Budget overrun issues in construction projects of southern part of Malaysia

Aftab Hameed Memon, Ismail Abdul Rahman
Faculty of Civil and Environmental Engineering, University Tun Hussein Onn Malaysia, Malaysia
Corresponding Author:aftabm78@hotmail.com

Abstract

Aim of Study
This study has focused on identifying the issues related to budget overrun faced by construction industry.

Need of Study
Construction industry is very significant in contributing socio-economic growth of a country. Hence, Malaysian government has allocated huge amounts of money for construction development in recent years. Unfortunately, the industry is facing severe problem of budget overrun.

Research Approach
This study was carried out quantitatively by conducting questionnaire survey amongst the client, consultant and contractors. A total of 122 collected questionnaires (97 large projects and 25 small scale projects) were analyzed statistically using SPSS software package.

Research Findings
The findings show that budget overrun is a common phenomenon in large as well as small projects. For large project, amount of cost overrun ranges from 5-10% of the estimated cost while in small projects, it was found as 10-15% of estimated cost. The major contributors to these overrun in large projects are material and construction costs while in small construction projects, the causes are material and plant & equipment costs. Most of the respondents suggested that the effective methods of controlling these overrun are cost code system and value management technique.

Limitations
Data collection for this was limited to construction industry of southern region of Malaysia.

Importance and Contribution
The findings of the study gave a very clear insight about the budget overrun problem in construction industry. Determined level of implementation for various techniques and significant contributors of budget overrun will be helpful for practitioners and researchers in developing a better system for controlling budget overrun.

Keywords: budget overrun, large projects, small project, contributors to budget overrun, Malaysia

I. INTRODUCTION
Completion of any project within the estimated budget is the basic requirement of the owners. To ensure this, practitioners adopt various practices of budget management and control. Budget management is a proactive procedure which focuses ‘create more value at lower cost’ by improving [1]. It can be achieved through promoting the principles of continuous improvements and helping the organization in making the right decisions at right time. In spite of wide use of budget management techniques, construction industry in Malaysia is facing serious problem of overrun in budget as asserted from a research project conducted by Abdullah [2] for construction projects administrated by MARA Malaysia. According to his study, more than 90% of MARA projects faced delays with major effect of budget overrun. Further, 80% of Public Work Department (PWD) projects in 2008 experienced delays with major effect of budget overrun [3]. Construction Industry Development Board (CIDB) Malaysia highlighted that construction industry in Malaysia is facing chronic problems like schedule delay, budget overrun, defects and over dependent of foreign workers as cited by [2]. Hence, budget overrun is very important issue which needs to be controlled as it can affect the development plan of any country. For effective control of budget, there are several techniques applied in construction industry worldwide which can help the practitioners in controlling this problem of budget overrun. Hence, this study is carried out in assessing the issues of budget overrun and investigating various budget management techniques applied in construction industry and their relative effectiveness.

II. RELATED WORKS
Construction industry is regarded as fragmented industry and every project involves myriad parties. Each party is responsible for different activities which are interrelated with each other in order to achieve full scale project. Further it involves various types of resources (majorly classified as material, manpower, machinery and money) and different operations. In achieving proper management and control of project budget, the expenses and cost of projects is classified in different categories. Broadly, construction cost can be classified into two categories [4] as follows:

- Direct cost: are attributable to a specific task of the project.
  - Material - costs of material, e.g. Concrete, welding rod, wastage, etc
  - Labour - costs of project workforce, e.g. salary, overtime payment, etc
  - Plant and equipment - e.g. office equipments, site equipment, etc. and also costs of delivering goods to the site
Indirect cost: cannot be directly attributed to any specific task of the project.

- General overhead – cost of advertising, profit, taxes, insurance, etc.
- Job overhead – cost of salary, office expenses, etc.

In order to control these, Tang [5] investigated 8 techniques in construction industry of Hong Kong. These techniques are:

- a) Budget Planning and Control
- b) Estimating
- c) Budgeting
- d) Cash Flow Forecasting
- e) Financial Reporting and Cost Reporting
- f) Cost Code Systems
- g) Value Management
- h) Judgement

A. Budget Planning and Control

Since more than 80% of project costs are determined during the initial stages of the design, hence early planning and skilful estimation helps in adequate decision making. For this, budget planning can be used effectively for evaluating the project budget. Ashworth [6] stated that by proposer application of this technique in construction projects:

- The tender sum is more likely to equate with the approved budget estimate
- There is less possibility of addendum in bills of quantities or re-budgeting being required
- Budget-effectiveness and a value-for-money design are more likely to be achieved
- A balanced distribution of expenditure is likely to produce a more rational design
- The amount of pre-tender analysis by the architect and quantity surveyor should enable more decision to be taken earlier, resulting in a smoother running of the project on site
- Budget planning provides a sound basis for comparing different projects

Budget planning process focused (a) establishment of a realistic first estimate, (b) plan showing how this estimates should be spent among the various parts or elements of a project, and (c) monitoring process to ensure that the actual design details for the various elements can be constructed within the cost plan. Figure 1 shows the stepwise approach for budget process.

![Figure 1. Budget planning during the design and construction phases (Source: Ashworth [6])](image)

Budget control is team endeavour and the effectiveness of cost control depends on how well the basic project management practices are implemented on the project [7]. Further, project budget control data helps project management in decision-making as well as it helps estimating and planning department for providing feedback in preparing effective estimates and bids on new projects [8].

B. Estimating

The estimating technique is usually used in construction at pre-tender stage to provide an indication of the probable budget of construction project. This is an important factor of client’s overall strategy of the decision to build. The estimate provides the basis for his budgeting and control throughout the lifecycle of a project. Depending on continuous progress and scope of project, estimate may be reviewed and revised many times. According to Ashworth [6] estimation may be classified into three categories for the purpose of producing a pretender as follows:

- a) Budgeting – this decides whether the project should proceed as envisaged
- b) Controlling – this uses the estimate as a control mechanism throughout the design process
c) Comparing – this uses the estimate as a basic for the evaluation of different design solutions

C. Budgeting

A budget is a financial evaluation of the future courses of action set out in a business plan. A budget is a financial evaluation of the future courses of action set out in a business plan. It is a detailed plan which sets out in terms of money, the plans for income and expenditure in respect of a future period of time [9]. It reflects the financial consequences of the agreed strategies that are necessary to achieve corporate objectives. The budgetary process fits into the overall planning process, it evaluates the financial consequences of the plan and provides financial feedback so that plans can be monitored and revised [10]. The purpose of a budget system is to serve the needs of management in respect of the judgments and decisions it is required to make and to provide a basis for the management functions of planning and control. The budget planning and relationship has illustrated in Figure 2.

![Budget Planning and Relationship Diagram]

Figure 2. Budget Planning and Relationship (Source: Weetman [9])
D. Cash Flow Forecasting

Cash flow of a project is a complete history of all cash disbursement and all earnings received as a result of project execution. Cash flow of a project equals to cash inflows to the enterprise minus cash inflows from the enterprise i.e. Cash inflows to the enterprise – Cash outflows from the enterprise.

Inflows and outflows of cash are caused by different factors and the enterprise will try to clear the causes [9]. Net cash flow of construction projects may be positive or negative during project lifecycle until the very end of construction if the final payment or advanced payment is received before starting the project. This is a typical situation when the final payment consist retention money and the retention percentage is greater than the percentage of the profit. According to Hyung [11], cash flow of a construction project consists of cash out (such as bid costs, preconstruction costs, mobilization, payments of subcontractors, labour and overhead); and cash in such as billings less retentions, retentions, claims and change orders.


Financial report and cost report is used to record all the financial transactions, payments in and out, together with amounts owed and owing [4]. It helps the management of organization in decision making and also for the financing of the project. This helps in knowing (a) financial performance to date, (b) anticipated financial performance of current year and (c) anticipated financial performance at the end of the project [12].

F. Cost Code System

The purpose of the cost code system is to enable huge of cost data to be identified and coded for the most efficient application of cost management throughout the contract period. Adequate coding system simplifies the data-handling facility and also provides economy of storage in the case of a computer [13]. A good and adequate system of coding is one that simplifies that task of referring to the items to be coded.

G. Value Management (VM)

Value Management (VM) is a multi-disciplinary, team orientated, structured, analytical process and systematic analysis of function which seeks best value via the design and construction process. It focuses on meeting client’s needs. It is a proactive, creative, problem-solving approach [14]. VM focuses on value rather than cutting cost and it does not mean to sacrifice the quality of building for the sake of reducing cost [15]. For successful VM application, client understands towards the VM concept is important as it is not just merely considering the cost but it considers the relationship between value, function, quality and cost in a wider perspective [16] whereby it eliminates the unnecessary cost which does not contribute to the project’s value, system and facilities [14].

H. Judgment

Any cost management techniques cannot be used without judgment [17]. Tang [5] highlighted that “the good price forecasting technique include both historical trend based data and competent judgement based on construction experience and knowledge”. The relationship between judgement and other techniques can be summarized as:

\[ \text{[technique]} + \text{[judgment]} = \text{[advice]} \]

III. DATA COLLECTION AN ANALYSIS METHOD

Survey amongst the practitioner involved in handling small and large scale projects in southern part of peninsular Malaysia was carried out for collecting data. A 5-point likert scale was used to understand the perception of practitioners for significance of contributors of budget overrun and the effectiveness of various methods of budget management. For assessing significance of contributors of budget overrun likert scale was used as: 1 for not significant, 2 for slightly significant, 3 for moderately significant, 4 for very significant and 5 for extremely significant while for assessing effectiveness of budget management techniques likert scale was used as: 1 for not effective, 2 for slightly effective, 3 for moderately effective, 4 for very effective and 5 for extremely effective.

Gathered survey responses were analyzed statistically using SPSS software package in calculating the ranking of budget overrun contributors and effectiveness of budget management methods based on the mean rank score. The higher the mean rank score shows the higher is the ranking. The formula used for the mean rank calculation is;

\[ M_s = \frac{R}{M_{max}^n} \]

Where \( M_R \) is Mean Rank, \( R \) is Individual Mean Rank of effect, \( R_{max} \) is the Maximum Individual Mean Rank of effect and \( n \) is the number of effects.

As a part of data collection, a total of 200 questionnaire sets (50 in small scale projects and 150 in large scale projects) were distributed randomly amongst the personnel involved in construction industry in the states of Johor and Melaka from southern part of Peninsular Malaysia. As a result 103 responses were received back, of which 6 questionnaire sets were incomplete and as considered as invalid. Table I shows the summary of the samples collected.

<table>
<thead>
<tr>
<th>TABLE I. SAMPLING STATISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Scale Projects</td>
</tr>
<tr>
<td>No of questionnaire sets distributed</td>
</tr>
<tr>
<td>No of questionnaire sets received</td>
</tr>
<tr>
<td>No of invalid (incomplete) questionnaire sets</td>
</tr>
<tr>
<td>No of valid questionnaire sets</td>
</tr>
<tr>
<td>% of questionnaires received against valid questionnaires received</td>
</tr>
<tr>
<td>% of questionnaires received against questionnaire distributed</td>
</tr>
</tbody>
</table>
IV. RESULTS AND DISCUSSION

A. Extent of Budget Overrun

The respondents were asked to confirm the issues of budget overrun in construction projects they have handled.

<table>
<thead>
<tr>
<th>Extent of Cost Overrun</th>
<th>Small Projects</th>
<th>Large Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>0%</td>
<td>4</td>
<td>0.0%</td>
</tr>
<tr>
<td>1-5%</td>
<td>5</td>
<td>20.0%</td>
</tr>
<tr>
<td>5-10%</td>
<td>8</td>
<td>32.0%</td>
</tr>
<tr>
<td>10-15%</td>
<td>5</td>
<td>20.0%</td>
</tr>
<tr>
<td>More than 15%</td>
<td>7</td>
<td>28.0%</td>
</tr>
</tbody>
</table>

Table II shows the budget overrun is common problem in both small scale and large scale projects. As perceived from the table, all the respondents stated that they face budget overrun in their projects. Majority of these respondents with 32% mentioned that their project overran by 50-10% of the budgeted cost of the projects. This is followed by 28% respondents mentioning that they face overrun of more than 15% in their projects while 20% of respondents faced 1-5% of overrun and 10-15% of budget overrun. On the other hand in large scale project 4% of respondents mentioned that their projects are completed within budgeted cost and 96% of respondents faced overrun in their projects. Of these, majority of respondents with approximately 61% stated that they faced 5-10% budget overrun in their projects. While 15.5% of respondents faced 1-5% of budget overrun, 11.3% of respondents faced more than 15% budget overrun and 8.2% respondents faced 10-15% of budget overrun.

B. Extent of Budget Overrun

Ranking of the contributors for budget overrun in small scale and large scale projects was assessed by calculating mean rank value of each contributor using statistical software package SPSS v17. The results are presented in table III.

<table>
<thead>
<tr>
<th>Budget Overrun Contributors</th>
<th>Small Projects</th>
<th>Rank</th>
<th>Mean Rank Value</th>
<th>Large Projects</th>
<th>Rank</th>
<th>Mean Rank Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Cost</td>
<td>7.42</td>
<td>1</td>
<td>7.13</td>
<td>6.05</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Plant and Equipment Cost</td>
<td>6.38</td>
<td>2</td>
<td>6.01</td>
<td>5.82</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Labour Cost</td>
<td>5.94</td>
<td>3</td>
<td>5.38</td>
<td>5.38</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Construction Cost</td>
<td>5.94</td>
<td>4</td>
<td>5.25</td>
<td>5.25</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Head Office Overhead</td>
<td>5.14</td>
<td>5</td>
<td>5.14</td>
<td>5.14</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Sub-contractor Cost</td>
<td>5.10</td>
<td>6</td>
<td>5.10</td>
<td>5.10</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Project Delay Cost</td>
<td>2.80</td>
<td>7</td>
<td>2.80</td>
<td>2.80</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>New Requirement of Owner</td>
<td>2.36</td>
<td>8</td>
<td>2.36</td>
<td>2.36</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Table III shows that material cost is most significant contributor of budget overrun in both small and large scale projects as perceived by the respondents. One of the main reason for material cost problem in Malaysia is monopoly of the suppliers which results in sudden shortage of certain material. Consequently, the industry players purchase the material at higher rates. Further fluctuation in material prices is also unpredictable factor and affects significantly on material costs. 2nd ranked factor in small scale project is found as plant and equipment cost for small scale project while in large scale projects, this factor is 3rd ranked factor. This may be because of the reason that in small scale projects mostly contractors are not financially strong and they bring the plants and equipments on rental for project execution while large contractors have their own plants and equipments. Respondents from small scale projects placed labour cost at 3rd place while this factor is placed at 4th rank by the respondents of large scale projects.

C. Extent of Budget Overrun

In order to management the budget of project to reduce the overrun, the respondents have been applying various methods in their projects. The respondents were asked about the effectiveness for each technique they have practiced. The survey responses were assessed hierarchal through mean rank value as presented in table IV.

The results in Table IV shows that in small scale projects, respondents considered that “Cost code system” is most effective technique while in large projects this technique is considered slightly effective and is ranked at 6th place. This is followed by value management technique is placed at 2nd rank by respondents involved in small scale projects and the same is placed at 5th rank by respondents involved in large projects. One of the possible reasons may be that VM has not yet become widely practiced in large projects of Malaysia. Hence actions should now be taken to exert its full potential to improve value for money for the clients of the industry. It is argued by Che Mat [16] that the clients’ understanding towards the VM concept is important as it is not just merely considering the cost but it considers the relationship between value, function, quality and cost in a wider perspective. It helps in eliminating the unnecessary cost...
which does not contribute to the project’s value, system and facilities [14]. On the contrary, Cash Flow Forecasting is considered as most effective technique for budget management in large projects while it is placed at 6th rank by respondents involved in small scale projects. In large scale projects, 2nd ranked technique rated is Tender Budgeting/Estimating and it is rated as 5th ranked effective techniques as perceived by respondents involved in handling small scale projects.

**TABLE IV. RANKING OF EFFECTIVENESS OF METHODS FOR BUDGET MANAGEMENT**

<table>
<thead>
<tr>
<th>Methods of Budget Management</th>
<th>Small Projects Mean Rank Value</th>
<th>Large Projects Mean Rank Value</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Code System</td>
<td>12.90</td>
<td>13.45</td>
<td>6</td>
</tr>
<tr>
<td>Value Management</td>
<td>12.46</td>
<td>14.23</td>
<td>5</td>
</tr>
<tr>
<td>Elemental Cost Plan/Comparative Cost Plan</td>
<td>12.14</td>
<td>15.29</td>
<td>2</td>
</tr>
<tr>
<td>Tender Budgeting/Estimating</td>
<td>11.90</td>
<td>15.29</td>
<td>2</td>
</tr>
<tr>
<td>Cash Flow Forecasting</td>
<td>11.82</td>
<td>15.84</td>
<td>1</td>
</tr>
<tr>
<td>Working Budgeting/On-going Job Budgeting</td>
<td>11.02</td>
<td>13.05</td>
<td>7</td>
</tr>
<tr>
<td>By Judgment with Experience and Intuition</td>
<td>10.58</td>
<td>14.64</td>
<td>4</td>
</tr>
</tbody>
</table>

V. CONCLUSION

Budget management is very crucial issue in achieving the completion of projects within the estimated budget of the projects. For this various techniques have been implemented in construction projects but yet the construction projects are rarely completed within budget. Hence, this study assessed the performance of various techniques of budget management and the significance of contributors of budget overrun in small scale and large scale projects. It will help the practitioners and researcher in improving the criteria and application strategies of the techniques considered as effective so that overrun of budget can be controlled. This study was carried out by survey amongst the practitioners involved in handling small and large scale projects in Johor and Melaka states of Peninsular Malaysia. The findings of the study are summarized as follow:

1) All the respondents participating in survey mentioned that they faced budget overrun in their projects while in large project 95% of projects mentioned that they face budget overrun
2) Majority of respondent in small as well as large scale projects mentioned that mostly the overrun faced in projects is 5-10% of the estimated budget of project
3) In small scale projects major contributors of budget overrun are material cost, plant & equipment cost and labour cost. While in large projects major contributors of budget overrun include material cost, construction cost and plant & equipment cost.
4) Cost code system, value management and elemental cost method are rated as 3 most effective techniques of management for budget in small scale projects. As perceived by respondents involved in large projects, top 3 effective method of budget management are Cash Flow Forecasting, Tender Budgeting/Estimating and Elemental Cost Plan

REFERENCES