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Post-Contract Cost Control for Building Construction Projects

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Abstract

Cost control is implemented to manage the cost of construction projects. Cost control is important in both pre-contract and post-contract stages, but it is more vital in the latter stage. It is a continuous process and must be conducted throughout the project to ensure the final construction cost does not exceed the estimated cost, thus preventing cost overrun. Various factors may lead to cost overrun, especially in building construction projects. Inadequate cost management is not a matter to be taken lightly because it results in a large number of cost overruns. This alarming problem is negatively affecting the parties involved in the project and the nation. Hence, this study is carried out to mitigate cost overrun by practicing effective cost control. This research is conducted to identify the post-contract cost control practices implemented by contractors for building construction projects, the challenges encountered, and the strategies to overcome the challenges. The quantitative method is utilized, which involves conducting a questionnaire survey. 28 respondents from G6 and G7 contractors have provided feedback, and the results obtained were analyzed using Statistical Social Package Science (SPSS). For the first objective, the post-contract cost control practices for building construction projects include monitoring material costs, using bills of quantities to manage construction costs, and monitoring overheads. For the second objective, the challenges encountered include poor project planning, poor communication between project parties, and improper contract documentation. For the last objective, the strategies to overcome the challenges include good construction planning, effective site supervision, and appointment of qualified management staff. This research explores the improvements in the practices of post-contract cost control in construction projects.

1. Introduction

Bekr (2015) defined cost overrun as the excess of actual cost over the estimated cost. It is also known as cost escalation, cost increase, or budget overrun. Abdel-Hafeez, El-Attar, & Abdel-Hafeez (2016) argued that an increase in project costs (cost overrun) could diminish the project's feasibility, as well as its contribution to community development and progress. On the other hand, Al-Mekhlafi, & Othman (2023) stated that cost overrun is a common problem in construction projects internationally. Nagham, & Abbas (2023) expressed the importance of determining the courses of cost overrun problems to overcome them.

According to Memon, Rahman, and Azis (2012), Malaysia's construction industry encounters challenges such as unsatisfactory performance of time and cost, construction waste, low-efficiency rate, and extremely reliance on foreign workers. Among the listed problems, time and cost performances are the most crucial. In India, Patel, Jain, and Saraswat (2016) found that cost overrun is a serious issue as construction projects undergo an increase in cost ranging from 0% to 126% of the contract amount. Adriana et al. (2023) reveal that the project execution phase emerges as the stage where cost and time changes occur.

Project control is an important part of the construction industry with the purpose of completing the projects within the period, cost, and fulfilling project objectives (Olawale and Sun, 2010). Doloi (2013) found that overall project cost performance relies on project planning and control, especially on the contracting parties' capability. Ashworth and Perera (2015) believed that the finances of construction projects must be managed from the inception stage up to the final certificate issuance. During the pre-contract stage, it is important to ensure the design of the project does not exceed the budget allocated (Cunningham, 2017a). Meanwhile, during the post-contract stage, the main goal is for the client to achieve the highest possible value for money and for the contractor to gain high profits from the project (Ashworth & Perera, 2015).

According to Abu Safiya and Suliman (2017), an out-of-control construction cost will increase the possibility of investment pressure, construction cost escalation, impact investment decision-making, and waste national finance. The construction industry often handles one-off projects, and thus, many variables are involved, so effective management control is required (Olawale & Sun, 2015). Bahaudin et al. (2012) stated that the sector that needs effective cost control the most is the construction industry due to the competitive nature of the industry itself. To remain in this fierce industry, a construction company must regard cost control as a fundamental operation tool (Sanni and Hashim, 2013). Ling and Ang (2013) reported that an excellent control system will lead to great performance on construction projects. Sun (2023) highlighted the need for effective measures of project cost control. Meanwhile, Shehu (2023) emphasized cost control policies within an organization. Overall, it may be said that cost control is an important part of construction projects. It is a continuous process and must be conducted throughout the project to ensure the final construction cost does not exceed the estimated cost, thus preventing cost overrun.

Cost overrun is an infamous issue in the construction industry. It is a problem that occurs in Malaysia and other countries. Tahir et al. (2019) explained that the construction industry in Malaysia is plagued with delays and cost overruns. Wan and Tan (2022) found that road construction in Malaysia encountered cost management problems. Kamaruddeen et al. (2020) observed that cost overruns of construction projects in Malaysia are between 5 to 10%.

Norul et al. (2019) argued that improper planning and poor site management are the main factors that cause cost overrun in the Malaysian construction industry. Azis et al. (2012) surveyed construction industry personnel who have experience administrating countless project types, including building, infrastructure, and building-infrastructure projects. 85% of the respondents admitted that they have encountered cost growth, and usually, the increase in cost is up to 5-10% of the project cost. Memon, Rahman, and Azis (2012) conducted a survey among approximately 200 clients, consultants, and contractors regarding the time and cost performance in construction projects and discovered that the cost overrun issue is encountered by the majority of the projects, only 11% of the construction personnel stated that the projects were completed within the allowance. 89% of the respondents also agreed that the cost may exceed 5-10% of the budgeted cost. In other countries such as the West Bank, Palestine, Mahamid, and Dmaidi (2013) found that cost overrun in building construction is a critical issue as they go through up to a 10-30% increase in total cost. In Pakistan, Malkhanti, Premalal, and Mudalige (2017) evaluated the cost overrun experienced by C1 to C5 grade contractors, and 78% of respondents confirmed that their projects must endure a 0-25% increase, 18% of them undergo a 25-50% rise, and 4% of the respondents suffer 50-75% growth.

Different countries may experience similar or different causes. Memon and Rahman (2013) revealed that the most crucial cost increase factors in small-scale projects in the southern part of Malaysia are the cost of materials, labours, plants, and equipment, while in large projects, it is due to the cost of materials, construction, plant, and equipment. Other factors include head office overheads, sub-contractor costs, project delay costs, and the owner's new requirements. However, Rahman, Memon, and Karim (2013) disagreed and stated that the main causes of the high final cost of large construction projects are materials price fluctuation, contractors' cash flow and financial complications, and unsatisfactory site management and supervision. Jamaludin, Mohammad, and Ahmad (2014) carried out a survey among 'Class A' building contractors in Klang Valley regarding the causes of cost discrepancy during the construction phase. The results showed that the major factor is incomplete design drawings and specifications in the tendering phase. This is followed by changes in client requirements, monetary problems experienced by contractors, fluctuation of material costs, and poor planning, scheduling, and monitoring. Azis et al. (2013) identified 58 cost overrun factors from previous studies, categorized them into eight categories, and ranked them according to severity in Malaysia's construction projects. In the Australian construction industry, Doloi (2013) conducted research related to the vital causes that affect the performance of projects before and during the construction stage in terms of cost. The top factors comprise accurate project planning and monitoring,

effective site management, contractors' efficiency, design efficiency, and communication. Mahamid and Dmaidi (2013) confirmed that the top five elements of cost overrun in the West Bank in Palestine include the political situation, fluctuation of prices of materials, economic instability, currency exchange, and level of competitors. They identified 41 factors through literature reviews and classified them into cost-estimating factors, construction item-related factors, project participants-related factors, environmental factors, and financing factors. More than half of the factors are very critical.

Mahamid and Dmaidi (2013) have investigated the cost growth leading consequences through previous studies such as less profit to client and contractor, cash flow issue, disputation, and end-user dissatisfaction. Cunningham (2017b) discovered that if cost overrun occurs during the construction stage, the client may suffer financial problems, which will have a negative impact on the quality of the project, and there is a possibility of project desertion. Conflict, counter-project objectives, and damage to the relationship of existing business might happen among construction clients, project managers, and construction companies. Mukuka, Aigbavboa, and Thwala (2014) found that project delay, extra cost, a shortfall of the budget, conflict among project members, substandard workmanship quality, and dissatisfaction by both owners and end users as the significant aftermath of cost overrun.

Various factors may lead to cost overrun, especially in building construction projects. Azis et al. (2013) stressed that inadequate cost management is not a matter to be taken lightly by developed and developing countries because it results in many cost overruns. This alarming problem is negatively affecting the parties involved in the project and the nation. Hence, this study is carried out with the aim of mitigating cost overrun by practicing effective cost control. as follows:

1. To identify the cost control practices of contractors for building construction projects during the construction stage.
2. To identify the challenges encountered by contractors in practicing cost control for building construction projects during the construction stage.
3. To propose strategies to overcome the challenges encountered by contractors in practicing cost control for building construction projects during the construction stage.

2. Literature Review

Cost control is essential in both the design stage and construction stage (Bahaudin et al., 2012). Cunningham (2017b) agreed that any cost increase during the construction phase may cause financial problems for the client, leading to the inability to complete the project according to requirements or even result in the project's abandonment. Thus, to avoid this problem, cost control must be implemented.

Omotayo and Kulatunga (2016) reviewed various post-contract cost control techniques from several researchers and described each technique. The research found that monitoring material cost is the most effective technique in controlling construction costs in the Nigerian construction industry, along with interim valuation, which is the second most effective technique. On the other hand, unit rate, cash flow monitoring, and variation management are ineffective techniques in cost control.

In Lagos, Sanni and Durodola (2012) found that establishing a working budget was the most frequent and effective method for cost control. The second and third most frequent methods used are monitoring labour and material costs, respectively. However, in terms of effectiveness, monitoring material costs ranked higher compared to monitoring labour costs. Among the most infrequent methods that are used by contractors in Lagos include generating reports, analyzing the reports, and keeping historical data. In addition, generating reports, monitoring earned value, and forecasting cost at completion are ineffective methods for cost control.

Chigara, Moyo, and Mudzengerere (2013) researched the cost management strategies utilized by building contractors in Zimbabwe. It has been found that project resources management is the most frequently used method to control construction costs. Resources management includes the management of materials, labours, plants, and equipment. This is followed by variance analysis, estimating and budgeting, cost reporting, cost value reconciliation, and conducting project meetings, respectively. Cash flow analysis is the least used method for cost control.

Otim, Nakacwa, and Kyakula (2012) identified the cost control techniques applied in building construction sites in Uganda. The authors found that there are seven techniques that were utilized by contractors in Uganda, which include the use of work programmes, work inspection, budgeting the work cost, conducting site meetings, keeping records of activities, monitoring work and cost performance, and evaluating the works conducted. The work programme is the most used technique, while keeping activity records is the least used technique. However, the authors were unable to identify the effectiveness of the techniques as there was not enough evidence. In addition, some sites do not have a particular method used for controlling cost, and even worse, some contractors are unaware of cost control procedures. The authors concluded that cost control problems were due to the lack of knowledge, inadequate implementation, and poor management.

Olawale and Sun (2010) discovered that project cost-value reconciliation is the most frequent cost-control technique used by contractors in the United Kingdom. Monitoring labour, plant, and material to compare the actual and forecasted is the second most used technique to control the cost. Other techniques include identifying profit or loss on each contract at valuation dates, identifying overall profit and loss, unit costing, standard costing, earned value analysis, and program evaluation and review techniques.

Azis et al. (2012) identified cash flow forecasting as Malaysia's most effective cost management technique. This is closely followed by tender budgeting/estimating and an elemental cost plan. Working budgeting/ongoing job budgeting is the least effective technique for controlling project costs. Other techniques discovered include the use of judgment techniques, financial reports and cost reports, value management, and cost code systems.

Cash flow is defined as the fund's activity in and out of an organization. The management of cash flow is a crucial process in determining the success or failure of a project, as it can have an impact on project cost and schedule. Project managers must consider it a significant matter because the project does not experience any delay, but it will still be deemed a financial failure if money is insufficient. Cost and time increase of projects are among the effects of an inadequate cash flow system. Both client and contractor need to manage their financial status and know the state of expenditures as they progress. The client must ensure that he has enough funds to make payment to the contractor and must be attentive regarding cost growth and project development. Meanwhile, the contractor constructs an administration that accumulates costs as they are incurred accurately and produces billing at a suitable time. A credit control system is also recommended to guarantee on-time payment (Venkataraman & Pinto, 2008). Mohamed Sayed et al. (2020) discussed the use of estimated cash flow management in project management. Can et al. (2023) proposed the adaptive control of resource flow to optimize construction work and cash flow via online deep reinforcement learning.

Earned Value Method (EVM) is a system that can determine the amount of completed work for the money used by using the data from work breakdown structure, project network, and time-phased cost and scheduled activities comparison schedule, allowing significant actual and estimated schedules and cost comparisons. Aside from comparing actual and estimated costs, EVM performs project assessment by combining time, cost, and value criteria. Next, EVM measures the value of work completed by using the cost rates determined in the estimated budget. In addition, the efficiency for which budgeted money is used compared to the value data supplied by EVM. This allows the prediction of estimated cost and schedule for completion of the project to be produced. The key elements that are required in generating an earned value analysis (Venkataraman & Pinto, 2008). Saputra et al. (2024), Konior et al. (2023), Tembo et al. (2024), and Sohrabi et al. (2024) discussed the use of EVM in project cost analysis and cost management.

The unit cost method involves dividing the cost of individual types of work by the quantity of the completed work to compare it with the amount in the tender. The report needs the work done value and cost comparison, and it must be provided every month following the valuation of interim consent from the client. The report aims to point out the areas and trends with issues and predict the project's final profit or loss so that corrective action can be applied to the problematic parts. Projects with monotonous performance are more efficient in implementing this approach than non-monotonous projects. Civil engineering work is suitable for this method as only a low number of high-value project components exist (Potts, 2008).

Activity-based Costing is a practical technique that comprehends a flow of activities, distinguishes value from non-value, and terminates useless activities. ABC's implementation steps consist of activity identification, resource cost assignment to activities, output identification, and activity cost assignment to outputs. This system's benefits include computing every cost element performance, decreasing cost distortion via careful observation and precise cost booking, and supplying management with useful measurement instruments to determine decisions within the allocated duration (Al-Hajj & Al-Zaher, 2012). Several authors researched the use of activity-based costing in construction cost management (Quesado, et al., 2021, Qi et al., 2021). Al-Mekhlafi, & Othman (2023) promoted the application of activity-based costing in manufacturing firms.

Cunningham (2017a) stated that the development of design during the construction stage is common since the desire to improve the product continuously exists. One way contractors can manage variations is through cost-value reconciliation (Chigara, Moyo & Mudzengerere, 2013). Cost-Value Reconciliation (CVR) combines established cost and value totals to assure the accuracy and authenticity of profits and the current financial state displayed in the company accounts. The aim is to develop a valid statutory accounts foundation and supply management data. This is to help in problem identification, reserve requirements, justification for depletion, and data to stop the losses from happening again. Aside from that, CVR will unveil the estimated budget and forecasted profit along with the project's final state evaluation, which is also known as the final account. The sum of the latest costs is compared to the valuation sum during the date of every interim valuation. The drawback of this method includes the absence of cost/profit breakdown numbers between the work types or distinct locations within the project and only assigning instructions on which project needs the assistance of senior management. Building projects fit this method due to a greater number of complicated components (Potts, 2008). A similar discussion related to cost-vale reconciliation was also found in Elserougy et al. (2024) and Serugga et al. (2023).

Resource management comprises materials, labour, and plant and equipment management, which aims to manage variances in resource utilization (Chigara, Moyo & Mudzengerere, 2013). Nagaraju, Reddy, and Chaudhuri (2012) revealed that resource management is not an easy task, and it is important for the construction manager to establish strategies to direct and control the resources accordingly to ensure a smooth project delivery. The availability of resources greatly impacts the time and cost of construction projects as all activities involved need a certain amount of resources. Otim, Nakacwa, and Kyakula (2012) and Sanni and Durodola (2012) agreed that project resources are part of the components that ensure project success. The importance of resource management has also received attention from Nalanda et al. (2024), Kedir et al. (2021), Ammirato et al. (2023), and Dhal et al. (2023).

Olawale and Sun (2010) identified the top cost control inhibiting factors. The authors found that design changes, project risks and uncertainties, inaccurate evaluation of project duration, non-performance of sub-contractors and nominated suppliers, and project complexity are the main causes that hinder the cost control process in the United Kingdom. Other factors include disputes between parties, discrepancies in contract documentation, contract and specification interpretation disagreement, price inflation, and financing and payment for completed works.

Ojedokun, Odewumi and Babalola (2012) studied the cost control variables in building construction in Nigeria. They discovered the causes of increased labour costs were due to inflation, government decision-review on wages, shortage of skilled labour, and unrealistic demand by labour unions. In addition, the high material cost was caused by costly production, shortage of materials, high demand for materials, and irrational profiteering by suppliers. Aside from that, the high cost of plants is a result of an increase in fuel rates and lubricants, costly maintenance, shortage of spare parts, and currency devaluation. Moreover, the increasing cost by sub-contractors is attributable to high bank interest rates on loans and overhead, costly imported material, labour and plant charges, delay and a short period of project completion, and overestimation by sub-contractors. Lastly, the construction cost is also affected by land cost. This is mostly due to the increase in land value as a result of increasing development area.

Chigara, Moyo, and Mudzengerere (2013) categorized the challenges to cost management experienced by building contractors in Zimbabwe into two groups: exogenous and endogenous factors. Exogenous factors are resource-related challenges, funding challenges, and variations. Meanwhile, endogenous factors comprise organizational problems, poor cost control systems, and incorrect estimates. It is found that labour-related challenges, organizational problems and material-related problems are the most crucial causes of poor cost management applications. Variations, poor cost control systems, funding problems, plant-related challenges, contractors' lack of competence, and inaccurate estimates are the least crucial factors.

Sanni and Hashim (2013) researched the obstacles to implementing an effective cost-control operation faced by contractors in the Nigerian construction industry during the construction stage. They discovered the main problems encountered in cost control implementation, which include improper contract documents, the appointment of staff with a lack of experience, unstable market conditions, project complexity, unstable government regulations, selection of procurement methods, and the absence of research and innovation. Other challenges include price and design complications, cost information quality, lack of training for young professionals, insufficient access to software packages, unclear exclusions, and professional bodies with a lack of effectiveness.

Rajguru and Mahatme (2016) revealed that the contractors in Amravati City Maharashtra, India experience cost optimization problems on-site mostly due to the lack of qualified personnel. Other problems include lack of material, labour, or mechanical plant, difficulty in obtaining cost data, unpredictable construction work environment, project duration, and the extra cost required to implement a cost optimization system.

Malkanthi, Premalal and Mudalige (2017) found that shortage of material, labour or mechanical plants, project duration, and complication in obtaining cost information are the top problems experienced by contractors in cost control implementation. On the other hand, inappropriate government policies, the lowest bidding procurement method, and the high cost of machinery are the least vital problems.

Cost overrun still occurs despite the implementation of cost control practices in construction projects. The challenges faced by contractors in controlling the cost during construction include difficulty in obtaining cost data, inexperience staff, improper contract documentation, lack of appropriate software for cost control, lack of skilled labour, lack of training in project management for the staff, fluctuation of material prices, shortage of materials, changes in material specification during construction, non-performance of sub-contractors, non-performance of suppliers, poor communication between project parties, poor project planning, inadequate staff in site organization, shortage of plant, failure of plants to work efficiently, project complexity, selection of procurement method and unpredictable construction work environment.

Otim, Nakacwa, and Kyakula (2012) suggested that contractors should take refresher courses related to construction project management. This is important to gain and improve knowledge concerning project cost control. Most of the time, failed cost control implementation was due to the lack of knowledge of cost control techniques and inadequate execution of the techniques.

Memon, Rahman, and Azis (2012) found that proper project planning and scheduling, effective site management and supervision, effective strategic planning, frequent progress meetings and proper emphasis on past experience, use of appropriate construction methods, use of experienced sub-contractors and suppliers, perform preconstruction planning, use up to date technology utilization, clear information and communication channels, frequent coordination between the parties, developing human resources, comprehensive contract administration, systematic control system and improving contract award procedure as the mitigation approaches to improve cost performance.

Doloi (2013) revealed that among the strategies that can be implemented by the contractors to address project cost overrun include effective site management and supervision, the appointment of qualified sub-contractors, proper control of resources, a clear process of project control, good project planning and monitoring, understanding the project scope and regulations of local authorities, good communication and co-ordination among project team members, understanding the design, construction methods and techniques and careful assessment of market conditions.

Awolesi, Fabi, and Akinseinde (2015) conducted a study on the effectiveness of mitigating approaches applied by medium-sized contractors in solving the cost overrun problem. The top 5 measures are effective site management and supervision, clear information and communication channels, use of experienced sub-contractors and suppliers, proper project planning and scheduling, and use of appropriate construction methods. Other approaches include a proper emphasis on past experience, performing preconstruction planning of project tasks and resources needed, use of up-to-date technology utilization, frequent coordination between the parties, effective contract administration, frequent project meetings, development of human resources, effective strategic planning, and systematic control system.

Rajguru and Mahatme (2016) recommended the contractors participate in training on construction project management to increase their knowledge of cost control techniques. Aside from that, the authors suggested proper materials management and ensuring the materials are maintained appropriately. The contractors are also encouraged to record the work progress of labours, evaluate work progress daily, hire competent labours, utilize equipment instead of labours, proper scheduling, and appropriate control procedures and records.

Various strategies can be implemented, such as the appointment of qualified management staff, careful assessment of market conditions, appointment of qualified sub-contractors and suppliers, clear understanding of the project scope, the establishment of clear communication protocol, effective contract administration, good construction planning, effective site management, effective site supervision, clear project control process, good co-ordination and frequent project meeting among project team members, use of appropriate construction methods, partake in training on construction project management, proper resources management, understanding the regulations of local authorities, , and use of latest technology.

3. Methods

For this research, the researcher utilizes primary data collection, where the researcher distributes the questionnaire survey. One of the advantages of utilizing a questionnaire survey is that it is economical because only minimum and reasonable expenses are needed to distribute the surveys to the construction companies. A similar research method has been adopted by related research as Norul et al. (2019), Omotayo and Kulatunga (2016), and Rajguru and Mahatme (2016).

3.1 Questionnaire Survey

There are four sections in the questionnaire survey prepared by the researcher concerning the basic information of respondents, the cost control practices during the post-contract stage, the challenges in practicing effective cost control, and the strategies to overcome them. The questions in the survey are constructed using the data obtained from the literature review.

3.2 Selection of Sample

The researcher selected approximately fifty (50) contractors around Klang Valley who have knowledge regarding post-contract cost control in building projects. Contractor organizations' information is obtained from the official website of the Construction Industry Development Board (CIDB).

3.3 Distribution of Questionnaires

The researcher distributed the questionnaires to the construction companies by calling the selected companies first, obtaining permission to send out the surveys to their companies, and then emailing and distributing the questionnaire survey by hand to approximately fifty (50) contractors comprising G6 and G7 contractors in Klang Valley who are involved in building construction projects. G6 and G7 contractors were chosen as the population

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as they are the contractors in Malaysia with high capability and qualified for high contract value projects. The tender limit for G6 contractors is RM10,000,000, whereas there is no tender limit for G7 contractors.

3.4 Data Analysis

The data obtained from the questionnaire survey is analyzed quantitatively using the Statistical Package for Social Sciences (SPSS) version IBM SPSS Statistic 24. Descriptive statistics is used in the analysis of all three research objectives. Frequency distributions are tabulated to describe the number of observations for variables studied.

4. Results

4.1 Survey Response

A total of fifty (50) questionnaires have been distributed to G6 and G7 contractors in Klang Valley who are involved in building construction projects. The respondents are required to answer the questionnaire surveys based on their experience and knowledge regarding post-contract cost control in building projects utilized by their current organization. The researcher called the selected companies first, obtained permission to send out the surveys, and then emailed and also distributed the questionnaire surveys by hand. Table 1 shows the responses to the questionnaire surveys that have been sent in detail.

Table 1 *Method of distribution of the questionnaire survey*

Method of Distribution	Total Distributed	Total Replied	Percentage (%)
By hand	5	5	100.0
By email	45	23	51.1
Total	50	28	56.0

Table 1 shows the method of distribution of the questionnaire survey. The table illustrates that five (5) questionnaire surveys were distributed by hand, and consequently, all five (5) (100%) of the questionnaire surveys distributed have been replied to by the companies. In addition, forty-five (45) questionnaire surveys were emailed to the selected companies, but only twenty-three (23) (51.1%) responses were obtained. In conclusion, a total of twenty-eight (28) questionnaire surveys were acquired out of the fifty (50) questionnaire surveys distributed. A total of twenty-two (22) questionnaire surveys were not returned to the researcher. Hence, it is found that the most effective method of distribution is by hand.

4.2 Section A: Background Information

Section A consists of the respondents' background information. The respondents are required to fill in their personal details and also their company's information. Some of the information provided is confidential; thus, it was not stated here, and it will only be used for reference purposes.

4.2.1 Particulars of Respondent

The respondents are required to choose the options provided regarding their highest educational background, such as Sijil Pelajaran Malaysia (SPM), Diploma, Bachelor's Degree, Master, PHD and others.

Table 2 *Highest education level of the respondents*

No.	Highest education level	Frequency	Percentage (%)
1.	Bachelor's Degree	26	92.9
2.	Master	2	7.1
	Total	28	100.0

Table 2 shows the highest education level of the respondents. The table displayed that most of the respondents are degree holders, with a frequency of twenty-six (26) and a percentage of 92.9%. On the other hand, two (2) (7.1%) out of the twenty-eight (28) respondents are Master holders.

The respondents are required to choose the options provided regarding their years of experience in the construction industry, which include less than 5 years, 5-10 years, 11-15 years, and more than 15 years.

Table 3 *Years of experience of the respondents in the construction industry*

No.	Years of experience in the construction industry	Frequency	Percentage (%)
1.	Less than 5 years	7	25.0
2.	5-10 years	9	32.1
3.	11-15 years	2	7.1
4.	More than 15 years	10	35.7
	Total	28	100.0

Table 3 shows the years of experience of the respondents in the construction industry. The table illustrates that respondents with more than 15 years of experience in the construction industry have the highest number with ten (10) respondents (35.7%). This is followed by nine (9) (32.1%) respondents with 5-10 years of experience, seven (7) (25.0%) respondents with less than 5 years experience, and lastly, two (2) (7.1%) respondents with 11-15 years of experience in the construction industry.

The respondents are required to fill their positions in their company in the space provided.

Table 4 *Position of respondents in the company*

No.	Position in the company	Frequency	Percentage (%)
1.	Quantity Surveyor	8	28.6
2.	Assistant Quantity Surveyor	3	10.7
3.	Senior Quantity Surveyor	1	3.6
4.	Quantity Surveyor Executive	1	3.6
5.	Contract Manager	5	17.9
6.	Assistant Contract Manager	1	3.6
7.	Contract Administrator	1	3.6
8.	Director	1	3.6
9.	Managing Director	2	7.1
10.	Senior Project Manager	1	3.6
11.	Senior Contract Executive	2	7.1
12.	Admin Executive	1	3.6
13.	Not stated	1	3.6
	Total	28	100.0

Table 4 shows the position of the respondents of the selected company. The table summarized that most of the respondents were quantity surveyors of their respective companies with a frequency of eight (8) respondents and a percentage of 28.6%. This is followed by five (5) (17.9%) respondents who are contract managers and three (3) (10.7%) respondents who are assistant quantity surveyors. In addition, respondents who are managing directors and senior contract executives share the same frequency, which is two (2) numbers with a percentage of 7.1% each. Moreover, there is one (1) respondent each who is a senior quantity surveyor, quantity surveyor executive, assistant contract manager, contract administrator, director, senior project manager, and admin executive with 3.6% respectively. However, one (1) (3.6%) respondent did not state his position in the company.

The respondents are required to choose their company's CIDB grade registration, which is either G6 or G7 construction companies.

Table 5 *CIDB grade registration of the companies*

No.	CIDB grade registration	Frequency	Percentage (%)
1.	G6	10	35.7
2.	G7	18	64.3
	Total	28	100.0

Table 5 shows the companies' CIDB grade registration. The table emphasized that there are ten (10) (35.7%) G6 contractors and eighteen (18) (64.3%) G7 contractors.

The respondents are required to choose their company's years of experience in the construction industry from among the options provided, such as less than 5 years, 5-10 years, 11-15 years, and more than 15 years.

Table 6 *Year of experience of the companies in the construction industry*

No.	Company's year of experience in the construction industry	Frequency	Percentage (%)
1.	5-10 years	3	10.7
2.	11-15 years	1	3.6
3.	More than 15 years	24	85.7
	Total	28	100.0

Table 6 shows the company's years of experience in the construction industry. The table demonstrated that most of the respondents work in a company that has more than 15 years of experience in the construction industry with a high frequency of twenty-four (24) (85.7%) out of twenty-eight (28) companies. There are three (3) (10.7%) respondents who work in companies with 5-10 years of experience and one (1) (3.6%) respondents who work in a company with 11-15 years of experience.

4.3 Section B: Post-Contract Cost Control Practices for Building Construction Projects

Section B is designed to achieve the first objective, which is to identify the cost control practices of contractors for building construction projects during the construction stage. A total of sixteen (16) post-contract cost control practices are listed in this section. The respondents are instructed to specify their level of agreement for each item listed using a five-point Likert scale.

Table 7 shows the results of the post-contract cost control practices for building projects based on all respondents.

Table 7 *Post-contract cost control practices for building construction projects (based on all respondents)*

Question no.	Practices	Strongly Disagree (1)		Disagree (2)		Neutral (3)		Agree (4)		Strongly Agree (5)		(4) + (5)
		No.	%	No.	%	No.	%	No.	%	No.	%	%
10.	Activity based costing	0	0.0	0	0.0	5	17.9	18	64.3	5	17.9	82.2
11.	Earned value method	0	0.0	0	0.0	9	32.1	14	50.0	5	17.9	67.9
12.	Establishing cost baselines to evaluate the planned cost against the actual cost	0	0.0	0	0.0	3	10.7	12	42.9	13	46.4	89.3
13.	Identifying cost overrun factors	0	0.0	0	0.0	3	10.7	14	50.0	11	39.3	89.3
14.	Interim valuations	0	0.0	0	0.0	2	7.1	17	60.7	9	32.1	92.8
15.	Monitoring equipment cost	0	0.0	0	0.0	1	3.6	16	57.1	11	39.3	96.4
16.	Monitoring labour cost	0	0.0	0	0.0	1	3.6	13	46.4	14	50.0	96.4
17.	Monitoring material cost	0	0.0	0	0.0	0	0.0	12	42.9	16	57.1	100.0
18.	Monitoring overheads	0	0.0	0	0.0	1	3.6	13	46.4	14	50.0	96.4
19.	Conducting site meetings to evaluate project cost	0	0.0	0	0.0	4	14.3	17	60.7	7	25.0	85.7
20.	Correcting construction errors within the cost contingency allowed	0	0.0	0	0.0	3	10.7	16	57.1	9	32.1	89.2
21.	Using unit rate-based cost estimating for cost control	0	0.0	0	0.0	9	32.1	12	42.9	7	25.0	67.9
22.	Using bill of quantities to manage construction cost	0	0.0	1	3.6	0	0.0	19	67.9	8	28.6	96.5
23.	Using historical data from previous projects to control cost	0	0.0	1	3.6	7	25.0	15	53.6	5	17.9	71.5
24.	Monitoring the occurrence of variation of works	0	0.0	0	0.0	3	10.7	15	53.6	10	35.7	89.3
25.	Using financial reports to determine the expenditure	0	0.0	1	3.6	4	14.3	17	60.7	6	21.4	82.1

Table 7 shows that most of the respondents agreed with the post-contract cost control practices for building construction projects listed. The table illustrated that every item listed was agreed upon by more than half of the respondents. Among all the practices listed, monitoring material cost practice obtained the highest score as all twenty-eight (28) respondents (100.0%) from both G6 and G7 contractors agreed with the statement. Twelve (12) (42.9%) respondents agreed, and sixteen (16) (57.1%) respondents strongly agreed that monitoring material costs can help to control the cost of building projects during the construction stage. The second highest is practices by using a bill of quantities to manage construction cost (96.5%), monitoring overheads (96.4%), monitoring overheads (96.4%), and monitoring labour cost (96.4%), each with a frequency of twenty-seven (27). This is then followed by interim valuations, a method agreed by the respondents with a frequency of twenty-six (26) (92.8%). Next, establishing cost baselines to evaluate the planned cost against the actual cost, identifying cost overrun factors, and monitoring the occurrence of variation of works share the same percentage of agreement, which is 89.3% with a frequency of twenty-five (25). Correcting construction errors within the cost contingency allowed also has the agreement of twenty-five (25) (89.2%) respondents. Then, the ranking continues with conducting site meetings to evaluate project cost, activity-based costing, using financial reports to determine the expenditure, and using historical data from previous projects to control cost with fourteen (14) (85.7%), twenty-three (23) (82.2%), twenty-three (23) (82.1%) and twenty (20) (71.5%) respondents respectively. Lastly, the practices that are least agreed upon by the respondents are the earned value method and using unit rate-based cost estimating for cost control which shares the same percentage of agreement, which is only 67.9% with a frequency of nineteen (19). The results show that among the top five rankings, three out of five practices involved the management of resources, which consists of monitoring of material, equipment, and labour costs.

Table 8 shows the summary of the research findings of the post-contract cost control practices for building construction projects based on all the respondents.

Table 8 *Summary of post-contract cost control practices for building construction projects (Based on all respondents)*

Question no.	Practices	Percentage of Agree and Strongly Agree %
17.	Monitoring material cost	100.0
22.	Using bill of quantities to manage construction cost	96.5
18.	Monitoring overheads	96.4
15.	Monitoring equipment cost	96.4
16.	Monitoring labour cost	96.4
14.	Interim valuations	92.8
12.	Establishing cost baselines to evaluate the planned cost against the actual cost	89.3
13.	Identifying cost overrun factors	89.3
24.	Monitoring the occurrence of variation of works	89.3
20.	Correcting construction errors within the cost contingency allowed	89.2
19.	Conducting site meetings to evaluate project cost	85.7
10.	Activity based costing	82.2
25.	Using financial reports to determine the expenditure	82.1
23.	Using historical data from previous projects to control cost	71.5
11.	Earned value method	67.9
21.	Using unit rate-based cost estimating for cost control	67.9

Table 8 shows the post-contract cost control practices for building construction projects and the total percentage of agreed and strongly agreed by the respondents from G6 and G7 contractors. The results of the research show that most of the respondents from both organizations agreed with the listed practices.

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4.4 Section C: Challenges Encountered in Practicing Post-Contract Cost Control Building Construction Projects

Section C is designed to achieve the second objective, which is to identify the challenges encountered by contractors in practicing cost control for building construction projects during the construction stage. A total of nineteen (19) challenges are listed in this section. The respondents are asked to state their level of agreement for each item listed using a five-point Likert scale.

Table 9 shows the results of the challenges encountered in practicing post-contract cost control for building projects based on all respondents

Table 9 *Challenges encountered in practicing post-contract cost control for building construction projects (Based on all respondents)*

Question no.	Challenges	Strongly Disagree (1)		Disagree (2)		Neutral (3)		Agree (4)		Strongly Agree (5)		(4) + (5)
		No.	%	No.	%	No.	%	No.	%	No.	%	%
27.	Difficulty in obtaining cost data	0	0.0	1	3.6	11	39.3	12	42.9	4	14.3	57.2
28.	Inexperience staff	0	0.0	2	7.1	4	14.3	16	57.1	6	21.4	78.5
29.	Improper contract documentation	0	0.0	0	0.0	3	10.7	15	53.6	10	35.7	89.3
30.	Lack of appropriate software for cost control	0	0.0	1	3.6	13	46.4	11	39.3	3	10.7	50.0
31.	Lack of skilled labour	0	0.0	1	3.6	9	32.1	10	35.7	8	28.6	64.3
32.	Lack of training in project management for the staff	0	0.0	0	0.0	9	32.1	14	50.0	5	17.9	67.9
33.	Fluctuation of material prices	0	0.0	0	0.0	7	25.0	13	46.4	8	28.6	75.0
34.	Shortage of materials	0	0.0	0	0.0	5	18.5	13	48.1	9	33.3	81.4
35.	Changes in material specification during construction	0	0.0	0	0.0	5	17.9	10	35.7	13	46.4	82.1
36.	Non-performance of sub-contractors	0	0.0	0	0.0	8	29.6	9	33.3	10	37.0	70.3
37.	Non-performance of suppliers	0	0.0	1	3.7	6	22.2	13	48.1	7	25.9	74.0
38.	Poor communication between project parties	0	0.0	0	0.0	3	10.7	14	50.0	11	39.3	89.3
39.	Poor project planning	0	0.0	0	0.0	3	10.7	14	50.0	11	39.3	89.3
40.	Inadequate staff in site organization	0	0.0	0	0.0	6	21.4	17	60.7	5	17.9	78.6
41.	Shortage of plants	0	0.0	2	7.1	6	21.4	14	50.0	6	21.4	71.4
42.	Failure of plants to work efficiently	0	0.0	1	3.6	8	28.6	11	39.3	8	28.6	67.9
43.	Project complexity	0	0.0	0	0.0	5	17.9	16	57.1	7	25.0	82.1
44.	Selection of procurement method	0	0.0	0	0.0	8	28.6	17	60.7	3	10.7	71.4
45.	Unpredictable construction work Environment	0	0.0	0	0.0	4	14.3	17	60.7	7	25.0	85.7

Table 9 shows that most of the respondents agreed with the challenges encountered in practicing post-contract cost control for building construction projects listed. The table illustrated that every item listed was agreed to by at least half of the respondents. Among all the challenges listed, improper contract documentation, poor communication between project parties and poor project planning obtained the highest score as 89.3% of the respondents from both G6 and G7 contractors agreed with the statement. A total of twenty-five (25) out of twenty-eight (28) respondents agreed and strongly agreed on the problems as the top challenges. The second highest challenge is the unpredictable construction work environment with the agreement of twenty-four (24) (85.7%) respondents. In the third place, changes in material specification during construction and project complexity share the same rank with a percentage of 82.1% and an agreement of twenty-three (23) respondents. Next is the shortage of materials (81.4%), the involvement of inadequate staff in site organization (78.6%) and participation of inexperience staff (78.5%) which are agreed by twenty-two (22) respondents. This is then followed by the fluctuation of material prices with a frequency of twenty-one (21) (75.0%) respondents. Next, non-performance of suppliers (74.0%), shortage of plants (71.4%) and selection of procurement method (71.4%)

share the same frequency of agreement which is twenty (20). Then, with an agreement of nineteen (19) respondents, non-performance of sub-contractors (70.3%), lack of training in project management for the staff (67.9%) as well as the failure of plants to work efficiently (67.9%) are also considered as challenges in implementing cost control. After that, it is followed by lack of skilled labour with a percentage of 64.3% agreement with a frequency of eighteen (18) and difficulty in obtaining cost data with a frequency of sixteen (16) (57.2%). Last of all, the challenge that is least agreed by the respondents is the lack of appropriate software for cost control with only fourteen (14) (50.0%) of the respondents, which is only half who agreed with the statement.

Table 10 shows the summary of the research findings of the challenges encountered in practicing post-contract cost control for building construction projects based on all the respondents.

Table 10 *Summary of challenges encountered in practicing post-contract cost control for building construction projects (Based on all respondents)*

Question no.	Challenges	Percentage of Agree and Strongly Agree %
29.	Improper contract documentation	89.3
38.	Poor communication between project parties	89.3
39.	Poor project planning	89.3
45.	Unpredictable construction work Environment	85.7
35.	Changes in material specification during construction	82.1
43.	Project complexity	82.1
34.	Shortage of materials	81.4
40.	Inadequate staff in site organization	78.6
28.	Inexperience staff	78.5
33.	Fluctuation of material prices	75.0
37.	Non-performance of suppliers	74.0
41.	Shortage of plants	71.4
44.	Selection of procurement method	71.4
36.	Non-performance of sub-contractors	70.3
32.	Lack of training in project management for the staff	67.9
42.	Failure of plants to work efficiently	67.9
31.	Lack of skilled labour	64.3
27.	Difficulty in obtaining cost data	57.2
30.	Lack of appropriate software for cost control	50.0

Table 10 shows the challenges encountered in practicing post-contract cost control for building construction projects and the total percentage of agreed and strongly agreed by the respondents from G6 and G7 contractors. The results of the research show that most of the respondents from both organizations agreed with the listed challenges.

4.5 Section D: Strategies to Overcome Challenges Encountered in Practicing Post-Contract Cost Control for Building Construction Projects

Section D is designed to achieve the third objective, which is to propose strategies to overcome the challenges encountered by contractors in practicing cost control for building construction projects during the construction stage. A total of eighteen (18) strategies are listed in this section. The respondents are instructed to specify their level of agreement for each item listed using a five-point Likert scale.

Table 11 shows the results of the strategies to overcome the challenges encountered in practicing post-contract cost control for building projects based on all respondents.

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Table 11 *Strategies to overcome the challenges in practicing post-contract cost control for building construction projects (Based on all respondents)*

Question no.	Strategies	Strongly Disagree (1)		Disagree (2)		Neutral (3)		Agree (4)		Strongly Agree (5)		(4) + (5)
		No.	%	No.	%	No.	%	No.	%	No.	%	%
47.	Appointment of qualified management staff	0	0.0	0	0.0	1	3.6	19	67.9	8	28.6	96.5
48.	Appointment of qualified sub-contractors	0	0.0	0	0.0	3	10.7	14	50.0	11	39.3	89.3
49.	Appointment of qualified suppliers	0	0.0	0	0.0	7	25.0	13	46.4	8	28.6	75.0
50.	Careful asessment of market conditions	0	0.0	0	0.0	6	21.4	16	57.1	6	21.4	78.5
51.	Clear understanding of the project scope	0	0.0	0	0.0	1	3.6	17	60.7	10	35.7	96.4
52.	Establishment of clear communication protocol	0	0.0	0	0.0	4	14.3	18	64.3	6	21.4	85.7
53.	Effective contract administration	0	0.0	0	0.0	2	7.1	18	64.3	8	28.6	92.9
54.	Effective site management	0	0.0	0	0.0	2	7.1	16	57.1	10	35.7	92.8
55.	Effective site supervision	0	0.0	0	0.0	1	3.6	15	53.6	12	42.9	96.5
56.	Good construction planning	0	0.0	0	0.0	0	0.0	15	53.6	13	46.4	100.0
57.	Clear process of project control	0	0.0	0	0.0	2	7.1	17	60.7	9	32.1	92.8
58.	Good co-ordination between project team members	0	0.0	0	0.0	1	3.6	17	60.7	10	35.7	96.4
59.	Frequent project meetings among project team members	0	0.0	0	0.0	7	25.0	12	42.9	9	32.1	75.0
60.	Partake in refresher courses concerning construction project management for the staff	0	0.0	0	0.0	9	32.1	14	50.0	5	17.9	67.9
61.	Proper resources management	0	0.0	1	3.6	2	7.1	18	64.3	7	25.0	89.3
62.	Understanding the regulations of local authorities	0	0.0	0	0.0	5	17.9	18	64.3	5	17.9	82.2
63.	Use of appropriate construction methods	0	0.0	0	0.0	2	7.4	16	59.3	9	33.3	92.6
64.	Use of up-to-date technology	0	0.0	0	0.0	6	22.2	17	63.0	4	14.8	77.8

Table 11 shows that most of the respondents agreed with the strategies listed to overcome the challenges encountered in practicing post-contract cost control for building construction projects. The table illustrated that every item listed was agreed to by at least half of the respondents. Among all the strategies listed, good construction planning obtained the highest score as all twenty-eight (28) respondents (100.0%) from both G6 and G7 contractors agreed with the statement. Fifteen (15) (53.6%) respondents agreed, and thirteen (13) (46.4%) respondents strongly agreed that by having a good construction plan, it can help to control the cost of building projects during the construction stage. The second highest strategies include the appointment of qualified management staff (96.5%), effective supervision (96.5%), a clear understanding of project scope (96.4%) and good co-ordination between project team members (96.4%) which these methods share a frequency of twenty-seven (27). The strategies with the third highest score consist of effective contract administration (92.9%), effective site management (92.8%) and clear process of project control (92.8%) with an agreement of twenty-six (26) respondents respectively. This is then followed by use of appropriate construction methods with the frequency of twenty-five (25) (92.6%) out of twenty-seven (27) respondents. Appointment of qualified sub-contractors and proper resources management are also strategies that are agreed by the respondents with a frequency of twenty-five (25) (89.3%). Next, the establishment of clear communication control has an 85.7% of agreement which with a frequency of twenty-four (24). After that, understanding the regulations of local authorities ranked with 82.2% of agreement, with a frequency of twenty-three (23). Then, the ranking continues with careful assessment of market condition, use of up-to-date technology, appointment of qualified suppliers and frequent project meetings among project team members with twenty-two (22) (78.5%), twenty-one (21) (77.8%), twenty-one (21) (75.0%) and twenty-one (21) (75.0%) respondents respectively. Lastly, the strategy that is least agreed by the respondents is to partake in refresher courses concerning construction project management for the staff with a percentage of agreement of only 67.9% with a frequency of nineteen (19).

Table 12 shows the summary of the research findings of the strategies to overcome the challenges encountered in practicing post-contract cost control for building construction projects based on all the respondents.

Table 12 *Summary of strategies to overcome the challenges encountered in practicing post-contract cost control for building construction projects (Based on all respondents)*

Question no.	Strategies	Percentage of Agree and Strongly Agree %
56.	Good construction planning	100.0
47.	Appointment of qualified management staff	96.5
55.	Effective site supervision	96.5
51.	Clear understanding of the project Scope	96.4
58.	Good co-ordination between project team members	96.4
53.	Effective contract administration	92.9
54.	Effective site management	92.8
57.	Clear process of project control	92.8
63.	Use of appropriate construction Methods	92.6
48.	Appointment of qualified sub-Contractors	89.3
61.	Proper resources management	89.3
52.	Establishment of clear communication protocol	85.7
62.	Understanding the regulations of local authorities	82.2
50.	Careful assessment of market Conditions	78.5
64.	Use of up-to-date technology	77.8
49.	Appointment of qualified suppliers	75.0
59.	Frequent project meetings among project team members	75.0
60.	Partake in refresher courses concerning construction project management for the staff	67.9

Table 12 shows the strategies to overcome the challenges encountered in practicing post-contract cost control for building construction projects and the total percentage of agreed and strongly agreed by the respondents from G6 and G7 contractors.

5. Discussion

More than half of the respondents agreed and strongly agreed that the practices listed are used in post-contract cost control. The practice that obtained the highest score was monitoring material cost, which was agreed upon by all of the respondents. This result is consistent with the research done by Omotayo and Kulatunga (2016), who found that monitoring material costs is the most effective technique for controlling costs. Three out of five most used practices agreed by the respondents involved resource management, which includes management of material, labour, and equipment. The result is consistent with the findings of research by Chigara, Moyo, and Mudzengerere (2013), where project resources management is the most frequently used method to control construction costs. Resource-related problems often contribute to cost overrun as they consist of a large portion of the total construction cost. Efficient resource cost management will result in a successful project. Hence, this is why most contractors apply practices that will control and manage the cost of resources to control the overall

construction cost. The least used practices to control cost by the respondents are the earned value method and using unit rate-based cost estimating for cost control. The result is consistent with the findings by Omotayo and Kulatunga (2016) and Sanni and Durodola (2012), who found that both practices are ineffective for cost control.

More than half of the respondents agreed and strongly agreed that the challenges listed are faced by contractors in post-contract cost control. The challenges that obtained the highest score are improper contract documentation, poor communication between project parties, and poor project planning, which 89.3% of the respondents agreed. This result is consistent with the research done by Chigara, Moyo, and Mudzengerere (2013) for poor project planning, Sanni and Hashim (2013) for improper contract documentation, and Olawale and Sun (2010) for poor project planning and poor communication between project parties as the main challenges for cost control implementation. Among the problems that may lead to improper contract documentation are ambiguities, errors, and discrepancies. Any contractual conflict that occurs may lead to changes, which may result in an increase in cost. Next, poor communication between project parties may lead to conflict and disputes. This problem may occur among the parties involved due to differences in personalities, beliefs, cultures, and backgrounds. Hence, the project members are reluctant or refuse to work together to achieve the same goal. Efficient project planning is necessary to execute the project successfully. Lack of understanding and knowledge of project scope may lead to poor project planning and thus result in project failure. The least agreed challenge experienced by contractors in practicing cost control during the construction stage is the lack of appropriate software for cost control, to which only half of the respondents agreed. The result is consistent with the findings by Sanni and Hashim (2013), who found that insufficient access to software packages is one of the problems encountered by contractors. Malkanthi, Premalal, and Mudalige (2017) listed difficulty in obtaining cost data as one of the top challenges; in contrast, the results of this research show that only 57.2% of the respondents agreed, and it is also the second least agreed the respondents.

The results of the research show that most of the respondents from both organizations agreed with the listed strategies. More than half of the respondents agreed and strongly agreed that the strategies listed can be implemented by contractors in post-contract cost control. The strategy that obtained the highest score is the good construction planning strategy, which is agreed by all twenty-eight (28) (100.0%) of the respondents. This result is consistent with the research done by Memon, Rahman, and Azis (2012), where they found that the strategy is vital to improving the cost performance of construction projects. It is also consistent with the findings from the research carried out by Doloi (2013) and Awolesi, Fabi, and Akinseinde (2015). An efficient construction project planning is vital in order to ensure project success. Good project planning can reduce risks and uncertainties and save the project time and cost. The previous section shows that the challenge of a lack of training in project management for the staff is not the main problem. Thus, the least agreed strategy by both organizations is partaking in refresher courses concerning construction project management for the staff. Otim, Nakacwa, and Kyakula (2012) and Rajguru and Mahatme (2016) recommended this strategy to improve the knowledge regarding cost control, as most failures of cost control implementations were due to a lack of knowledge. Hence, this research shows that most respondents have sufficient knowledge of cost control implementation.

6. Conclusion

The study was organized into three primary research objectives. The first objective was to identify the cost control practices of contractors for building construction projects during the construction stage. Based on the questionnaire survey results, contractors' cost control practices for building construction projects during the construction stage include monitoring material costs, using the bill of quantities to manage construction costs, monitoring overheads, monitoring labour costs, and interim valuations.

The second objective aimed to identify the challenges encountered by contractors in practicing cost control for building construction projects during the construction stage. Based on the results obtained from the questionnaire survey, the challenges encountered by contractors in practicing cost control for building construction projects during the construction stage include poor project planning, poor communication between project parties, improper contract documentation, unpredictable construction work environment, project complexity, changes in material specification during construction and shortage of materials.

The third objective was to propose strategies to overcome the challenges encountered by contractors in practicing cost control for building construction projects during the construction stage. Based on the results obtained from the questionnaire survey, the strategies to overcome the challenges encountered by contractors in practicing cost control for building construction projects during the construction stage include good construction planning, effective site supervision, appointment of qualified management staff, good co-ordination between project team members, clear understanding of the project scope, effective contract administration, effective site management, clear process of the project control and use of appropriate construction methods.

The following limitations are acknowledged. Firstly, the sample size was small, with twenty-eight (28) responses. Secondly, the data was obtained only from the G6 and G7 contractors. The validity of the research

would be enhanced with a bigger sample size and covered more categories of contractors. Nevertheless, this research can serve as a preliminary study for a comprehensive study on the subject matter.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The authors confirm their contribution to the paper as follows: ***study conception and design:*** *Tan Chin Keng, Nur Fariza Binti Suleiman;* ***data collection:*** *Tan Chin Keng, Nur Fariza Binti Suleiman;* ***analysis and interpretation of results:*** *Tan Chin Keng, Nur Fariza Binti Suleiman;* ***draft manuscript preparation:*** *Tan Chin Keng, Nur Fariza Binti Suleiman. All authors reviewed the results and approved the final version of the manuscript.*

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