A Study on Factors Causing Cost Overrun of Construction Projects in Sarawak, Malaysia

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Abstract Cost overrun is one of the issues confronting the construction industry. Most of the construction projects in Malaysia have experienced cost overrun of 5 to 10% of the total contract sum. In examining the east Malaysia scenario, this study aims to identify the factors causing cost overrun of construction projects in Sarawak. A quantitative approach was adopted in carrying out the research. Stratified random sampling was adopted to obtain data from Grade 7 contracting companies and quantity surveying firms operating in Sarawak. Descriptive statistics (measures of central tendency) and the Relative Importance Index (RII) were used to analyze the data. The most significant factors identified were the shortage of material, lack of plant and spare parts of equipment, acceleration required by clients, change of work scope or changes in material specification by clients, mistakes during construction, fluctuation in prices of raw materials, shortage of workforce, lack of skilled labour, poor project management, poor cost control and awarding of a contract to the lowest bidders. This study complements the existing knowledge on the factors causing cost overrun in the Malaysian construction industry. Hence, clients, contractors, project managers, quantity surveyors, and other project participants will be aware of the factors considered while planning for a project.

Keywords Cost Overrun, Construction Industry, Construction Projects, Sarawak, Malaysia

1. Introduction

The construction industry contributes positively to the growth of the socio-economic status of a country, thus leading to the improvement of the people’s standard of living. However, one of the major problems hampering the successful completion of most projects in the construction industry is a cost overrun. Therefore, to consider a project as being successful by any construction company, Olawale and Sun [1] state that the three main elements, time, cost and quality, must be achieved. Cost overrun of construction projects is not a new issue across the construction industries and can be seen as a common issue across project sites. According to Ameh et al. [2], only 16% of 8,000 construction projects in Nigeria were completed within budget, time and quality in 1994. Flyvbjerg’s et al. [3] research further shows that most of the projects in the construction industry globally are not completed within the estimated budget. The research finding implies that only a few projects are completed within the estimated budget. Hence, cost overrun of construction projects can be viewed as a global issue that requires collective efforts from all the construction industry players [4].

Studies such as Memon et al. [5], Rahman et al. [6], and Memon et al. [7] have examined the issue of cost overrun in the Malaysian construction industry. However, these studies do not explicitly focus on the eastern region of Malaysia; they instead focus on the Malaysian Peninsula. For instance, Rahman et al. [6] identified the significant factors causing cost overruns in large construction projects in Malaysia. Their study found that more than half of Malaysian construction projects (55%) experienced cost overruns and that public sector project performed better than private sector projects. However, the focus of their study was not to identify the factors causing cost overrun of construction projects in Malaysia. In Shehu et al. [8] study, the unit of analysis was made up of various projects. However, only one project was chosen from Sarawak State, representing 0.3% of the total sampled projects across Malaysia. Besides, the authors acknowledge that their findings might not necessarily be generalized to all geographical locations.
2. Factors Causing Cost Overrun in the Construction Industry

There are several types of factors causing cost overrun of construction projects. Researchers have grouped the factors into several categories. For example, Rahman et al. [6] grouped the factors into seven: contractor’s site management-related factors, design and documentation related factors, financial management-related factors, information and communication technology-related factors, labour management-related factors, materials and machinery related factors and project management & contract administrative-related factors. However, Baloyi and Bekker [9] used a three-broad category in determining the factors that caused cost overrun in the 2010 FIFA World Cup stadia in South Africa. The three broad categories are client-related factors, contractor related factors and external related factor. This paper adopts the three broad categories used by Baloyi and Bekker [9]. The reason is that the three broad categories can accommodate other classifications used in previous studies [6].

2.1. Client Related Factors

The client-related factors causing cost overrun are the factors attributed to the client and the consultants representing the client [9]. The client-related factors are presented in Table 1.

| No | Client related factors                                                                 | References |
|----|----------------------------------------------------------------------------------------|------------|
| 1  | Contract awarded to the lowest bidder                                                   | [9-12]     |
| 2  | Poor project management and poor cost control                                          | [2, 7, 10, 11, 13] |
| 3  | The long period between design and time of bidding or tendering                         | [2, 10, 11, 12] |
| 4  | Inaccurate preparation of cost estimates                                                 | [9-12]     |
| 5  | Incorrect planning                                                                       | [2, 10, 11] |
| 6  | Client’s late contract award                                                             | [9]        |
| 7  | Change of work scope or changes in material specification by client                     | [2, 9, 12, 13] |
| 8  | Waiting for information                                                                  | [10]       |
| 9  | Monthly payment difficulties                                                             | [7, 10, 13] |
| 10 | Slow decision making                                                                    | [10]       |
| 11 | Design and documentation issues                                                         | [7, 13]    |
| 12 | Inappropriate procurement                                                                | [12]       |
| 13 | Acceleration required by the client                                                      | [12]       |
| 14 | Delay of drawings and site instructions                                                  | [12]       |

Sources: [9, 11]

2.2. Contractor Related Factors

| No | Contractor related factors                                                                 | References |
|----|----------------------------------------------------------------------------------------|------------|
| 1  | Lack of skilled labour                                                                  | [9, 10]    |
| 2  | Mistakes during construction                                                            | [10, 12, 13] |
| 3  | Inadequate or frequent breakdowns of construction plant and equipment                  | [7, 10, 13] |
| 4  | Contractor’s financial difficulties                                                     | [10]       |
| 5  | Labour (human) resource                                                                  | [2, 7, 13] |
| 6  | Poor site management                                                                    | [2, 7, 12, 13] |
| 7  | Contractor’s workload                                                                   | [2, 13]    |
| 8  | Incompetent subcontractor                                                                | [12]       |
As shown in Table 2, the contractor related cost overrun factors are those factors that are attributed to the contractor’s organization [9].

2.3. External Factors

Cost overrun factors that are beyond the control of the client and the contractors are classified as part of the external factors [9]. Table 3 presents the list of cost overrun antecedents that can be attributed to external factors.

Table 3. External factors causing cost overrun on the construction project

| No | External factors                                      | References                       |
|----|-------------------------------------------------------|----------------------------------|
| 1  | Fluctuation in prices of raw materials                | [2, 9-11]                        |
| 2  | Unstable cost of manufactured                         | [11, 14]                         |
| 3  | The high cost of machinery                            | [11, 15]                         |
| 4  | Additional work                                       | [2, 11]                          |
| 5  | Inappropriate government policies                     | [2, 11]                          |
| 6  | Shortage of workforce                                 | [2, 9, 10, 13]                   |
| 7  | Project complexity                                    | [9, 13]                          |
| 8  | Increase in labour cost                               | [9]                              |
| 9  | Delays in work approval                               | [10]                             |
| 10 | Delays in inspection and testing of work              | [10]                             |
| 11 | Shortage of material                                  | [2, 7, 10]                       |
| 12 | Shortage of plant and equipment’s parts               | [10]                             |
| 13 | Material procurement                                  | [7, 13]                          |
| 14 | Imported material                                     | [10]                             |
| 15 | Late delivery of materials and equipment              | [2, 10]                          |
| 16 | Economic stability                                    | [2, 10, 12, 13]                  |
| 17 | Inadequate site investigation or unexpected site condition | [10, 12, 13]               |
| 18 | Weather                                               | [2, 10, 12, 13]                  |
| 19 | Poor communication between all parties                | [2, 12, 13]                      |
| 20 | Disputes among the parties involved in the project    | [2, 13]                          |
| 21 | Fuel shortages                                        | [13]                             |
| 22 | Site accidents                                        | [13]                             |
| 23 | Project location                                      | [2, 13]                          |
| 24 | Domination of the construction industry by foreign firms and aids | [2, 16]                         |
| 25 | Absence of construction cost data                     | [2]                              |
| 26 | Level of competition                                  | [2, 17]                          |
| 27 | Social and cultural impacts                           | [2, 18]                          |
| 28 | Labour nationality                                    | [2]                              |
| 29 | Information and communication technology               | [7]                              |

3. Materials and Method

3.1. Research Approach

The factors causing cost overrun of construction projects were identified in the literature and were categorized into client, contractor and external related factors. This study adopted a quantitative approach in carrying out the research and used a stratified simple random sampling technique to collect the relevant data. The population for this study comprised contractors’ companies that registered with the Construction Industry Board Malaysia (CIDB) and the quantity surveying firms that registered with the Board of Quantity Surveyors in Malaysia. A total of 25 quantity surveying firms and 201 out of the 420 Grade 7 contractors participated in the survey.

With reference to Enshassi’s et al. [19] prescription, this research used a 5-point Likert scale ranging from 1 to 5 as follows: 1 = Not significant, 2 = Slightly significant, 3 = Moderately significant, 4 = Very significant, and 5 = Extremely significant. Respondents were requested to rate a list of 35 factors causing cost overruns from 1 to 5.

3.2. Data Analysis

It is a known practice among scholars to use the Relative Importance Index (RII) for researches that relate to the identification of factors influencing cost overrun Rafidah et al. [20]; Yehiel [21]; Gündüz et al. [22]; Hemanta [23]. Following the pattern adopted by Kometa et al. [24]; Sambasivan and Soon [25], who used the RII analysis to determine the relative importance of various delay factors, this research also adopted the same analysis to determine causes of cost overrun in the Sarawak State of Malaysia. The data collected from the respondents were analyzed using the Statistical Package for Social Science (SPSS) version 22 to determine the descriptive statistics. Besides, the Relative Importance Index (RII) was adopted in this study. RII values were obtained using the formula in equation 1 with the aid of Microsoft Excel.

$$RII = \frac{\sum W}{(A+N)}$$

Where RII is relative importance index, W is the weightage assigned to each factor by the respondent on a scale of one to five, A is the highest weight (5 in this research), and N is the total number of the sample. Akadiri’s [26] level of importance was used to interpret the RII values obtained as follows: high importance (RII = 0.8-1), high-medium importance (RII = 0.6-0.8), medium importance (RII = 0.4-0.6), medium-low importance (RII = 0.2-0.4) and low importance (RII = 0-0.2).
4. Results

Figure 1 depicts the response rate of this paper:

![Response Rate Diagram](image)

Table 4. Respondents’ profile

| GENERAL INFORMATION       | FREQUENCY | %     |
|---------------------------|-----------|-------|
| **Type of Organization**  |           |       |
| QS Consultant Firm        | 8         | 15.69 |
| Contracting companies     | 43        | 84.31 |
| **Gender**                |           |       |
| Male                      | 27        | 52.94 |
| Female                    | 24        | 47.06 |
| **Age**                   |           |       |
| 20-25                     | 23        | 45.10 |
| 26-30                     | 6         | 11.76 |
| 31-35                     | 11        | 21.57 |
| 36-40                     | 4         | 7.84  |
| 41 and above              | 7         | 13.73 |
| **Ethnic**                |           |       |
| Malay                     | 3         | 5.88  |
| Chinese                   | 42        | 82.35 |
| Indian                    | 6         | 11.76 |
| Others                    | 0         | 0.00  |
| **Position**              |           |       |
| Project director          | 3         | 5.88  |
| Project manager           | 4         | 7.84  |
| Project coordinator       | 1         | 1.96  |
| Architect                 | 1         | 1.96  |
| Engineer                  | 25        | 49.02 |
| Quantity surveyor         | 17        | 33.33 |
| Others                    | 0         | 0.00  |
| **Level of education**    |           |       |
| Diploma                   | 15        | 29.41 |
| Degree                    | 35        | 68.63 |
| Master                    | 1         | 1.96  |
| Doctorate                 | 0         | 0.00  |
| Others                    | 0         | 0.00  |
| **Experience**            |           |       |
| Less than two years       | 21        | 41.18 |
| 2 - 4 years               | 7         | 13.73 |
| 4 - 6 years               | 7         | 13.73 |
| 6 years and above         | 16        | 31.37 |

A total of 60 copies of the questionnaire out of 226 were returned. However, nine (9) copies of the questionnaire were incomplete and cannot be used for the analysis. Thus the overall percentage (Fig.1) used for the analysis was 22.6%.
out of which the contractor firms accounted for 19% and the quantity surveying firms accounted for 3.6%. According to Cheung et al. [27], 14.1% of response rate in the construction industry is still considered acceptable. Therefore, the response rate (22.6%) of the present study is considered an acceptable one. Table 4 presents the demographic profile of the respondents. 84.31% of the respondents were contracting companies, and the remaining 15.69 were QS consulting firms. The male respondents were 52.94 %, and females were 47.69%. 82.35% were Chinese, 11.76% and 5.88% were Indians and Malays, respectively.

Table 5 presents the results of the relative importance index of the factors causing cost overrun of construction projects in Sarawak, Malaysia. The factors are presented in the following descending order. In essence, the shortage of material was ranked first. It was followed by shortage of plant and spare parts of equipment, acceleration required by the client, change of work scope or changes in material specification by the client, mistakes during construction, fluctuation in prices of raw materials, shortage of workforce, lack of skilled labour, poor project management and poor cost control. Contract awarded to the lowest bidder was ranked tenth. Delays in work approval and unstable cost of the manufactured product were both ranked eleventh, additional work and breakdowns of construction plant & equipment were ranked fourteenth. Waiting for information was ranked thirty-fifth. Out of the thirty-five factors, the first eight factors were considered a high-medium level of importance. In contrast, the remaining twenty-seven factors were regarded as a medium level of importance.

### Table 5. Factors causing cost overrun of projects

| CRITERIA                                                      | MEAN | RII   | RANK | LEVEL OF IMPORTANCE      |
|---------------------------------------------------------------|------|-------|------|--------------------------|
| Material shortage                                             | 4.37 | 0.6282| 1    | High-Medium              |
| Plant and equipment shortage                                   | 4.33 | 0.6225| 2    | High-Medium              |
| Acceleration required by the client                           | 4.31 | 0.6197| 3    | High-Medium              |
| Change of scope/material specification by client              | 4.29 | 0.6169| 4    | High-Medium              |
| Mistakes during construction                                  | 4.29 | 0.6169| 4    | High-Medium              |
| Fluctuation in prices of raw materials                        | 4.20 | 0.6028| 6    | High-Medium              |
| Shortage of workforce                                         | 4.18 | 0.6000| 7    | High-Medium              |
| Lack of skilled labour                                        | 4.18 | 0.6000| 7    | High-Medium              |
| Poor project management/ poor cost control                    | 4.16 | 0.5972| 9    | Medium                   |
| Contract awarded to the lowest bidder                         | 4.14 | 0.5944| 10   | Medium                   |
| Delays in work approval                                       | 4.12 | 0.5915| 11   | Medium                   |
| Unstable cost of manufactured product                         | 4.12 | 0.5915| 11   | Medium                   |
| Incompetent subcontractor                                     | 4.10 | 0.5887| 13   | Medium                   |
| Inaccurate cost estimates prepared                            | 4.08 | 0.5859| 14   | Medium                   |
| Additional work                                               | 4.08 | 0.5859| 14   | Medium                   |
| Breakdowns of construction plant & equipment                  | 4.08 | 0.5859| 14   | Medium                   |
| Incorrect planning                                            | 4.06 | 0.5831| 17   | Medium                   |
| Increase in labour cost                                       | 4.06 | 0.5831| 17   | Medium                   |
| The gap between design and tendering                          | 4.02 | 0.5775| 19   | Medium                   |
| Poor site management                                          | 4.02 | 0.5775| 19   | Medium                   |
| Delay of drawings and site instructions                       | 4.00 | 0.5746| 21   | Medium                   |
| Inappropriate procurement                                     | 4.00 | 0.5746| 21   | Medium                   |
| The high cost of machinery                                    | 3.98 | 0.5718| 23   | Medium                   |
| Inappropriate government policies                              | 3.98 | 0.5718| 23   | Medium                   |
| Contractor’s financial difficulties                           | 3.98 | 0.5718| 23   | Medium                   |
| Project complexity                                            | 3.96 | 0.5690| 26   | Medium                   |
| Design and documentation issues                               | 3.96 | 0.5690| 26   | Medium                   |
| Delays in inspection and testing of work                      | 3.92 | 0.5634| 28   | Medium                   |
| Labour (human) resource                                       | 3.90 | 0.5606| 29   | Medium                   |
| Contractor's workload                                         | 3.88 | 0.5577| 30   | Medium                   |
| Material procurement                                          | 3.88 | 0.5577| 30   | Medium                   |
| Slow decision making                                          | 3.80 | 0.5465| 32   | Medium                   |
| Client’s late contract award                                  | 3.71 | 0.5324| 33   | Medium                   |
| Monthly payment difficulties                                  | 3.61 | 0.5183| 34   | Medium                   |
| Waiting for information                                       | 3.57 | 0.5127| 35   | Medium                   |
5. Findings and Discussion

5.1. Shortage of Material (RII = 0.6282)

Shortage of material was ranked the highest out of the total factors, and it was categorized under external factor. Most of the respondents strongly agreed that it was a significant factor. The mean of this factor was "4.37" while RII was "0.6282". The result suggests that increase in cost is due to shortage of material which leads to the waste of time. Thereby leading to the extension of the completion time, which in turn brings about an increase in the overhead. In a previous study conducted in Ghana, the shortage of material was ranked as number 13 [10]. However, another study conducted in Nigeria showed that this factor was ranked as number 2 [2]. Therefore, the respondents in Nigeria and Sarawak strongly agree that a shortage of material will result in a cost overrun of the project. Also, another study conducted in the western part of Malaysia showed that the shortage of material was ranked number 4 [7]. Therefore, the respondents in the western part of Malaysia and the present study were firmly in agreement that this factor may lead to cost overrun in the construction industry. Hence, the respondents in the present study and previous studies all have the same opinion. However, the ranking of the previous study conducted in Ghana differed significantly with the present study. This difference can be attributed to the difference in culture and working environment of both countries.

5.2. Shortage of Plant and Spare Parts of Equipment (RII = 0.6225)

Shortage of plant and spare parts of equipment was ranked second out of the total factors, and this factor was categorized under external factor. The mean of this factor was "4.33" while RII was "0.6225". Most of the respondents strongly agreed that this factor was one of the significant factors. The shortage of plant and spare parts of equipment might cause a delay in work, especially where the spare parts in question need to be imported. Thus the plant will remain dormant until the spare parts are replaced. Hence, the progress of work would be significantly hampered to the detriment of the project. The previous study conducted in Ghana showed that a shortage of plant and spare parts of equipment was one of the factors causing cost overrun of the project. The result of this factor was ranked 13th, which was considered to be moderate [10]. However, the result of the present study showed that a shortage of plant and spare parts of equipment was significant. Most of the respondents strongly agreed that this factor had the most significant influence on the cost, and it was ranked second. Hence, the respondents in the present study and previous studies have different perception due to the differences in location and culture.

5.3. Acceleration Required by Client (RII = 0.6197)

Acceleration required by the client was the third out of the total factors. However, it was categorized under client-related factors. The mean of this factor was "4.31" while RII was "0.6197". Most of the respondents agreed that the client's request to speed up the construction work would result in a cost overrun. The workers shall work overtime or have a night shift to work overnight when the client's request is urgent, and so speeding up the construction period requires crashing activities and getting more workers. The cost incurred for working overtime may result in a cost overrun of the project. The previous study conducted in Asian countries such as South Korea, Hong Kong, Taiwan, Sri Lanka, Vietnam, Malaysia, Singapore and other countries showed that acceleration required by the client was one of the factors causing cost overrun of project work. However, speeding up the construction by the client in previous studies was ranked 12th [12]. Most of the respondents in the present study believed that acceleration required by the client was significant, and it was ranked second. Hence, there is a divergent opinion among researchers on this factor.

5.4. Change in the Scope of Work or Specification of Materials by Client (RII = 0.6169)

Change of the scope of work by the client was ranked fourth. Besides, it was categorized under client-related factors. The mean of this factor was "4.29" while RII was "0.6169". Most of the respondents agreed that the changing scope of work or changes in the specification of materials influenced the cost of the project. In other words, variation means including or omitting part of the work. Also, issuing variation after the completion of that part of the work, it might cause the contractor to demolish the existing work and reconstruct. The completion date will have to be extended due to the variation order, and the additional cost will result in cost overrun of the project.

Previous studies conducted in Nigeria and Uganda showed that variation was a significant factor causing cost overrun of projects and was ranked the first [2, 13]. Another study conducted in South Africa also showed that this factor was a significant factor causing cost overrun of projects, and it was ranked number two [9]. However, another study conducted in Asian countries such as South Korea, Hong Kong, Taiwan, Sri Lanka, Vietnam, Malaysia, Singapore, and other countries ranked this factor in the 9th position [12]. The result of the present study also showed that this factor had an influence on cost, and it was ranked fourth. Hence, the respondents in the present study and previous study do have similar perception and opinion.
5.5. A Mistake during Construction (RII = 0.6169)

An error during construction was ranked 5th out of the total factors, and it was categorized under contractor-related factors. The mean of this factor was "4.29" while RII was "0.6169". Most of the respondents agreed that a mistake during construction due to the contractor's fault would result in a cost overrun. If the contractor fails to execute the work per the contract or install unapproved material, it may lead to the demolition of the work, and then be reworked. This rework would invariably hinder the progress of work and subsequently result in a cost overrun.

Previous studies conducted in Uganda and Asian countries such as South Korea, Hong Kong, Taiwan, Sri Lanka, Vietnam, Malaysia, Singapore and other countries showed that mistakes during construction were one of the factors causing cost overrun of projects. However, it was ranked 18th in Asian countries, while Uganda ranked it 14th [12, 13]. In another study conducted in Ghana, this factor was ranked 22nd, this suggests that this factor is not severe [10]. Nevertheless, the respondents of the present study agreed that mistakes during construction had an impact on cost, and it was considered to be a significant factor as it was ranked 15th. Hence, the respondents in the present study and previous studies have varied perception and opinion.

5.6. Fluctuation in Prices of Raw Materials (RII = 0.6028)

Change in prices of raw materials was ranked 6th out of the total factors, and it was categorized under external factors. The mean of this factor was "4.20" while RII was "0.6028". Most of the respondents agreed that an increase in the cost of material would lead to cost overrun of projects. In construction projects, raw materials constitute a large amount of the construction cost. Therefore, the cost of construction will increase if the prices of raw materials increase.

Previous studies conducted in Pakistan and South Africa showed that the fluctuation in prices of raw material was ranked number one, which means it was considered highly significant [9, 11]. Besides, another study conducted in Ghana showed that fluctuation in prices of raw material was ranked 8th [12]. Another study which was held in Nigeria ranked it second [2]. Therefore, there was a relationship between the previous studies and the present study that ranked it 8th. Hence, the respondents of the earlier studies and the present study may have similar perception and opinion. However, another study conducted in Asian countries such as South Korea, Hong Kong, Taiwan, Sri Lanka, Vietnam, Malaysia, Singapore and other countries showed that this factor was ranked 15th [12]. This result may be due to the working environment and the perception of the respondents.

5.7. Shortage of Manpower (RII = 0.6000)

Shortage of workforce was ranked as the 7th out of the total factors, and it was categorized under external factors. The mean of this factor was "4.18" while RII was "0.6000". Most of the respondents agreed that the shortage of workforce would lead to cost overrun. The construction work will face critical delay as a result of the inadequate workforce and will slow down progress on site.

Previous studies conducted in Ghana, Uganda, and South Africa showed that the shortage of workforce was considered to be moderate. At the same time, it was ranked as 21st, 17th and 9th in Ghana, Uganda and South African, respectively [9, 10, 13]. On the other hand, another study conducted in Nigeria showed that the shortage of workforce was ranked as 5th, which means it was considered to be significant [14]. The respondents of the present study believed that the shortage of workforce influenced cost. The result of the previous studies conducted in Ghana, Uganda, and South Africa was different from the present study due to the difference in location, perception, opinion and working environment. However, the result of the present study and previous study, which was conducted in Nigeria, was considered to be significant, meaning that the respondents may have similar perceptions and cultures.

5.8. Lack of Skilled Labour (RII = 0.6000)

Shortage of skilled labour was ranked 8th out of the total factors, and it was categorized under contractor-related factors. The mean of this factor was "4.18" while RII was "0.6000". Most of the respondents agreed that the lack of skilled labour would lead to cost overrun. Poor workmanship would lead to a reworking which may affect the quality and standard of the finished product.

The previous study conducted in Ghana showed that a lack of skilled labour was one of the factors causing cost overrun of projects. The position of this factor was 20th [10] whereas it was ranked 3rd in another study conducted in South Africa [9]. The respondents of the present study strongly agreed that the lack of skilled labour was a significant factor causing cost overrun of projects, and it was ranked 8th. Hence, the result of the previous study conducted in South Africa and the present study considered the lack of skilled labour to be significant, as respondents had similar perception. However, the result of the present study differs from the study conducted in Ghana. This difference might likely be due to cultural difference and opinion of the respondents in both studies.

5.9. Poor Project Management and Poor Cost Control (RII = 0.5972)

Poor project management and poor cost control were ranked the 9th out of the total factors, and it was categorized under client-related factors. The mean of this
factor was "4.16" while RII was "0.5972". Most of the respondents agreed that poor project management and cost control would result in a cost overrun. Inappropriate planning during the design stage and construction stage may hinder the completion time of the project, estimated cost and the required quality. However, poor cost control during the design stage and construction stage may lead to the high cost of construction.

A previous study conducted in Pakistan showed that poor project management and poor cost control were ranked 5th while another study conducted in Ghana ranked it 1st [10, 11]. Besides, another study conducted in Nigeria showed that poor project management and poor cost control was ranked fourth [2]. Meanwhile, the previous study conducted in the western part of Malaysia showed that this factor was ranked second [7]. At the same time, it was ranked 9th in this study. This finding, therefore, suggests that the respondents of previous study and present study strongly consider this factor to be significant.

5.10. Contract Awarded to the Lowest Bidder (RII = 0.5944)

Contract awarded to the lowest bidder was in the 10th position out of all the factors causing cost overrun, and it was categorized under client-related factors. The mean of this factor was "4.14" while RII was "0.5944". Most of the respondents agreed that the contract awarded to the lowest bidder would result in a cost overrun. The lowest bidder does not mean the better bidder as the lowest bidder may not often deliver quality work.

Previous studies conducted in Pakistan and Asian countries such as South Korea, Hong Kong, Taiwan, Sri Lanka, Vietnam, Malaysia, Singapore and other countries showed that contract awarded to lowest bidder was a significant factor causing cost overrun of projects. However, it was ranked 4th in Pakistan and 1st in Asian countries [12, 11] while it was ranked 8th in the previous study conducted in South Africa [9]. Another study conducted in Ghana showed that this factor was ranked 14th [9]. In this present study, it was ranked 10th which was similar to the study conducted in Asian countries.

6. Conclusions

This paper complements the existing body of knowledge on the factors causing cost overrun across the construction industries. A comparison of the findings of this paper and previous related studies on cost overrun suggest that the level of importance attached to each cost overrun factor depends on the perception of the respondents and their location. Since all the 35 cost overrun factors and their level of importance are presented in a table, the first ten factors have been discussed and compared with previous studies. This is not to say that the remaining twenty-five (25) factors are of less importance in Sarawak, Malaysia. The top ten factors are the shortage of material, shortage of plant and spare parts of equipment, acceleration required by the client, change of work scope or changes in material specification by the client, mistakes during construction, fluctuation in prices of raw materials, shortage of workforce, lack of skilled labour, poor project management and poor cost control and the contract awarded to the lowest bidder. The factors have been discussed and compared with previous studies. Consequently, the paper provides insight and enables the clients, contractors, project managers and other players in the construction projects on the factors that could cause cost overrun of construction projects. Once they are identified early, it can then be managed and mitigated at the inception. The analyzed data of this research were collected through a quantitative survey approach. This factor is considered a major limitation of this paper. Future research could interview with relevant players in the construction industry to obtain qualitative data on the causes of cost overrun. Besides, future research could examine other grades of contractors not considered in this study. Moreover, registered developer under Sarawak Housing and Real Estate Developer Association (SHEDA) can be taken into consideration to have a diverse perception of practitioners in the construction industry.

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