CONSTRUCTION COST CONTROL FOR ROAD PROJECTS IN THE CONTEXT OF MALAYSIAN CONTRACTORS

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ABSTRACT

Cost overrun is a common problem in the construction industry. Cost overrun occurs when the actual cost exceeds the budgeted, estimated, original, or target cost. Implementing cost control is complicated since it must evaluate many things, such as budget, project cash flow, cost performance, and others. In road construction projects, cost overrun is typical even though cost control has been practised. Road construction in Malaysia can be observed to have cost problems, and cost control practised in the industry needs to be improved. This research aims to analyse the present methods of cost control utilised by contractors in road projects and propose possible strategies to improve cost control in enhancing project cost performance. The objectives of this research are to investigate the practices of cost control in road projects by the contractors, to assess the problems encountered, and to suggest possible strategies to overcome the problems. This research employs a quantitative method by conducting a survey questionnaire as an approach to data collection. A total of 160 questionnaires were distributed to G5, G6, and G7 contractors, while only 32 questionnaires were received. However, only 27 respondents were involved in a road project. The data obtained were analysed by using Microsoft Excel. Based on the results, cost control practices in road projects include record keeping, financial reports, valuation of work in progress, work programmes, approximate quantities method, cost control at the site, and daily labour controlling. Next, the problems encountered include obtaining standard data, change of works from variation order, changes of design, instability of material prices, and inaccurate quantity take-off. Lastly, the strategies to overcome the problems include practising effective strategic planning, practising effective site management, providing detailed descriptions of Bill of Quantities (BQ), utilising cost value comparison, and ensuring the cost budget is realistic.

Keywords: Cost Control, Road Projects, Construction, Malaysia

1.0 INTRODUCTION

Road network system is not only limited to moving people from one point to another but also a key logistics mechanism for the movement of goods and resources from the point of production to the point of consumption as well as the waste disposal process Lambert (1997) as cited in Noraini and Zakaria (2010). With the roads' existence, Malaysia's transportation system has become easier and a catalyst for economic growth.

According to the Department of Statistics Malaysia (DOSM) (2018), the Malaysian construction sector has shown growth in gross output value by 7.2 percent per annum from RM 177.9 billion in 2015 to RM 204.4 billion in 2017. The civil engineering sub-sector contributed the highest gross output value, with RM 63.7 billion (31.2 percent). The data published by DOSM does not properly specify the value of gross output by road works project, but the development of road works is beneficial. The construction project must be implemented successfully to meet the needs of the country, community, or individuals. As emphasised by Rahman et al. (2020), three factors determine the success of a construction project: the project to be completed within the allocated time and budget meets predetermined requirements and objectives and cause minimal environmental disruptions.

As for road construction projects, highways can be categorised as large road projects, which consume high costs. Since a high cost is involved, cost control is needed for the success of the project. Olawale and Sun (2015), cost control is about assuring that work elements within a project are accomplished following their respective budget. Three types of costs are involved in highway projects: budget, actual, and planned costs. Budget cost is the sum of unit price with the quantity of materials per drawing, the actual cost is the total cost used in constructing the project, and planned cost refers to the predetermined plan production cost.

Cost overrun is a common problem in the construction industry. Cost overrun occurs when the actual cost exceeds the budgeted, estimated, original, or target cost (Alemu and Olav, 2017). In road construction projects, the occurrence of cost overrun is expected, which leads to losses to the stakeholders even though parties involved in construction, especially the contractors, implement cost control. Hence, road construction in Malaysia can have cost problems, and cost control practised in the industry needs to be improved. Research on cost management or road construction, especially in Malaysia, discovered the cost problem in Malaysian road construction.

This research aims to analyse the present methods of cost control utilised by contractors in road projects and propose possible strategies to improve cost control in enhancing project cost performance. The objectives of this research are to investigate the practices of cost control in road projects by the contractors, to assess the problems encountered, and to suggest possible strategies to overcome the problems. Moreover, this research focused on construction cost control practices in road projects in Malaysia. In addition, this research also focuses on the perspective of G5, G6, and G7 contractors in Malaysia who are registered with the Construction Industry Development Board (CIDB).

2.0 LITERATURE REVIEW

Cost control is considered a process where the construction cost of the project is managed through the best methods and techniques to avoid losses by the contractor when executing the construction project (Ayinde, 2018). Currently, the construction industry uses different cost control techniques (Malkanthi et al., 2017; Premalal et al., 2017; Olawale and Sun, 2015). In addition, various types of qualitative methods are available to perform cost control through planning and scheduling (Oyebode, 2019).

2.1 Practises of Construction Cost Control

Cost control is the initiative to maintain the cost of a project within the budget. According to Olawale and Sun (2015), project cost-value reconciliation is the most used technique among contractors and consultants in the United Kingdom. Malkanthi et al. (2017) found that Microsoft Project (MS Project) is the best current practice of the cost-controlling technique followed by daily material and labour controlling and earned value management. In Oyo State, Nigeria, Ayinde (2018) revealed that the most effective cost control practices are record keeping, valuation of work in progress, work programmes, material management, earned value management, and budgetary control. Furthermore, Akhil and Das (2019) determined that most construction practitioners choose cost control at the site as a cost control technique. In Malaysia, Bahaudin et al. (2012) identified the cost control methods and procedures that contractors G7 in Malaysia are currently utilising as performance (corrective) based cost control. However, the authors added that Malaysian contractors are lacking in the use of information technology and are more comfortable with the

traditional method of controlling construction costs. Besides, Yuann (2015) discovered that the Quantity Surveyor often uses the approximate quantities method in pre-contract under the unit price contract and square meter basis for lump sum contract.

2.2 Problems in the Practices of Construction Cost Control

According to Olawale and Sun (2015), the main problem is inaccurate cost estimates in control task planning. This is because no plan is made on how the cost is controlled. Malkanthi et al. (2017) discovered that a shortage of material, labour, or mechanical plant is a significant problem the contractors face in controlling costs. Adjei et al. (2018) found that many contractors use outdated cost management practices and need to gain knowledge in using the latest tools and Information Communication Technology (ICT), making it difficult to solve the current cost problem. Kasimu (2016) revealed that construction practitioners in Nigeria involved in infrastructure project delivery suffer from improper planning problems and insufficient involvement of quantity surveyors in infrastructure projects.

In Malaysia, Tan and Adzman (2015) exposed that most contractors have agreed that changes of design, shortage of labour, inaccurate quantity take-off, lack of cost information, lack of expertise, lack of knowledge and inaccurate cost estimate are problems that are often encountered when practising cost control. In addition, Yuann (2015) revealed that variation order and additional cost to carry out the method are the serious problems faced by Malaysian quantity surveyors in consulting firms.

2.3 Strategies to Overcome Construction Cost Control

Olawale and Sun (2015) recommended that the contractor ensure that the cost budget is always realistic and that the project team understands the cost estimate. Malkanthi et al. (2017) suggested that the contractor should utilise Microsoft Project (MS Project) in daily monitoring progress and use the earn-value theory to ensure the process of cost control runs systematically. In addition, they are practising effective strategic planning and proper project planning among the strategies to overcome the problem of poor cost management in infrastructure projects (Kasimu, 2016). Sohu et al. (2019) proposed several mitigation measures for contractors, clients, and consultants involved in road projects. For example, the client should plan each activity before starting the project to avoid inadequate planning. Among other mitigations are detailed design changes should be provided, and any delays in approval and procedures should be avoided.

According to Tan and Adzman (2015), providing training programs in cost control to the staff, managing the inflation risk by allowing fluctuation of price in the contract, minimising the design changes, and constantly updating the cost data are among the highly recommended strategies to counter the problems in cost control practices in the Malaysian construction project. Moreover, Yuann (2015) discovered that among strategies that can be implemented to solve the problems encountered during the implementation of cost control include the designer should alert current authorities requirements, and contractors must be aware and inform consultants and clients of any difficulty and problems that involved variation order during construction.

3.0 METHODOLOGY

This research employed a mono-method quantitative approach to obtain the required data. A similar method has been applied in some other research on construction cost control, such as Ayinde (2018) and Yuann (2015). A quantitative approach is considered following the purpose of

this study in measuring respondents' agreement on practices, problems, and strategies in cost control according to their experiences and perceptions. The approach has advantages such as being cheaper to implement and standardised so that comparisons can be made easily and impact measurements can usually be measured (Kabir, 2016).

For the research strategy, the survey method is used by distributing questionnaires to contractors. The survey method is very popular used in social science data-gathering techniques because it can provide accurate, reliable, and valid data. Still, doing this requires considerable effort and thought (Neuman, 2014). It is very suitable to be used for this research because this research is very much in need of facts on cost control practices and problems in cost control practices in road projects from the perspective of contractors in Malaysia. The survey also requires the researcher to ask directly from the respondent or someone known to know the problem being studied. Respondents involved in the contractor must have sufficient knowledge of cost control management for road construction projects.

The scope of this research is conducted on contractors registered with CIDB as G5, G6, and G7 contractors only. The contractor's information is taken from the official website of the Construction Industry Development Board (CIDB) and the contractors' website. Apart from that, the contractors must have experience in road construction projects in Malaysia. Therefore, purposive sampling was used in this research.

4.0 RESULTS AND DISCUSSION

A total of one hundred and sixty (160) questionnaires were distributed to registered G5, G6, and G7 contractors in Malaysia who engage in road construction projects through email. Thirty-two (32) questionnaires were answered out of one hundred and sixty (160) questionnaires distributed. However, five (5) out of thirty-two (32) respondents have never been involved in a road project. Thus, data analysis was only performed on twenty-seven (27) contractor companies involved in road projects. The characteristics of the respondents are shown in Table 1.

Table 1 Demographic information of the respondents

Current position in the company	Working experience in the construction industry	Highest academic qualification	Grade of CIDB registration
Quantity surveyor	Less than five years	Bachelor	G5
Managing director	5 - 10 years	Bachelor	G5
Quantity surveyor	5 - 10 years	Diploma	G5
Project manager	More than 15 years	Master	G6
Civil engineer	5 - 10 years	Master	G6
Project manager	Less than five years	Bachelor	G6
Civil engineer	5 - 10 years	Master	G6
Quantity surveyor	5 - 10 years	Bachelor	G6
Finance	More than 15 years	Bachelor	G6
Quantity surveyor	Less than five years	Bachelor	G7
Executive accountant	Less than five years	Bachelor	G7
Quantity surveyor	Less than five years	Bachelor	G7
Civil engineer	5 - 10 years	Bachelor	G7
Quantity surveyor	5 - 10 years	Bachelor	G7

Project director	More than 15 years	Master	G7
Civil engineer	Less than five years	Bachelor	G7
Planning Engineer	5 - 10 years	Bachelor	G7
Assistant contract manager	11 - 15 years	Bachelor	G7
Quantity surveyor	5 - 10 years	Bachelor	G7
Quantity surveyor	11 - 15 years	Diploma	G7
Project manager	More than 15 years	Diploma	G7
Project manager	More than 15 years	Bachelor	G7
Quantity surveyor	5 - 10 years	Bachelor	G7
Project manager	11 - 15 years	Bachelor	G7
Quantity surveyor	Less than five years	Diploma	G7
Administrative Staff	5 - 10 years	Master	G7
Project manager	More than 15 years	Bachelor	G7

4.1 Practices of Construction Cost Control in Road Projects

There are eighteen (18) construction cost control practices listed in this section. The respondents were required to state their stance on the listed practice options (yes, no, or not sure) based on their experience. Table 2 shows the results of the practices of construction cost control in road projects based on all respondents.

Table 2 Construction cost control practices in road projects

No.	Practices	Yes		No		Not sure	
		No.	%	No.	%	No.	%
1.	Approximate quantities method	26	96.3	1	3.7	0	0.00
2.	Budgetary control	24	88.9	3	11.1	0	0.00
3.	Cash flow forecasting	24	88.9	2	7.4	1	3.7
4.	Cost control at the site	26	96.3	1	3.7	0	0.0
5.	Cost modelling	17	63.0	6	22.2	4	14.8
6.	Daily material controlling	24	88.9	3	11.1	0	0.0
7.	Daily labour controlling	26	96.3	1	3.7	0	0.0
8.	Earned value management	20	74.1	3	11.1	4	14.8
9.	Elemental Cost Plan	19	70.4	5	18.5	3	11.1
10.	Financial report	27	100.0	0	0.0	0	0.0
11.	Performance (corrective) based cost control	20	74.1	3	11.1	4	14.8
12.	Project cost–value reconciliation	18	66.7	3	11.1	6	22.2
13.	Record keeping	27	100.0	0	0.0	0	0.0
14.	Square meter basis	25	92.6	2	7.4	0	0.00
15.	Supply chain management	22	81.5	3	11.1	2	7.4
16.	Tender budgeting	25	92.6	2	7.4	0	0.0
17.	Valuation of work in progress	27	100.0	0	0.0	0	0.0
18.	Work programmes	27	100.0	0	0.0	0	0.0

Table 3 shows the construction cost control practices in road projects and the total percentage of respondents from G5, G6, and G7 contractors who stated ‘yes’. This table analyses the results from Table 2 by sorting according to the total percentage for ‘yes’. The results of the research conducted showed that most respondents from all grades of contractors stated 'yes'; they use the cost control practices that have been listed.

From the table, four practices get the highest percentage score of 100.0 % in the financial report, record keeping, valuation of work in progress, and work programmes where all respondents use both practices in cost control. These results are in line with a study conducted by Ayinde (2018) in which the researcher found that record keeping, valuation of work in progress, and work programs are the most effective cost control techniques for contractors in Oyo State, Nigeria while Azis et al. (2012) investigated that financial report obtained the third rank in his research results. The most used practices with the second highest percentage are the approximate quantities method, cost control at the site, and daily labour control. The result is consistent with the findings of studies conducted by Akhil and Das (2019), Yuann (2015), and Malkanthi et al. (2017), as they found that all these practices were among the most frequently used methods by contractors.

However, two cost control practices are least used compared to other methods: cost modelling and project-cost value reconciliation. Olawale and Sun (2015), in their study in the UK, found that project cost-value reconciliation is the highest used by contractors and consultants, which is not in line with the results of this study. This is because these practices are pretty odd in Malaysia and prevent them from stating 'yes' to these practices. In addition, the results of research conducted by Yuann (2015) on cost control practices found that cost modelling was less effective, which is in line with the results of this research.

Table 3 Summary of Construction Cost Control Practices in Road Projects

No.	Practices	Percentage of answering 'yes' (%)
1.	Financial report	100.0
2.	Record keeping	100.0
3.	Valuation of work in progress	100.0
4.	Work programmes	100.0
5.	Approximate quantities method	96.3
6.	Cost control at the site	96.3
7.	Daily labour controlling	96.3
8.	Square meter basis	92.6
9.	Tender budgeting	92.6
10.	Budgetary control	88.9
11.	Cash flow forecasting	88.9
12.	Daily material controlling	88.9
13.	Supply chain management	81.5
14.	Earned value management	74.1
15.	Performance (corrective) based cost control	74.1
16.	Elemental Cost Plan	70.4
17.	Project cost–value reconciliation	66.7
18.	Cost modelling	63.0

4.2 Problems Encountered in Practicing Construction Cost Control in Road Projects.

As listed in this section, twenty-four (24) problems are encountered in practising construction cost control. The respondents were required to rate their level of agreement for each problem listed in the questionnaire using a five-point Likert scale consisting of (strongly disagree, disagree, neutral, agree, and strongly agree).

Table 4 shows the results of the problems encountered in practising construction cost control in road projects based on all respondents.

Table 4 Problems encountered in practising construction cost control in road projects

No.	Problems	Strongly disagree (1)		Disagree (2)		Neutral (3)		Agree (4)		Strongly agree (5)		(4) + (5)
		No.	%	No.	%	No.	%	No.	%	No.	%	%
1.	Additional costs incurred to carry out the cost control practices	0	0.0	1	3.7	13	48.1	9	33.3	4	14.8	48.1
2.	Challenges in obtaining standard data	0	0.0	0	0.0	8	29.6	16	59.3	3	11.1	70.4
3.	Change of works from variation order	0	0.0	0	0.0	6	22.2	14	51.9	7	25.9	77.8
4.	Changes of design	0	0.0	1	3.7	7	25.9	13	48.1	6	22.2	70.3
5.	The ever-changing environment of construction projects	0	0.0	1	3.7	11	40.7	9	33.3	6	22.2	55.5
6.	Improper monitoring procedures for cost control	0	0.0	4	14.8	8	29.6	10	37.0	5	18.5	55.5
7.	Improper planning for cost control	0	0.0	3	11.1	9	33.3	12	44.4	3	11.1	55.5
8.	Improper use of quantitative tools	0	0.0	3	11.1	11	40.7	10	37.0	3	11.1	48.1
9.	Inaccurate cost estimate	0	0.0	2	7.4	10	37.0	13	48.1	2	7.4	55.5
10.	Inaccurate quantity take-off	0	0.0	4	14.8	7	25.9	13	48.1	3	11.1	59.2
11.	Instability of material prices	0	0.0	2	7.4	7	25.9	8	29.6	10	37.0	66.6
12.	Insufficient involvement of Quantity Surveyors	2	7.4	3	11.1	8	29.6	11	40.7	3	11.1	51.8
13.	Lack of computer software usage	2	7.4	6	22.2	13	48.1	4	14.8	2	7.4	22.2
14.	Lack of cost information	0	0.0	5	18.5	9	33.3	10	37.0	3	11.1	48.1
15.	Lack of expertise	3	11.1	4	14.8	11	40.7	6	22.2	3	11.1	33.3
16.	Lack of knowledge	4	14.8	4	14.8	10	37.0	6	22.2	3	11.1	33.3
17.	Outdated cost management practices	0	0.0	5	18.5	9	33.3	9	33.3	4	14.8	48.1
18.	Short project duration	1	3.7	1	3.7	14	51.9	7	25.9	4	14.8	40.7
19.	Shortage of labour	1	3.7	3	11.1	13	48.1	6	22.2	4	14.8	37.0
20.	Shortage of materials	1	3.7	2	7.4	12	44.4	8	29.6	4	14.8	44.4
21.	Shortage of mechanical plant	1	3.7	4	14.8	9	33.3	9	33.3	4	14.8	48.1
22.	Slow decision making	0	0.0	6	22.2	9	33.3	8	29.6	4	14.8	44.4
23.	Unclear on control task for cost control	0	0.0	4	14.8	12	44.4	7	25.9	4	14.8	40.7
24.	Wrong reporting method	1	3.7	6	22.2	8	29.6	9	33.3	3	11.1	44.4

Table 5 shows the problems encountered in practicing construction cost control in road projects and the total percentage of agreed and strongly agreed by the respondents from G5, G6, and G7. This table analyses the results from Table 4 by sorting according to the total percentage for "Strongly agree" and "Agree". The results of the research summarised that almost half of the respondents from all grades of contractors agreed with the listed problems.

From the table, the problem that obtained seventy-seven the highest score is the change of works from variation order which 77.8 % of respondents agreed on. These results are consistent with Yuann (2015) research on quantity surveyor consulting firms. The consistency of the results indicates that many parties in construction face these problems, whether consultants or contractors.

Two problems have a high percentage score of 70.4 % and 70.3 %, namely challenges in obtaining standard data and design changes. The results of research conducted by Malkanthi et al. (2017) align with the results of this study, where they discovered that these two problems are often faced by contractors resulting in cost overruns in construction. Furthermore, Tan and Adzman (2015) have analysed fourteen problems that occur among G7 contractors in Malaysia and found that changes in design are among the top problems that arise and further strengthen the results of this research.

The lack of computer software used is the lowest number of respondents who agreed, only 22.2 %, equivalent to six (6) out of twenty-seven (27) respondents. This problem is one of the moderate problems in the results of a study conducted by Tan and Adzman (2015). Hence, this shows that the lack of computer software usage is not a major problem that often occurs among contractors in Malaysia.

Furthermore, the problems that ranked second lowest were lack of expertise and knowledge, with an agreed percentage of 33.3 %. However, there is some contradiction with the results of Tan and Adzman (2015) study, which found that these two problems were often encountered when practising cost control. An extension of research is needed to unravel this contradiction.

Table 5 Summary of the problems encountered in practising construction cost control in road projects

No.	Problems	Percentage of agree and strongly agree (%)
1.	Change of works from variation order	77.8
2.	Challenges in obtaining standard data	70.4
3.	Changes of design	70.3
4.	Instability of material prices	66.6
5.	Inaccurate quantity take-off	59.2
6.	The ever-changing environment of construction projects	55.5
7.	Improper monitoring procedures for cost control	55.5
8.	Improper planning for cost control	55.5
9.	Inaccurate cost estimate	55.5

10.	Insufficient involvement of Quantity Surveyors	51.8
11.	Additional costs incurred to carry out the cost control practices	48.1
12.	Improper use of quantitative tools	48.1
13.	Lack of cost information	48.1
14.	Outdated cost management practices	48.1
15.	Shortage of mechanical plant	48.1
16.	Shortage of materials	44.4
17.	Slow decision making	44.4
18.	Wrong reporting method	44.4
19.	Short project duration	40.7
20.	Unclear on control task for cost control	40.7
21.	Shortage of labour	37.0
22.	Lack of expertise	33.3
23.	Lack of knowledge	33.3
24.	Lack of computer software usage	22.2

4.3 Strategies to Overcome the Problems in Practicing Cost Control in Road Projects

There are twenty-one (21) strategies listed in this section. The respondents were required to rate their level of agreement for each strategy listed in the questionnaire using a five-point Likert scale consisting of (strongly disagree, disagree, neutral, agree, and strongly agree).

Table 6 shows the results of the strategies to overcome the problems encountered in practising cost control in road projects based on all respondents.

Table 6 Strategies to overcome the problems in practicing construction cost control in road projects

No.	Strategies	Strongly disagree (1)		Disagree (2)		Neutral (3)		Agree (4)		Strongly agree (5)		(4) + (5)
		No.	%	No.	%	No.	%	No.	%	No.	%	%
1.	Appoint a qualified team for cost control	0	0.0	3	11.1	8	29.6	9	33.3	7	25.9	59.3
2.	Ensure the cost budget is realistic	0	0.0	0	0.0	5	18.5	11	40.7	11	40.7	81.5
3.	Ensure the project team understands the cost estimate	0	0.0	1	3.7	4	14.8	8	29.6	14	51.9	81.5
4.	Finalise design before the tender stage for design and building contract	0	0.0	1	3.7	6	22.2	6	22.2	16	59.3	81.5
5.	Follow guidelines from construction authorities	1	3.7	1	3.7	4	14.8	9	33.3	12	44.4	77.8
6.	Frequent coordination between parties in the project	0	0.0	1	3.7	6	22.2	7	25.9	13	48.1	74.1
7.	Frequent updating of the cost data	0	0.0	0	0.0	5	18.5	12	44.4	10	37.0	81.5
8.	Minimise the design changes	0	0.0	1	3.7	6	22.2	8	29.6	12	44.4	74.1
9.	Periodic monitoring regime	0	0.0	0	0.0	8	29.6	9	33.3	10	37.0	70.4
10.	Practice value engineering	0	0.0	1	3.7	7	25.9	10	37.0	9	33.3	70.4
11.	Practice effective site management	0	0.0	1	3.7	3	11.1	11	40.7	12	44.4	85.2
12.	Practice effective strategic planning	0	0.0	0	0.0	4	14.8	11	40.7	12	44.4	85.2
13.	Provide detailed descriptions of BQ	0	0.0	1	3.7	3	11.1	8	29.6	15	55.6	85.2
14.	Provide detailed design changes	0	0.0	1	3.7	4	14.8	8	29.6	14	51.9	81.5
15.	Provide training program in cost control to the staff	0	0.0	1	3.7	6	22.2	8	29.6	12	44.4	74.1
16.	Up-to-date cost status reporting	0	0.0	1	3.7	5	18.5	9	33.3	12	44.4	77.8
17.	Use of systematic control mechanism	0	0.0	1	3.7	5	18.5	11	40.7	10	37.0	77.8
18.	Use of earn value theory	0	0.0	1	3.7	8	29.6	9	33.3	9	33.3	66.7
19.	Use of estimating methods which are sensitive to changes	0	0.0	1	3.7	8	29.6	8	29.6	10	37.0	66.7
20.	Utilise cost-value comparison	0	0.0	1	3.7	3	11.1	13	48.1	10	37.0	85.2
21.	Utilise information technology (IT)	0	0.0	0	0.0	5	18.5	13	48.1	9	33.3	81.5

Table 7 shows the strategies to overcome the problems encountered in practising cost control in road projects and the total percentage of agreed and strongly agreed by the respondents from G5, G6, and G7 contractors. This table analyse the results from Table 6 by sorting according to the total percentage for "Strongly agree" and "Agree". Based on the results, it is clearly shown that most of the respondents from all grades of contractors agreed with the listed strategies. Each of the strategies listed has a percentage of agreed, and 94 strongly agreed, of more than 50.0 %.

From the table, the highest score among all is 85.2 %, with a total of twenty-three (23) respondents agreeing with effective site management practice, effective strategic planning practice, providing detailed descriptions of BQ, and utilise cost value comparison as the most relevant strategy to be applied in cost control practice in a road project. Kasimu (2016) also suggested that effective site management and strategic planning are effective mitigation measures to overcome cost control problems for infrastructure projects. In addition, Yuann (2015) recommended providing detailed descriptions of BQ, and Olawale and Sun (2015) suggested utilising cost value comparison to overcome construction cost control problems.

On top of that, lack of expertise is not a big problem contractor face in practising cost control. Therefore, the least agreed strategy by all respondents is to appoint a qualified team for cost control. Sohu et al. (2019) suggested this strategy so that the cost control team can make the right decisions and avoid common mistakes. Thus, most respondents are qualified and have sufficient expertise in practising cost control.

Table 7 Summary of the strategies to overcome the problems encountered in practice

No.	Strategies	Percentage of agree and strongly agree
67	Practice effective site management	85.2
68	Practice effective strategic planning	85.2
69	Provide detailed descriptions of BQ	85.2
76	Utilise cost-value comparison	85.2
58	Ensure the cost budget is realistic	81.5
59	Ensure the project team understands the cost estimate	81.5
60	Finalise design before the tender stage for design and built contract	81.5
63	Frequent updating of the cost data	81.5
70	Provide detailed design changes	81.5
77	Utilise information technology (IT)	81.5
61	Follow guidelines from construction authorities	77.8
72	Up-to-date cost status reporting	77.8
73	Use of systematic control mechanism	77.8
62	Frequent coordination between parties in the project	74.1
64	Minimise the design changes	74.1
71	Provide training program in cost control to the staff	74.1

65	Periodic monitoring regime	70.4
66	Practice value engineering	70.4
74	Use of earn value theory	66.7
75	Use of estimating methods that are sensitive to changes	66.7
57	Appoint a qualified team for cost control	59.3

5.0 CONCLUSION

The study concludes that the practices of cost control in road projects by the contractors that are often used are record keeping, financial reports, valuation of work in progress, work programmes, approximate quantities method, cost control at the site, and daily labour controlling.

Furthermore, contractors often face several problems in practising cost control. Among the significant problems are challenges in obtaining standard data, change of works from variation order, changes of design, instability of material prices, and inaccurate quantity take-off.

In addition, the study finds that possible strategies that can be proposed are practising effective strategic planning, practising effective site management, providing detailed descriptions of BQ, utilising cost value comparison, and ensuring the cost budget is realistic. These strategies obtained a high percentage of scores from respondents.

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