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Ranking of important knowledge areas and measurement of competency levels of construction project managers in Cambodia

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Abstract

The objectives of this paper are to rank the important knowledge and measure competency levels of construction Project Managers (PMs) in Cambodia. The important knowledge areas of construction PMs were analyzed and ranked by Analytic Hierarchy Process (AHP) method and competency levels were measured by Relative Level Index (RLI) from perception of main stakeholders such as contractors, consultants, and project owners. The results of ranking showed that time, quality, cost, and safety management are the main important knowledge areas for construction project managers in Cambodia, respectively. However, the ranking of important knowledge of contractor PMs is different among each stakeholder's perception. Moreover, the result of competency level measurement presented that competency level of contractor PMs in Cambodia is in medium level. However, in perception of contractors, competency level of construction PMs in Cambodia is higher than competency level of contractor PMs in perception of consultants and project owners.

Keywords: Knowledge, Competency, Construction, Project managers, Cambodia

1. Introduction

For any project management system to be effective, a project must be managed by a project manager who exhibits high knowledge and competencies. In this regards, success is achieved when the project satisfies what Roseau [1] called the triple constraint comprising performance specification, time (schedule), and money (budget). Consequently, it is of crucial importance that strong competencies required by the construction project managers should be clearly known or elaborated in order to make the improvement of inadequacy. As Phann [2] stated that construction project managers' problems always occur in Cambodia, consisting of poor leadership, lack of responsibility, inefficient decision analysis, unrealistic project schedule, poor project planning and control, and unreasonable risk analysis. In addition, Cambodia is one of developing countries in ASEAN which would be intensively invested by many stockholders from various countries in the future on all sectors; especially construction field. Local construction project managers were, therefore, surveyed in terms of knowledge and competencies in order to explore their weakness for implementing in construction projects. That is why this research was accordingly conducted by studying the current knowledge and competency levels of construction project managers in Cambodia in an attempt to improve their performances.

2. Objectives

The first aim of this paper is to present the exploration and the ranking of important knowledge areas of construction project managers in Cambodian from perceptions of contractors, consultants and owners. It is secondly needed to study the current levels of competency to apply those knowledge areas in implementing in construction project tasks.

3. Research methodologies

This research was conducted step by step as shown below:

3.1 Exploring PMs' important knowledge areas form literature reviews

The aims of literature reviews were to gather important knowledge areas from text books, articles, journals, international conference papers, and project management manuals and deepen the proper understanding of knowledge and competencies of construction PMs.

3.2 Questionnaire development

A questionnaire was developed based on relevant literature reviews. The pattern questions were composed of open-end question and closed-end questions. It consists of 3 parts such as general questions, comparison of important

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knowledge areas, and measurement of competency levels. It was clearly designed and given to those who play a role in construction project such as contractors, consultants, and owners in Cambodia.

3.3 Data collection

Two city; Phnom Penh and Siem Reap, respectively were thoroughly investigated and surveyed to use in this research by referring to some building construction projects. According to sample size formula stated by Yamane [3] , the totally 14 construction sites (mostly large projects) were surveyed and also 36 respondents consisting of 14 contractors, 12 consultants, and 10 owners were interviewed in details in accordance with the developed questionnaire to clearly acquire the necessary data and information about specific aspects.

3.4 Data analysis

There are 2 main types of data such as rankings of important knowledge areas and competency levels which were taken into analysis.

1. The important knowledge areas of construction project managers were ranked by using Analytic Hierarchy Process (AHP) method stated by Saaty [4] which consists of 5 scales for making pair wise comparison of each knowledge area: (1) equal importance, (3) weak importance, (5) strong importance, (7) very strong importance and (9) absolute importance. Data was collected from perception of three main stakeholders such as contractors, consultants, and owners. The total rankings of knowledge areas would be obtained from average of weight (w) of all respondents by simultaneously checking the variances of all respondents to ensure that they do not have quite different variances.

2. The PMs' competency levels were obtained from the evaluations of main stakeholders (contractors, consultants, and owners) which delineates the ability of project managers of contractors of how to apply those kinds of important knowledge area for carrying out in their current construction projects. The method used for analyzing the level of competencies of construction project managers is scoring tool. The mean score of each knowledge area was calculated to obtain the Relative Level Index (RLI) [5] as shown in following equation.

$$RLI = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{5N}$$

Where n_1, n_2, n_3, n_4, and n_5 are very low, low, medium, high and very high level of PMs' competency, respectively and N is total number of respondents.

4. Results

The results were divided into two parts such as the ranking of important knowledge areas of construction project managers in Cambodia and their competency levels to apply those knowledge areas. Hang [6] explored the 13 knowledge areas of PMs in construction firm by using literature reviews and questionnaires as shown in first column of Table 1–Table 4.

4.1 Ranking of important knowledge areas

The ranking of important knowledge areas of contractor project managers from overall perceptions as shown in Table 1 were divided into 3 levels including high importance (w>0.1), medium importance (0.1>w>0.04), and low importance (w<0.04). The result showed that quality, time, cost, and safety management, are considered as high important knowledge areas of project managers of contractor because the values of their means of weight are equal to or more than 0.1. Furthermore, risk, contract, labor, and material management, are counted as medium important knowledge areas. At last, human resource, documental, subcontractor, communication, and equipment management are assumed as low important knowledge.

Table 1 Ranking of PMs' important knowledge areas from overall perception

Knowledge Areas	Weight (w)	Level of Importance	Rank
Time	0.1864	High	1
Quality	0.1594	High	2
Cost	0.1320	High	3
Safety	0.0978	High	4
Risk	0.0608	Medium	5
Contract	0.0520	Medium	6
Labor	0.0430	Medium	7
Material	0.0410	Medium	8
Human resource	0.0390	Low	9
Document	0.0324	Low	10
Subcontractor	0.0311	Low	11
Communication	0.0299	Low	12
Equipment	0.0182	Low	13

Moreover, the ranking of important knowledge areas of contractor project managers from perceptions of contractors, consultants, and owners were indicated in Table 2, Table 3, and Table 4, respectively.

Table 2 Ranking of PMs' important knowledge areas from contractors' perception

Knowledge Areas	Weight (w)	Level of Importance	Rank
Time	0.2019	High	1
Cost	0.1964	High	2
Quality	0.0897	Medium	3
Safety	0.0879	Medium	4
Labor	0.0873	Medium	5
Risk	0.0821	Medium	6
Material	0.0774	Medium	7
Human resource	0.0711	Medium	8
Subcontractor	0.0418	Medium	9
Documental	0.0416	Medium	10
Communication	0.0376	Low	11
Contract	0.0334	Low	12
Equipment	0.0287	Low	13

From perception of contractors, knowledge areas of time and cost management are high important but knowledge areas of time, quality, safety, and cost management are high important from perception of consultant. Nevertheless, from perception of owner, quality and time management are high important knowledge areas for construction PMs in Cambodia.

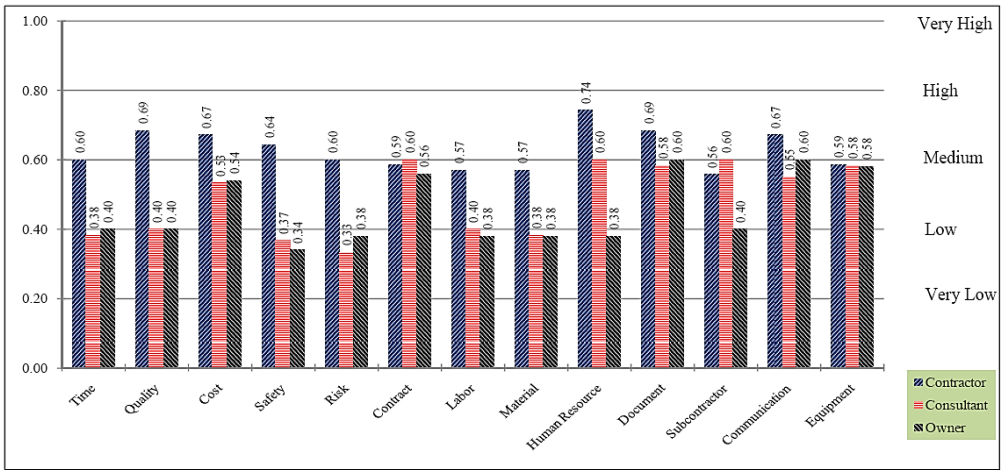

Figure 1 Competency levels of construction PMs in Cambodia

Table 3 Ranking of PMs' important knowledge areas from consultants' perception

Knowledge Areas	Weight (w)	Level of Importance	Rank
Time	0.2173	High	1
Quality	0.1991	High	2
Safety	0.1173	High	3
Cost	0.1103	High	4
Contract	0.0580	Medium	5
Risk	0.0560	Medium	6
Document	0.0265	Low	7
Material	0.0259	Low	8
Communication	0.0257	Low	9
Subcontractor	0.0249	Low	10
Human resource	0.0249	Low	11
Labor	0.0249	Low	12
Equipment	0.0122	Low	13

Table 4 Ranking of PMs' important knowledge areas from project owners' perception

Knowledge Areas	Weight (w)	Level of Importance	Rank
Quality	0.1894	High	1
Time	0.1400	High	2
Cost	0.0892	Medium	3
Safety	0.0883	Medium	4
Contract	0.0645	Medium	5
Risk	0.0443	Medium	6
Document	0.0291	Low	7
Subcontractor	0.0265	Low	8
Communication	0.0265	Low	9
Human resource	0.0211	Low	10
Material	0.0196	Low	11
Labor	0.0169	Low	12
Equipment	0.0138	Low	13

4.2 Competency levels

In Figure 1, the competency levels of those PMs were classified to 5 levels of Relative Level Index RLI (0-0.2 = very low, 0.2-0.4 = low, 0.4-0.6 = medium, 0.6-0.8 = high, and 0.8-1.0 = very high). The RLI indicated that the competencies of PMs in Cambodia to apply the important knowledge areas from perceptions of contractors are generally in higher level than that of consultants and owners. From overall perceptions, the competency of construction PMs in Cambodia is mostly in medium level. However, from perceptions of consultants and owners; those PMs' competency is mostly low to apply some knowledge areas such as time, quality, safety, risk, material, labor, human resource, and subcontractor management.

5. Conclusions

After analyzing the collected data using AHP method, the results indicated that time, quality, cost, and safety management, are respectively the 1st to 4th ranking of 13 knowledge areas based on the overall construction parties' perception. These four knowledge areas are considered as the high important knowledge. On the other hand, the Relative Level Index (RLI) showed that the competencies of construction project managers in Cambodia to apply the important knowledge from perceptions of contractors are generally in higher level than the perceptions of consultants and owners. According to the results, the competencies to apply the important knowledge are mostly medium in Cambodia from overall perceptions, whereas they are mostly low from perceptions of consultants and owners such as time, quality, safety, risk, material, labor, human resource, and subcontractor management.

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