLUSION

This study has been in Malaysian construction companies to investigate the perception of the project managers regarding the most important competencies needed to formulate a competent project manager. A number of 21 competencies are initially identified and investigated. Through questionnaires, these competencies are ranked according to RII values. 10 competencies are found with a mean value above the average value of the mean values (4.1755), namely " Project Cost Management Competency", " Project Integration Management Competency", " Project Scope Management Competency", " Project Time Management Competency", " Project Quality Management Competency", " Project Risk Management Competency", " Project Human Resources Management Competency", " Project Procurement Management Competency", " Project Communications Management Competency", and " Managerial Competency" are deemed as the most important competencies. It is noticeable that the first nine competencies are the competencies that formulate the project management knowledge competencies in PMCD Framework (2002). This indicates that project managers in Malaysia aware of the importance of project management approach and is in line with respondents' memberships in the professional associations as 69.1% of them are PMI members.

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