

Value Management: A Systematic Approach for Improving Time Performance in Construction Projects

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Abstract— The construction industry is considered to be the largest contributor to the nation's economy. However, there are many challenges that had to be overcome to ensure construction projects are successful in achieving the minimum cost to utilize the necessary resources in the success of the project. Some of the construction projects failed to be completed on schedule due to the negligence of certain parties in ensuring that the project value is at the maximum level. Responding to the challenge, this research hopes to counter this problem and help towards the betterment of the construction industry using a value management approach. Therefore, this paper discusses the successful factors in implementing value management through the interview and documentation data gathering process. As a result, it shows that local practitioners of value analysis in construction projects should consider these important factors as a catalyst for increasing the value of projects.

Keywords— Value management; construction industry; time performance; delay; qualitative analysis.

1. Introduction

The practice of value engineering started since World War II when a company named Generic Electric Co had to deliver despite shortages of resource, which consisted of labor skills, raw materials, and components for construction [1]. Nowadays, value engineering practices is viewed as a very useful approach in project management due to its effectiveness in reducing cost. Value engineering goes through a systematic process,

called analysis, which consists of value discovery, value realization, and value optimization. This systematic process has helped many project managers in any type of project to build a profit in terms of cost savings. Analysis in value engineering is useful at several phases during project management. It includes acceptance of new building design, sales decline by company, expensive component part for construction, and price competition among competitors. The failure to adapt these elements with problem solving may cause the construction project to become delayed due to the extra time needed to overcome last minute problems.

Hence, project managers are responsible to drive the project into successful time completion according to the schedule planned through a systematic process called value engineering. Therefore, determining the identity of a project by the project manager is the most important step to plan the process through value engineering [2]. Currently, there are a few types of construction methods being applied, namely conventional and modern method. The challenges faced by every type of construction projects would also affect the way a project manager counters a problem.

The conventional method in construction projects is viewed as a traditional type where the components for construction is pre-fabricated on site and construction of the building is through setting reinforced concrete frames [3]. However, the conventional method contributes several complications due to its weaknesses which would make the value engineering process very useful during project management.

In addition, this method would require a lot of workers when compared to the modern method; contribute less of profit, perform many unnecessary activities, and fail in time completion of the construction project [4]. In order to achieve successful time completion for a conventional construction project, the process of value engineering is very crucial to be adopted. Moreover, the conventional method was also found as a contributor toward delay, as its processes proceed in a sequential manner [5]. Hence, more attention towards value management in conventional construction projects needs to be focused upon to prevent project delay.

This paper provides a potential answer by concentrating on investigating the factors that should be considered in implementing value engineering in construction projects from the perspectives of local project managers from conventional construction project background, and strategies that can be developed in the future. The reason of its implementation in conventional projects opens up a broad awareness among project managers and other project participants in order to avoid extension of time.

2. Literature Review

2.1 Definition of Extension of Time (EOT)

The definition of EOT is the differences based on specific stakeholder position, such as client, contractor, engineer, and consultant. EOT from the perspective of a client means less value of project due to extra funding needed to support the project beyond the schedule. Meanwhile, from the consultant's perspective, it is the stated workload in construction project at a time [6]. As a whole, EOT is known as a time overrun beyond the time specified in the schedule since the planning phase [7]. The phenomenon of EOT exists in construction projects due to many factors. In general, lack of awareness among practitioners in implementing proper and detailed value management would contribute towards delay.

2.2 Value Management (VM)

The value itself refers to the proportion number of ratio between customer satisfaction and amount of

cost used [8], whereas, value management (VM) means arranging the relationship between functions and cost [9]. Other researchers viewed VM as a solution towards problems in building construction by providing a guideline and creation of the innovation element [10]. Moreover, this kind of tool is very beneficial for the project outcome in terms of cost savings and fulfilling customer needs [11].

Actually, the term value management is also known as value engineering [8]. The most recent (2011) publication from the United States Defense Department stated that value engineering and VM are considered similar [12].

The aim of VM is to produce a valuable project in terms of minimal use of money and high function of the construction project. The benefits of the implementation become an attraction to the government in adopting VM, particularly in project management programs [13]. Through the effectiveness of VM implementation in construction projects, EOT is able to be avoided and thus would ensure the project is completed on time.

3. Methodology

This paper reports the initial findings in the pilot stage of an on-going research on value engineering in conventional construction projects in Malaysia, focusing on the importance of value engineering implementation during project management.

This research employs a qualitative approach because it is appropriate to be conducted due to an involvement of the project manager in project management and delay in construction projects [14]. Besides that, this approach is a given since the researcher will make use of qualitative data in order to uncover alternative explanations for the current situation [15].

An semi-structured interview was conducted aiming to investigate the factors that should be considered in implementing value engineering in construction projects from the perspectives of local project managers from conventional construction project background. Therefore, the main objective of this interview was to gain an opinion from local project managers about the importance of value engineering implementation during project management based on their past experience in handling conventional construction projects.

The interview process covered the rating among respondents towards the importance of value engineering implementation during project management based on their past experience in handling construction projects, the impact on time completion of the project, and suggestion for future improvement in enhancing the practice of value engineering process.

The nature of participant organizations and work experience is shown in Table 1 and several criteria were used for the selection of participants. This interview required participants that have experience as a project manager in handling conventional construction projects faced with an extension of time. Hence, non-probability sampling is the most appropriate to achieve this research objective.

The selection of participants was performed by expert sampling in order to get data based on their past experience to describe the situation. The perspective of the local project manager who handles conventional construction projects is very important to promote the practice of value engineering during project management, particularly in conventional construction projects. Tables 1 summarizes the participant's profile.

Table 1. Participants Profile

Na me	Job Title	Experie nce (years)	Location	Gender
R1	Civil Engineer	20	Northern	Male
R2	Archite ct	16	Northern	Male

4. Data Findings

The objective of the study was to identify successful factors in implementing value engineering during management of conventional construction projects. Value engineering is very important to be implemented in conventional construction projects, especially for a big project that needs a large amount of capital. As much as 5 to 10% benefit on cost savings could be gained through value engineering [1]. Many problematic cases in construction projects have been successfully solved through value engineering practices and it is very critical for project

participants to implement the most systematic method for evaluation in order to gain successful on time completion of the project [16].

However, the practices of value engineering process should be implemented by a project manager together with the required knowledge, skills, and abilities. These three elements should be developed among project managers to ensure success in the evaluation process [1]. According to R1 and R2, both agreed that value analysis required knowledgeable project teams to counter any risks involved that would increase the cost of the project. Comparing the two results, it could be observed that they have similar perspectives.

Value engineering is conducted in order to gain "value improvement" and further reducing the overall cost of the construction project. However, different problems would require different approaches in order to increase the value of certain functions. According to R1, effective action needs to be performed by considering the financial strength and number of resources to avoid high cash flow during heavy load in the Critical Path Method (CPM). R1 stated that:

'Construction activities need to be slowed down by utilizing existing resources during heavy load in CPM to avoid continuously high cash flow due to the inadequate financial resources'-R1

This statement was strongly supported by R2 who claimed that rate of high cash flow is able to interfere with the project progress and render the project to stagnate because of commitment to sufficient financial resources at a time. There are few factors that need to be considered to generate high value in construction projects. R2 stated that:

'Teams that participate in value analysis must have sufficient information to make right decision making, right belief, positive attitudes, and always seek for an advice from experts to gain an opinion or suggestion to reduce the high cash flow'-R2

In addition, teamwork for value analysis, especially in conventional construction projects, should focus on particular items in the design to avoid any unnecessary parts and improve the quality of design. Nowadays, the transformation of design tool from traditional to BIM software becomes very popular among designers in the 3D form. However, R2 claimed that:

'changing technology must be well adapted by project participant with knowledge and soft skill [which] is required in identifying which part in design is waste and which is worth'-R2

Through the application of BIM, it would help to reduce errors to the bare minimum or zero, particularly in project design and drawing [17]. Other than that, some conventional construction projects have implemented Industrialized Building System (IBS) at a certain level in construction building. R1 claimed that:

'in my case, the conversion method from conventional into IBS consumes about more than 1 million which is required on certain building level and miscommunication among project participant apparently occur during absorption of an item from drawing into contract'-R1

Hence, this highlights that poor relations in teamwork would lead into insufficient information in construction projects. The function in teamwork should be well developed through a systematic process to create productive project participants which help to improve the value of the projects [18]. According to R2, the procedure to get an approval took several years due to the certain levels that must be followed through. This complexity took longer time for certain departments to make a decision before giving an approval. Time taken to get an approval makes the construction delay become further delayed. Time, quality, and cost for every project is very important to be considered at optimum risk before construction activities begin [17]. R2 viewed value engineering in construction projects as a long term endeavor and it is very risky if a person ignores some important features. R2 stated that:

'high cost invests for the project, means high risk for the construction project to fail. Hence, we should be more focused on certain aspects such as quality, durability, usefulness, continuity, compliance, and effective management'-R2

The findings from the interview identified factors that should be considered in implementing value engineering in Malaysian construction projects, from the perspective of the local project manager. However, there are only a few critical factors found through the perspective of the local project

manager that handle conventional construction projects in Malaysia. Further research should be done to investigate new factors based on perspectives of project managers who handle IBS construction projects in Malaysia in order to have a comparison. These factors could be further utilized by value engineering implementers in the Malaysian construction industry to further increase the value of this pertinent industry. This is an important issue for future research in order to improve the value of construction projects.

5. Discussion

Management value or value engineering has been intensively applied in some developing countries such as India and Myanmar due to its effectiveness in bringing benefits to the project user and developers. Nowadays, the construction process has become very challenging because many factors must be considered before making the correct decision and avoid any increase in cost or poor value for the construction project. Negligence in taking into account factors that could adversely affect the performance of the project would lead to many errors and eventually involve the high cost of rework. Looking towards problem solving or improve existing functions for cost reduction through value engineering is a reason for value engineering to be important [19].

In order to making a powerful team with respect to value management, this team would consist of architects, civil engineers, structural engineers, mechanical engineers, electrical engineers, and cost estimation experts. Each team member should be ready and willing to implement value engineering for all construction activities. Based on a statement by R2, it shows that relationships between team members of value engineering are very important. Lack of awareness in terms of good relationship among them is a root for many problems such as insufficient information for right decision making, wrong decision making, and errors in constructions activities. These problems would lead to increased use of capital, which is more than the planned budget at the initial phase and cause extension of time for the construction project.

Other than that, the role of implementing value engineering is also important to ensure that any activities in construction are still under complete control despite a shortage of financial resources at any given time. Based on a statement made by R1, slowing down the progress of activities by using

the existing workforce during heavy work load in CPM with a high cash flow at that moment would bring the project under control. Even though the progress of the project is not according to the planned schedule, the cost for the project was brought under control without the need to hire more workers to bear the brunt of the work. The engineering towards this function during this moment would seem to really work in bringing high value to the project without increasing cost.

In the meantime, R2 also agreed that knowledge and technical skill are highly needed to ensure successful value engineering implementation. This means that changes in sophisticated technology can be fully utilized to assist in reducing the cost of the project if accompanied by a high level of knowledge towards specific functions. In addition, it also helps in saving time and improving the quality of the project. Without implementation of value engineering, for sure systematic method to improve the value of project for a specific function is predetermined [18]. Hence, cost reduction for the project would fail to be achieved.

The potential for cost reduction can be divided into large and small. The phase for value engineering starts to be implemented from concept, schematic, production, bids, and construction processes. Therefore, the value engineering process is a process that can be applied to various functions and it is an advantage to the construction project in gaining target features and avoiding unnecessary cost.

6. Conclusion

Based on perspectives from both respondents, the results showed that value engineering gives a positive impact on project participants, regardless whether the participant is a developer or project owner. The positive impacts mean contribution in term of benefits from a few aspects such as profit to the stakeholders and improve the productivity in Malaysian construction industry. In order to achieve the objectives, all participants which involve in of value engineering should be more particular on certain items rather than looking at the total project picture or check the daily performance of the project. Knowledge and technical skills become a driven for value engineering becomes effective in managing the construction project. Therefore, the cost of the project would be more high value and economical. In a mean time, it would reduce the time consumption to complete the

construction project rather than claim extension of time.

Acknowledgement

The authors of this paper express their utmost gratitude to Universiti Utara Malaysia for supporting this research endeavor through the University Grant Scheme (University/SO CODE: 13431) funding and facilities provided, in order to complete this research project successfully.

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