

Evaluation of Factors Affecting on Construction Equipment Acquisition Methods in Malaysia

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Abstract. Purchasing with cash, financing through a loan, renting and leasing are four most common ways for Construction Equipment Acquiring (CEA). For having the best result in profit for a construction industry choosing the best alternative for obtaining equipment is one of the most important issues. The optimum acquisition strategy comes from accurate estimates of revenues and cost and also some non-financial factors that effect on choosing acquisition mode. The purpose of this report is to evaluate these factors, to find out which factor is more important and which one has the lowest effect on acquisition mode. To achieve the research objective, the factors that effect on CEA has been identified previously in a wide research. This identification has been carried out using different literatures and by interviewing from experts in construction. For evaluation of factors some questionnaires has been prepared using this information and distributed between construction professionals. A one sample t-test has been carried out as a statistical method. The result of this study can be used for construction manager to make a better decision in CEA.

Keywords: Construction Equipment, Factors Effecting on Construction Acquisition Methods

1. Introduction

The construction industry constitutes an important element of the Malaysian economy. Although it accounts for only 2.5% of the gross domestic product (GDP) in 2007, the industry is critical to national wealth creation as it acts as a catalyst for, and has multiplier effects to the economy and also enables other industries namely manufacturing, professional services, financial services, education and others. Recent years decline in the performance of the Malaysian construction industry has resulted in the urgent need for the Malaysian construction industry to chart its direction towards strengthening its foundations to face current and future challenges [1].

When commercial manufacturing of heavy construction equipment began, the primary way to acquire a new piece of equipment was outright purchase [2], [3]. Players in the construction industry typically were wealthy and filled all of the primary roles i.e. owner, designer, and contractor [4].

Traditionally, the equipment purchase process was complete when the contractor selected a specific make and model of machine from a dealer. This acquisition process today includes numerous financing options and scenarios that banks, finance companies, leasing agencies, and manufacturers' offer [3], [5].

One of the big issues in construction companies is that the company need construction equipment but doesn't know whether to buy it rent it or lease it; in the other word company doesn't know how to acquire it [2], [6], [7]. There are varieties of factors that a good manager should consider in acquiring the equipment. These factors are both financial and non-financial [2], [8], [9]. A good construction manager should identify these factors and by evaluating them decision making is possible. [2], [3].

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This research focuses on construction companies in Malaysia, especially in Johor Bahru and Kuala Lumpur, to evaluate the financial and non-financial factors affecting on CEA methods.

2. RESEARCH METHODOLOGY

2.1. Secondary Data Source

A detailed literature review was carried out to gather general information about the objectives of this study considered by construction practitioners in various countries. Conducting literature review helped to recognize the research topic in detail and general.

Moreover, extra sources as well as essential knowledge required regarding this study were obtained through literature review. The resources employed during literature review of this study are international and local conference papers, documents, internet, magazines, journal articles, books, and etc.

Secondary data sources were used to identify specially the financial factors affecting on construction equipment acquiring method.

2.2. Primary Data Source

The primary data source of this study was interview. The interview is divided into two main stages which are preliminary interview and main interview. Initially preliminary interview was conducted through communicating with the key personnel of contractor companies.

This interview was done through asking open ended questions. The results from this stage then used mainly to get some ideas and establish the objectives through finding the problems. At the next stage, the main interview was conducted through asking semi structured questions which enabled the respondents to comment on the questions, on the one hand, and also allowed the interviewer to ask follow up questions, on the other hand.

The interview was used specially for identifying non-financial factors affecting on construction equipment acquisition methods.

After preliminary data gathering, questionnaire survey has carried out to reach the objective of this study among selected construction practitioners involved in construction projects. Questionnaire survey specifically has been used for evaluation of factors affecting on CEA methods.

3. Results And Findings

This section presents the evaluation of the collected data from literature review and interview using questionnaire survey.

The main questionnaire was formatted based on data obtained from literature review and improved based on modifications applied in the interview stage. Fifty (50) sets of questionnaires were handed over to the respondents by the means of two main ways, namely postal questionnaire and self-administrated questionnaire and only 32 responses were fully received, constituting a response rate of 64%.

The designed questionnaire asks the respondents' opinion towards the classification of financial and non-financial factors affecting CEA methods. The following sections will discuss in detail the outcome of this survey.

3.1. Financial factors affecting on construction acquiring method

Financial Factors	Not important	Neither important nor unimportant	Important	Very important	Extremely important	Mean Index
<i>Equipment Expenses</i>						
Fixed Costs						
Purchase price	-	2	4	12	14	4.19

Financial Factors	Not important	Neither important nor unimportant	Important	Very important	Extremely important	Mean Index
Freight charges	-	-	6	14	12	4.19
Initial unloading and assembly	-	-	8	18	6	3.94
Depreciation	-	5	13	8	6	3.47
Interest	-	12	7	10	3	3.13
Insurance	-	8	12	8	4	3.25
Sales taxes	-	-	11	17	4	3.78
Storage	-	-	9	9	14	4.16
Operating Costs						
Repair	-	-	11	12	9	3.94
Maintenance	-	-	5	14	13	4.25
Supplies	-	5	11	12	4	3.47
Fuel	-	-	7	10	15	4.25
Oil	-	3	7	22	-	3.59
Labour	-	2	7	19	4	3.78
Transportation	-	3	14	10	5	3.53
Break down	-	9	12	6	5	3.22
Set up	-	4	13	13	2	3.41
Overhauls	-	2	7	16	7	3.88
Inspection	-	1	10	20	1	3.66
Modification	-	-	19	13	-	3.41
Indirect Cost						
Supervision	-	2	15	8	7	3.63
Overhead	-	-	6	17	9	4.09
Other Costs						
Obsolescence	-	1	17	14	-	3.41
Inflation	-	6	11	14	1	3.31
Improper selection or replacement	-	5	9	13	5	3.56
Equipment Revenue						
Internal revenue (From actual contracts or internal use by contractor)	-	3	8	18	3	3.66
External (hourly work for client and other contractors)	-	5	9	18		3.41
Salvage value	-	7	7	13	5	3.50

3.2. Non-Financial factors affecting on construction acquiring method

Non-Financial Factors	Not important	Neither important nor unimportant	Important	Very important	Extremely important	Mean Index
<i>Advertisement</i>						
Company name (logo)	-	-	11	17	4	3.78
Prestige of company	-	3	10	14	5	3.66
Image to public	-	3	11	7	11	3.81
<i>Adaptability</i>						
Compatible with company goals	-	4	5	13	10	3.91
Planning: budgets, upgrading, interchanging	-	3	13	15	1	3.44
Storage: Work cycles, market fluctuations	-	5	6	19	2	3.56
Mobility: remote sites, scheduling, coordination	-	-	13	19	-	3.59
Flexibility: versatility of acquisition mode	-	-	12	19	1	3.66
<i>Availability</i>						
Opportunity to get work because of owning specialized equipment	-	6	16	7	3	3.22
Lag time during procurement	-	3	9	16	4	3.66
Demand of market for this equipment, backlog of work	-	2	7	19	4	3.78
Freedom of use of equipment	-	2	12	13	5	3.66
<i>Risk</i>						
Possibility of losing contracts due to lack of working capital	-	4	4	18	6	3.81
Obsolescence: risk of improved model being developed	-	5	12	9	6	3.50
Timing: timing of loan, lease payments	-	5	9	13	5	3.56
Other investments: compare risks and rates of return	1	5	6	19	1	3.44
Disposal: risk of low salvage value, poor used market	1	13	8	9	1	2.88
Competitiveness: of acquisition mode, strategy (situation of other construction contractors)	-	8	15	9	-	3.03
<i>Organization</i>						
Compatibility of staff for proper operation, repair and maintenance of equipment	-	7	15	10	-	3.09
Transportation and assembly capability	-	3	21	7	1	3.19
Replacement parts, inventory, storage	-	5	11	7	9	3.63
Employee morale: new equipment, owned, etc.	-	8	17	5	2	3.03
Pre-acquisition analysis: future work, market	-	7	11	9	5	3.38
Post-acquisition analysis: generate work, replacement, etc.	-	3	16	13	-	3.31

3.3. Single sample t-test

One sample t-test is defined as a statistical method employed to understand the mean difference between the sample and the known value of the population mean. The purpose of the one-sample t-test is to determine whether there is sufficient evidence to conclude that the mean of population from which the sample is taken is different from specified value. [10]

The confidence interval on the mean is related to the one sample t-test. We apply confidence interval when specified value of the population mean is not being tested. Alternatively, we need to understand a range of conceivable values of unfamiliar population mean from which the sample was selected. The fundamental hypothesis of one-sample t-test is that the population from which the sample t-test is normal.

In this study the confidence interval has been set at 95%. If the acquired value of significance is more than 0.05 of set level of significance, then we can agree the null hypothesis. Null hypothesis says that there is no significance difference of ratings among different respondents. As a result, it can be resulted that the population from which the sample is selected has a normal distribution.

4. Conclusion

This study investigated the information requirements for construction managers to make a proper decision in acquiring construction equipment that can be used broadly in construction projects. It looked at what information would be most important for the contractors and project manager in finding best alternative for CEA methods. Contractors should consider both financial and non-financial factor to make a good decision. The degree of importance for each factor has been specify by experts and experienced construction managers.

5. References

- [1] (CIDB), C. I. (2007). Construction Industry Development Board (CIDB). Retrieved June 05, 2010, from Construction Industry Development Board (CIDB):http://www.constructionportal.com.my/index.php?option=com_content&view=article&id=83&Itemid=565
- [2] Z. LOTKER, B. P.-S. *RENT, LEASE OR BUY*. Symposium on Theoretical Aspects of Computer Science, 2000.
- [3] GRANSBERG, D. D., POPESCU, C. M., & RYAN, R. C. *Construction Equipment Management for Engineers, Estimators and Owners*. CRC Press is an imprint of Taylor & Francis Group.2006
- [4] KULULANGA, G., & McCAFFER, R. *Measuring knowledge management for construction organizations*. Emerald .2001
- [5] Shiu-Wan Hung, R.-H. T. *Factors affecting the choice of technology acquisition mode: An empirical analysis of the electronic firms of Japan, Korea and Taiwan*. Technovation .2007.
- [6] Clappa, D., Shulera, S., Nobe, M. D., DeMirandaa, M., & Nobe, M. E. *Capital Equipment Acquisition in Heavy Construction* . International Journal of Construction Education and Research .2007.
- [7] Coker, C. (2007). *Equipment purchasing and leasing*. The JG Press, Inc.
- [8] Dennis R. Schmidt, K. L. *Post-acquisition financial performance and executive compensation*. *Strategic Management Journal*.
- [9] Ghazi, A. A. *Construction Equipment Management Practices of Major Contractors in Saudi Arabia*. King Fahd University of Petroleum & Minerals, Box # 1637, Dhahran 31261.2002.
- [10] Alan C. Elliott, W. A. (2007). *Statistical analysis quick reference guidebook*.