Abstract

In Malaysia, high demand for refurbishment projects mainly contributed by increase the number of building obsolescence. However, refurbishment projects are difficult to manage compared to new-built due to uncertainty factors inherent in the projects. One of the factors that contribute to the uncertainty of refurbishment project is different types of procurement system used for the projects. The uncertainty mainly contributed by lack of communication and involvement amongst the project stakeholders in all stages in the project process. As a result, most of refurbishment project end up with poor project performance. The main objectives of this paper are to present how procurement system could contribute to the uncertainty and show how they affect the overall performance of refurbishment projects. Triangulation technique was used for research methodology, which involved semi-structured interviews with 15 architects and postal questionnaire survey that involved 234 respondents. Descriptive and inferential statistics were used in data analysis. The result concludes that there is no wide gap between the traditional and design-and-build procurement systems because the designers come from different organizations. High involvement recorded by the contractor for design-and-build procurement method during pre-construction stage. However, there is no significant correlation detected by different types of procurement towards project performance.

Key Words: Uncertainty, Refurbishment, Procurement, Malaysia

1. Introduction

Many construction management writers agree that refurbishment projects are more risky and complex than new-build projects, which makes them more difficult to manage [1, 2]. For instance, in Rahmat [3] found about only 20 percent of the refurbishment projects in the UK started work on site with more than 60 percent of the design complete. These studies show that in the majority of refurbishment projects, a high proportion of the design information could only be obtained during the construction stage. One of the factors contribute to difficulties in managing refurbishment project is different types of procurement system. This is because type of procurement method dictates the participants involved and their role during the project process. The procurement used would also determine the degree of involvement and relationship between the clients, designers and other project participants in every stage of project process. In design-and-build, the contractors could be involved and contribute ideas to improve the design, from the schematic design stage. This contributes to a significant difference where the contractors could improve much in the aspect of constructability. Contractors’ idea in refurbishment projects are vital since the designers have to deal with the existing building condition.

Therefore, the rationale for conducting this study is to identify the effect of traditional and design-and-build procurement in refurbishment projects. The study will be extended to examine degree of involvement of key participant of the refurbishment projects and investigate on relationship between different types of procurement method towards project performance.

2. Types of Procurement System

The type of procurement method determines how the project would be managed. Winch [4] argued that the 'project uncertainty' could be found in the way that projects are awarded and how the construction project is
managed into a system of contract. In this respect, it is defined as ‘contracting complexity and uncertainty’.

The importance of selection of a procurement method has been pointed out by Chan [5], who found the procurement methods influence the time performance of construction projects. Time would be affected by the flow of project that is driven by different type of procurement method. Similarly, Naoum [6] stated that the major factor affecting cost and time overruns were the procurement method adopted. Bowen et al. [7] supported the view that one of the reasons contributing to the poor performance of the construction industry principally is the inappropriateness of selection of procurement method. This indicates the effect of using different types of procurement methods in project delivery. For instance, the design-and-build approach integrates the design and construction process whereas in the traditional method the two processes are separate.

The availability of various procurement systems provides greater choice to the clients. The approach by the client and consultants in selecting the appropriate procurement system should be done cautiously, depending on risk, available resources and nature of the projects. However, the selection of a procurement system is not consistent and is uncertain because it is based on the vagaries of key individuals in a project [8]. Similarly, Hamzah [9] mentioned that the selection of the procurement methods tend to be different among the clients. The preference of selection depends on the extent to which client’s objectives could be met.

Love et al. [10] and Masterman [11] argued that a competitive tendering system such as the traditional method could contribute to the uncertainty of the contracting system. The main characteristic of traditional procurement system, beside separate obligations in design and construction, is that the traditional method normally needs to have design completed before work is started on site. The need to have a complete set of design before work starts on site is difficult to achieve. In refurbishment projects, problems with the accuracy of information used to produce drawings is not uncommon [12]. The risk of having variation orders during the construction stage is extremely high. With incomplete documentation during the tender stage, it is difficult for the contractor to come up with accurate price estimation. The unknown items that could only be uncovered during the construction stage become obstacles to complete the design.

Moreover, Fellows et al. [13] said that the traditional procurement system is not appropriate for refurbishment projects due to the low integration among site and design team members. The main characteristic of the traditional method that separates design and construction period would eliminate the element of integration in the projects. Therefore, it is wise for clients to shift to other type of procurement methods such as design and build to minimize risk in refurbishment projects.

The dissatisfaction of the clients with the performance of the traditional procurement system leads the client to find out procurement method that has single point of responsibility. The natures of refurbishment works that are fragmented and lack information available require close coordination between the design and the site team members from the initial stage of projects. The integration would induce the projects to perform better by improving the flow of information. Rahmat [3] said that integration is important to overcome fragmented problems in refurbishment projects. Furthermore, the integration of design and construction could end up with savings in time and cost by a fixed lump sum price [11]. Therefore, the procurement methods used in refurbishment projects should have an element of integration between the design and the construction processes. This cannot be achieved by implementing traditional procurement method for project delivery.

In Malaysia, Rahmat et al. [14] surveyed registered architects found that the majority of them have experience with 6 types of procurement methods in the design process. The survey results indicated that the majority of projects handled by the architects in this country used the traditional method of procurement system (44.6 percent) followed by design-and-build (36 percent). This implies that these two procurement systems are the most preferred methods used for building projects in Malaysia.

From the literature, it could be concluded that the selection of an appropriate procurement system in the project delivery process is important. In refurbishment projects, integration between design and construction with single point responsibility concept has the potential to minimize design deficiencies. Hence, the design-and-build procurement method could be appropriate to be used in refurbishment projects. The literature also indicated that the uncertainty of the project delivery system would affect the final outcomes of projects.

3. Methodology

This research designed with the triangulation approach, which implement a postal questionnaire and semi-structured interview for data collection method. In order to get a high response rate, the questionnaires were short and simple and did not take much time for respondents to answer. The respondents in this study were
designers and architects who are directly involved in getting approval from respective local authorities. A set of questionnaire sent to the final list of 234 respondents. After filtration made from 82 replied questionnaires, 62 questionnaires found to be useful for analysis, giving a response rate of around 28 percent. The replied questionnaires represent 62 different refurbishment projects that the minimum contract value is RM 1,000,000. Demographic profile of the respondents shows in Figure 1. The chart shows three quarter of the respondents was principal architects with more than 10 years working experience. This indicates that data collected are reliable and quality.

4. Result and Discussion

The results in Table 1 show a cross tabulation between the size of refurbishment projects and the type of procurement system used.

Table 1: Frequency of distribution of project size and type of procurement system used

<table>
<thead>
<tr>
<th>Size of Project (Million Ringgit Malaysia)</th>
<th>Traditional, (n=68) %</th>
<th>Design &amp; Build, (n=12) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 1.5</td>
<td>52.5</td>
<td>20.0</td>
</tr>
<tr>
<td>1.6 to 3.0</td>
<td>19.7</td>
<td>20.0</td>
</tr>
<tr>
<td>3.1 to 4.5</td>
<td>8.2</td>
<td>10.0</td>
</tr>
<tr>
<td>4.6 to 6.0</td>
<td>3.3</td>
<td>0.0</td>
</tr>
<tr>
<td>More than 6.0</td>
<td>16.4</td>
<td>50.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The result shows that 86 percent of the refurbishment projects that participated in this study used the traditional method of procurement system. The design-and-build procurement method was implemented mostly in larger project size (60% were more than 3 million). The present result supported the findings of Rahmat [3] who found an almost similar pattern in the UK, and Rahmat et al. [14] who found that traditional procurement method was the most popular, followed by design-and-build. The results of Rahmat’s [3] study are shown in Table 2.

Table 2: Frequency of distribution of project size in traditional and design-and-build procurement systems

<table>
<thead>
<tr>
<th>Size of Project (Million Pound)</th>
<th>Traditional, (N=57) %</th>
<th>Design &amp; Build, (N= 10)%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 1.0</td>
<td>26.3</td>
<td>0.0</td>
</tr>
<tr>
<td>1.1 to 1.5</td>
<td>24.6</td>
<td>20.0</td>
</tr>
<tr>
<td>1.6 to 2.0</td>
<td>14.0</td>
<td>20.0</td>
</tr>
<tr>
<td>2.1 to 2.5</td>
<td>7.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2.6 to 4.0</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>More than 4.0</td>
<td>24.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Rahmat (1997)

The clients decide the type of procurement method used. It implies the clients are more familiar with traditional procurement system; besides it is less risky to them. However, the traditional procurement system has the less integration of key personnel compared with the design-and-build approach. The importance of integration for the key participants in handling refurbishment projects is due to the fragmented nature of refurbishment projects and also to improve design information-processing capacity among them. Therefore, design-and-build system could be the best option to achieve integration, particularly between the contractor and the design team, as indicated by Mitropolous and Tatum [15].

However, the results support the findings of Ling and Leong [16] who discovered that the performance of design-and-build was slightly lower compared with the traditional method. The present result indicates that clients are less comfortable with introducing the design-and-build system in refurbishment projects since they are not familiar with the design-and-build procurement system.

Second, ten of the principal architects in Kuala Lumpur were interviewed revealed that some architects feel uncomfortable handling a project with design-and-build procurement system, since the contractor would interrupt the process of design with unrealistic ideas, which sometime influenced the clients. The architects prefer to liaise with other consultants and the clients in
handling the initial stage of design. Thus, the conflict between the contractor and the consultants tended to be greater in the design-and-build system. This probably minimized the tendency for the architects to recommend the design-and-build procurement method to their clients.

On the other hand, clients prefer to have a fixed design, which is easier for the client to prepare funding for the projects. Design-and-build always produces a higher initial cost since all risk of the projects would be fully absorbed by the contractor. Although the design-and-build system would not end up with high variation, in refurbishment projects the proposed price most of the time is too high. Furthermore, the detailed design and supervision is fully done by the contractor, and that can contribute to a low quality of product. It implies the importance of knowledge for the clients and the architects to determine the appropriate type of procurement system for the refurbishment projects. Architects need to advise and educate the client on the importance of having integration in refurbishment projects that could improve the performance of the project.

Second, the architects need to convince the client of the advantage of implementing the design-and-build procurement system. Since the result identified very few refurbishment projects used the design-and-build system, it is quite difficult to examine the performance of design-and-build projects. This reflects the important role of the architects to provide valuable advice to the clients since the majority of the clients are lacking in technical skill of construction projects [17].

The Mann-Whitney U test was employed to check whether any significant difference was found in the respondents answer between design-and-build and the traditional procurement system. The result indicates a difference in terms of design fees and some degree of involvement of design key participants. The design fees for design-and-build projects normally were included in the contract sum. A cross tabulation between type of procurement system and design fees received indicate that the portion of design fees for design and build tend to be lower. This is probably because the client would ask for a higher discount for a design-and-build project, since the construction works of the projects would be awarded to the same organization.

Second, it is expected that a different procurement method could provide a different degree of participation of key personnel. The Mann-Whitney U test showed that the degree of involvement for contractor and engineer did differ. The different degree of participation by the engineers was probably because the content of engineering design could be higher in design-and-build projects, which required more participation of engineers in the design process. The content of services and structural works in design-and-build procurement system is higher compared to the traditional system. Besides, the design-and-build tends to be bigger in size.

The results indicate that there is no wide gap between the traditional and design-and-build procurement systems. This could be because the architects involved in refurbishment projects come from different organizations. The design-and-build contractors out-source the consultant’s services and do not have in-house designers team. Therefore, not much difference shows in the answer of both procurement systems.

The result further analysed using associative test to check any significant relationship between types of procurement methods toward project performance. The Kendall’s Tau-b result was expected to show a positive correlation that would indicate that design-and-build procurement is associated with higher project performance in refurbishment projects. The results of the correlation test are shown in Table 2. 

Table 2: The Correlation Matrix between Procurement Methods and Project Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time variance</th>
<th>Cost variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement Methods</td>
<td>.191</td>
<td>.094</td>
</tr>
</tbody>
</table>

* Correlation at 5% significance level
** Correlation at 1% significance level

In general positive correlations were detected in the test. However, the correlations detected were not significant. This indicates that types of procurement used in refurbishment projects did not significantly influence the project performance of refurbishment projects.

5. The Degree of Involvement of Key Participants Involved in Decision-Making in the Refurbishment Design Process

A high degree of involvements of key design participants in decision-making process was examined. The semi-structured interviews with 15 architects show that there is differentiation of tasks in the decision-making process of refurbishment project in every project stage. Key participants involved in the project process were not differentiated according to their professional group, which is based on their specialised. The participants are group into three; based on their domain. They are designer group (architect, M&E engineer, C&S engineer and specialist), continuous management group (client and quantity execu-
surveyor) and contractor. Architects, clients, M&E engineers and C&S engineers showed a high involvement in all stages of the project process. Quantity surveyors were highly involved in the design development until the construction stage. Contractors recorded greater involvement during the construction stage with the majority of the projects using traditional procurement method. Specialists indicated medium involvement in all stages of the project process. The differentiation produced decision-making gaps.

A high involvement was indicated by some of the key participants outside their domain in the projects. The result in the interviews show that the degree of involvement of key participants tends to extend outside their domain to increased integration. The evidence suggested that a high involvement of the design-and-build contractor in the pre-bid stages (schematic, design development and contract documentation) when the project is greater uncertain.

The results show that uncertainty of refurbishment projects influence the degree of involvement of designers group in the construction stage. The involvement of M&E engineer, C&S engineer and specialist were higher during the construction stage. The evidence suggested that increased involvement of key participants in decision-making during the construction stage improved project performance. The degree of involvement of the architects and M&E engineers were greater during the construction stage, which increased integration in the refurbishment project process during the construction stage. This is different from new-build projects, in which the degree of involvement of designers was generally low during the construction stage. However, there is no evidence that contractor involved outside their own domain during the pre-bid stages (schematic, design development and contract documentation stage) would improve project performance.

The refurbishment projects require both differentiation and integration of tasks. Differentiation is important to ensure efficient use of resources and to minimise conflicts. Integration is important to ensure the activities of the key participants are well coordinated. Therefore, the architects and clients were expected to play the role of coordinator in the project process. They are strongly involved throughout the period of the project process of refurbishment projects.

6. Conclusion

The above discussions demonstrate the conflicting needs and the difficulties that arise in the project process of refurbishment projects. The tasks of the key participants are differentiated, but in certain situations need to be integrated. The key participants need to remain in their own domain to avoid conflicts, and yet frequently are required to venture outside their domain to increase coordination. The key participants involved in refurbishment projects therefore, must be professional in their own domain but at the same time must be flexible and show understanding of the nature of work in other areas of specialization.

7. References


