Cost Overruns in Housing Projects

Lee See Wen[1], Rozlin Zainal[1,2]*, Mohd Hilmi Izwan Abdul Rahman[1,2], Hamidun Mohd Noh[1,2]

[1] Department of Construction Management, Faculty of Technology Management and Business,
Universiti Tun Hussein Onn Malaysia (UTHM) Parit Raja, Batu Pahat Johor, 86400, MALAYSIA

[2] Centre of Excellence for Facilities Management (CeFM), Faculty of Technology Management and Business,
University Tun Hussein Onn Malaysia, 86400 Batu Pahat, Johor, MALAYSIA

*Corresponding Author Designation

Abstract: Construction field plays an important role in economic growth especially the housing projects. While it is usual to see a construction project fail to meet its aims within the specified budget owing to a variety of circumstances, it is also common to see a construction project fail to meet its objectives within the specified budget due to a variety of factors. The impacts of cost overrun are implying loss of profit for non-completion, and defamation that could jeopardize his/her chances of winning further jobs, if at fault to a contractor. Thus, this research is to identify the factors that causing cost overruns in housing projects, to identify the impacts when cost overruns occur in housing projects and the method used to overcome when the cost overruns occur in housing projects. There were 210 contractors in Johor were the respondents for this research. Questionnaire form was used to carry out the research. The questionnaire form delivered through email to the respondents. The data were analysed using Statistical Package for Social Science (SPSS) software for analysed on descriptive statistic to obtain the result. After obtaining the data, the researcher can find out that poor scheduling is the main factor that causing cost overruns in housing projects. While losing profit is the main impacts when cost overruns occur in housing project. For objective 3, the researcher identifies that method correct maintenance in control of material, optimizing employee scheduling for control of labor cost and offering high quality training in control of equipment cost are the main methods to overcome cost overruns problems in housing projects. In conclusion, this research not only alert the contractors, but also helps the stakeholders, client and so on who relate to the housing projects more understanding about the factors that cause cost overruns, the impacts that cost overruns brings and the method to overcome the cost overruns issue that happened in Johor.

Keywords: Contractor, Cost Overruns, Housing Projects

1. Introduction

For many years, the housing sector has relied on conventional development techniques due to increased demand for improved houses, constant technological advances, rising building prices, and stricter environmental restrictions. Cost overrun is a common occurrence in the construction business, and it occurs in practically every project. When the project's actual cost exceeds the original estimates, this is known as cost overrun (Ivars, 1983). According to one very comprehensive research made on cost overruns in global construction, it was found that 9 out of 10 projects had overrun, in each of the 20 countries and five continents studied, there was a 50 to 100 percent common overrun (Azhar, 2008).

Cost is one of the major considerations throughout the construction project management life cycle. According to a study from KPMG, just 31% of all projects came within 10% of the budget in the past 3 years (2012-2014). Housing project are typically large, uncertain and complex in many aspects. Cost overrun can have a damaging economic effect ranging from allocative inefficiency of scarce resources, further delays, contractual disputes, claims and litigation to project failure and total abandonment. (Gbhabo, 2017).

According to Malaysia, cost overruns affected more than half of the projects, with 79.95% of public sector construction projects and 66.65% of private sector construction projects finishing ahead of schedule. (Zayyana *et al.*, 2014). While the result carried out by Rahman, 2012 stated that a questionnaire survey was conducted among construction stakeholders in the central and southern regions of Peninsular Malaysia, and the results revealed that 89% of the projects had cost overruns. This demonstrates that cost overruns are a serious issue in the Malaysian construction sector that must be addressed.

There are three research questions in this study, what are the factors that causing cost overruns in housing projects, what are the impacts when cost overruns in housing projects and how to overcome the cost overruns problems in housing projects? While for the research objectives are to identify the factors that causing cost overruns in housing projects, to identify the impacts when cost overruns occur in housing projects and to study the methods used to overcome the cost overruns problems in housing projects.

This research was carried out by questionnaire form to collect the data. The main focus of this research is to study the factors, impacts that cause by cost overruns and the methods used to overcome this issue. The research area is designated at Johor, Malaysia due to the existing stock and incoming supply for residential is ranked as the 2 (JUBM, JUBM & Arcadis Construction Cost Handbook Malaysia, 2020). The respondents are targeted as contractors who involved in current project launch in Johor because the contractor is one of the parties who face a lot of cost overruns problems during project implementation (Sharma, 2014).

This research is aiming to provide references to the graduates and undergraduates students as a refence to the relevant subject and problems. Besides, it also aims to alert the stakeholders such as contractors, project manager and other stakeholder organization to prevent the cost overruns issue due to it brings impacts not only to the project but also affect the management of company. Next, it can also aware the clients of housing projects about the cost issue and the impacts, avoid happening communication and misunderstanding problem and lastly cause cost overruns issue occurs.

2. Literature Review

Cost overruns problems always happen not only in the housing projects, but also in other construction projects. There are a lot of parties involved in the housing projects, for example contractor,

the owner, project manager, labor, consultant and other. All of these involved with money which is also defined as cost. In a construction housing project, one person's fault must be borne by everyone. When there is a parties made a mistake, all of the other parties need to bear the follow-up problem that cause by one of the parties.

2.1 Construction Cost

Construction cost means the total cost of the project's construction, including all supervision, materials, supplies, labour, tools, equipment, transportation, and other facilities furnished, used, or consumed, without deduction for penalties, liquidated damages, or other amounts withheld from payment to the contractor or contractors, but not including the consulting engineer's fee or other payment to the consulting engineer or architect, and not including the consulting engineer's fee or other payment to the consulting engineer or architect (Horstman, 2016).

(a) Construction Cost Specification

Different models of buildings have different standards and specification in housing projects. Different models which mean it affect the change of cost in housing projects.

(b) Construction Cost for Johor Bahru

Table 1: Construction Cost for Johor Bahru (JUBM, 2020)

	RM/m²		
	BUILDING	SERVICES	TOTAL
DOMESTIC			
Detached houses (mass housing)	1,600 - 2,150	750 – 950	2,400 – 3,100
Detached houses (high end)	2,250 – 2,805	800 – 1,000	3,050 – 3,805
Terraced houses	800 – 1,130	200 – 350	1000 – 1,480
Average standard apartments, high rise	1,200 – 1,600	300 – 550	1,500 – 2,150
Luxury apartments, high rise	2,435 - 3,050	600 – 900	3,035 – 3,950
Low costs housing	450 – 550	105 – 145	555 – 695
Low costs flats, low rise (< 6 levels)	600 – 750	155 – 215	755 – 965
Low costs flats, high rise (< 15 levels)	685 – 785	230 – 260	915 – 1,045

From the Table 1 can notice that the construction cost for the detached houses of mass housing and high end are around RM 2,400/ m² until RM 3,100/ m² and RM 3,050/ m² until RM3,805/ m² respectively. RM 1,000/m2 until RM 1,480/m2 for terraced houses. Average standard for high rise apartments costs is around RM 1,500/ m² to RM 2,150/ m² and for high rise luxury apartments costs around RM 3,035/ m² to RM 3,950/ m². While for the low costs housing is around RM 555/ m² to RM 695/ m². The low costs flats, low rise (< 6 levels) and Low costs flats, high rise (< 15 levels) costs RM 755/ m² until RM 965/ m² and RM 915/ m² and RM 1,045/ m² respectively.

2.2 Cost Overrun

Cost overrun is defined as the difference between actual and budgeted costs, or the change in contract value divided by the original contract value. For simplicity of comparison, this calculation can be converted to a percentage (Bentil, 2017).

"Cost overrun = Final Contract Amount – Original Contract Amount"

2.3 Factor that causing cost overruns happen in housing projects

Generally, cost overrun in housing projects arises from the impact of financial risk. However, factors causing cost overrun are not only financial problems, but more complex especially in the

construction housing project. There are some factors contribute to cost overrun in housing project which are found from the researcher's study as shown as Table 2.

Table 2: Comparing Factors Causing Cost Overrun

No.	Factors	(Ade Asmi Abdul Azis, 2012)	(Samarghandi, 2016)	(Nabil Al-Hazim, 2017)	(Venkateswaran, 2017)	(Renuka, 2018)	(Islam, 2019)	(Cumberlege, 2021)
1.	Site Availability						√	
2.	Site Conditions	√		√	√	√	√	√
3.	Social site conditions					√		
4.	Change order		√		√		√	√
5.	Rework			√		√		
6.	Subcontractor's and/or vendors' performance	√				√		
7.	Approval/permit late	√	√			√	√	
8.	Inaccuracy in budgeting, scheduling and resource planning		√		√			√
9	Materials price fluctuations	√		√	√	√		√
10.	Rules and regulation		√			√		
11.	Owner's additional requirement	√		√			√	
12.	Inflation		√					
13.	Delay in Payment			√			√	
14.	Weak Cash Flow		√			√	√	
15.	Bad Weather		√	√	√	√		
16.	Financial Management	√						
17.	External factors	√						

According to Table 2 can notice that cost overruns is not only the issue happen recently. From the Table 2, the site condition is ranked as the top among 17 factors that carried out with these previous studies.

(a) Cost Overrun Classification

According to the Sharma (2014) can notice that all parties that related to the housing projects are being classified into 11 groups which are owner, contractor, consultant, design, project, material, labor, equipment, contract, coordination/communication and external. There are 53 factors that cause cost overruns and being classified into 11 groups that related to the housing projects. As example, factors that caused by contractor is poor planning and scheduling. A poor planning and scheduling cause the problem of delay during the housing projects held. Delaying in housing project cause a lot of unnecessary expenses occur such as extra labor fee, extra machinery fee and other. While in this research, we were more focus on the factors that cause by the contractors as shown in Table 3.

Table 3: Cost Overruns Factors Classification (Sharma, 2014)

No.	Cost Overrun Factors	Group
1.	Poor planning and scheduling	
2.	Contractor lack of experience	
3.	Financial difficulty faced by contractor	
4.	Obsolete and improper construction method	
5.	Rework due to error in construction	Contractor
6.	Disputes on site	
7.	Incompetent sub-contractor	
8.	Poor site management	
9.	Waste on site	

2.4 Impacts When Cost Overruns Occur in Housing Projects

Impacts are the consequences that encountered when cost overruns occur on a housing project. The cost overruns have obvious impacts for the key stakeholders in particular and on the construction industry in general. The major impacts of cost overruns as shown in (Patel, 2016) are delays during construction, supplementary agreement, additional cost, budget short fall, adversarial relationship between participants of the projects, loss of reputation to the consultant, consultant is viewed as incompetent by project owners, high cost of supervision and contract administration for consultant, delayed payments to supplier and contractors and lastly, the contractor suffer from a budget shortfall of the client and poor-quality workmanship. These effects obviously not only bring impact to the contractors, but also impact the management and the process of projects.

2.5 Method Used to Overcome the Cost Overruns Problems in Housing Projects

The cost control is a process that should be continued through the construction period to ensure that the cost of the project is kept within the agreed cost limits. The control of construction costs takes place during every phase of the construction project. Construction cost control aims to limit the client's expenditure to within the amount agreed supplementary agreement, to achieve a balanced design expenditure between the various elements of the buildings and to provide the client with a value for money project. Cost control can be achieved through the method control of material, control of labor cost and control of equipment cost (Morsy, 2014).

3. Research Methodology

Research methodology is the specific procedures or techniques used to identify, select, process, and analyse information about a topic. This research discussed the methods used to present the main factors causes cost overruns phenomena in housing projects, impacts that occur due to the cost overruns and the ways in avoiding the cost overruns occur.

3.1 Research Design

A quantitative strategy was used in this research to collect data from a specific sample group using questionnaires. This method was used to achieve the objective of the research which were the factors of cost overruns, the impacts of cost overruns and the method to overcome the problem of cost overruns. Thus, this research presented the numerical data from questionnaires and data collected were analyze using SPSS Software to analyse the numerical data and the Microsoft Word were used to transforms the data into graphical, chart, and tables form.

3.2 Population and Sample

In this research, the population size is 459 contractors which is involved in current housing project delivery in Johor according to the data provided by Official Portal Ministry of Housing and Local

Government for the year 2020. The target respondent is focused on the contractors that involved with current housing project. According the (Jabatan Perumahan Negara, 2020), there are 459 on track housing project launched in Johor which means there are at least 459 contractors involved in this project. According to the Krejcie and Morgan table, the sample size for population 460 is 210 which mean in this research, the research need to get 210 respond from the contractors in Johor to achieve our objectives related the factors, the impacts and the methods about the cost overruns issue in housing projects.

Table 4: Population (P) and sample size (S) using Krejcie and Morgan (Kenpro, 2012)

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

3.3 Data Collection

(a) Type of Data Source

In this research, the primary data is obtained through the questionnaire form. The questionnaire form contains the question which is related to the research's objectives which are the factors that causing cost overruns happen in housing projects, the impacts when cost overruns occur in housing projects and the method used to overcome the cost overruns problems in housing projects. While the secondary data is the information from the online references such as the journal article, report, newspaper and others.

(b) Questionnaire Design

Questionnaires are written in many different ways, to be used in many different situations and with many different data-gathering media (Brace, 2018). A questionnaire is a research device or instrument that is made up of a series of questions which are closed-ended or open-ended. The goal is to collect relevant data from respondents which can then be used for a variety of purposes.

In this research, this study is carried out by using Google Form through questionnaire. The questionnaire of this research consisted of four sections with Section A, B, C and D. There are both closed and open-ended questions in the questionnaire. The questionnaire made up of four sections which are the demographic information in Section A, factors causing cost overrun in Section B, impacts of cost overrun in Section C and the last Section D which is the method used to overcome the cost overruns problems. Likert scale is used as a measurement of this research which is represented by 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree while 5= Strongly Agree.

3.4 Pilot Study

In pilot study, 5 people public were given the questionnaire form before it been hand over to all the public. This is to endure that the questions provided are realistic and practical as well appropriate and meet the requirements of this study. After making a pilot study, an analysis of the research questions was performed (Yunus, 2014). This way refers to respondents' understanding and misunderstanding in answering research question. Based on feedback comments, researcher can improve the questionnaire format or question before publishing the questionnaire form to the public. After the pilot study by 5 respondents who involved in construction industry, the results showed that the reliability test done with the alpha value 0.993 which is more than the specific value which is 0.600 (Refer to Table 5). This means that this distribution questionnaire form can be proceeded to real respondents (Datt, 2015).

Table 5: Reliability Test

Number of respondents	Alpha Cronbach's Value
5	0.993

3.5 Data Analysis

Statistical Package for Social Sciences (SPSS) software is carried out to analyze the data results obtained from the questionnaire form. The analysis used in this study is through descriptive analysis Likert Scale. Data obtained has been displayed in the form of tables, charts and graphs interpretation and ease of reading and comprehension by using Microsoft Word.

(a) Descriptive Analysis

According to the Bush (2020), descriptive analysis can be categorised into 4 types which are measures of frequency, measures of central tendency, measures of dispersion and measures of position. In this research, measures of central tendency were used to analyse the data obtained through questionnaire form. In descriptive analysis, common measure of central tendency is including the three averages which is mean.

Table 6: Assessment level based on mean score (Moidunny, 2009)

Mean Score	Assessment
1.00 – 1.80	Very Low
1.81 – 2.60	Low
2.61 – 3.20	Medium
3.21 – 4.20	High
4.21 – 5.00	Very High

(b) Likert Scale Analysis

Respondents required to rate using Likert scale as a measurement of agreeableness, strongly disagree which is represent by number 1, disagree is number 2, neutral number 3, 4 and 5 which are represented agree and strongly agree as shown in Table 7.

Table 7: Five likert scale measurement (Boone, 2012)

Score Value	1	2	3	4	5
Likert Scale	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. Data Analysis and Results

The data analysis was divided into several sections based on the questionnaire form. The first part (A) discussed the descriptive analysis of respondents' background. The second part (B) discussed about

the factors that causing cost overruns in housing projects. While for third (C) and fourth part (D) are discussed the impacts when cost overruns in housing projects and the methods used to overcome the cost overruns problems in housing projects respectively.

4.1 Part A: Demographic Information

There are 137 respondents who are formed by the contractors in Johor. The total response rate has a percentage of 65.23% which is acceptable according to Fincham (2008) stated that the normal response rate for questionnaires is within 60. This section was classified into 3 questions which are the gender, race and working experience. According to the result of the questionnaire form, most of the respondents of the study are composed of male that is representative 91% of all respondents while women are only 9%. For the race, the majority respondents are Malay which is 51.82% followed by Chinese of 29.93% and Indian with 18.25%. Based on the data obtained for working experience, 13.87% of the respondents having less than 1-year experiences. 30.66% of the respondents are having 1 – 5 years experiences; 11.68% for 6 – 10 years while for working experience 11 – 15 years are 10.22%. Besides, the highest percentage which is 33.58% contributed to the working experience more than 15 years.

4.2 Part B: To identify the factors that causing cost overruns in housing projects (Objective 1).

Part B questions pay more attention to the factors that causing cost overruns in housing project. In this section, the researcher has posed 16 questions which had a Likert scale option. After collecting the data, the summary of factors that causing cost overruns in housing projects as shown in Table 8.

Table 8: Summary of Factors that Causing Cost Overruns in Housing Projects

Factor	Mean	Ranking	Agreement Level
a) Poor Planning	3.50	4	High
b) Poor Scheduling	4.12	1	High
c) Lack of Experience	4.08	2	High
d) Financial Difficulty	3.66	3	High
e) Obsolete Construction Method	3.50	4	High
f) Improper Construction Method	3.47	7	High
g) Rework due to the error in construction	2.62	11	Medium
h) Disputes on site	2.31	14	Low
i) Incompetent sub-contractor	3.16	8	Medium
j) Poor site management	3.04	9	Medium
k) Waste on site	2.79	10	Medium
l) Additional work	3.49	6	High
m) Lowest bid procurement policy	2.10	16	Low
n) Change in the scope of the project	2.34	13	Low
o) Late material delivery	2.48	12	Low
p) Changes in material specifications	2.29	15	Low

From Table 8 can notice that poor scheduling is ranked as the highest factor that causing cost overruns in housing projects. Following by lack of experience ranked as 2, financial difficulty (3), poor planning and obsolete construction method (4), additional work (7), incompetent sub-contractor (8), poor site management (9), waste on site (10), rework due to the error in construction (11), late material delivery (12), change in the scope of the project (13), disputes on site (14), changes in material specification (15) and the last one is the lowest bid procurement policy (16).

4.3 Part C: To identify the impacts when cost overruns occur in housing projects (Objective 2)

Part C questions pay more attention to the impacts when cost overruns occur in housing project. In this section, the researcher has posed 16 questions which had a Likert scale option. After collecting the data, the summary of impacts when cost overruns occur in housing projects as shown in Table 9.

Table 9: Summary of impacts when cost overruns occur in housing projects

Impact	Mean	Ranking	Agreement Level
a) Delays during construction	4.05	6	High
b) Supplementary agreement	3.99	10	High
c) Additional cost	3.96	11	High
d) Budget short fall	4.31	3	High
e) Adversarial relationship between participants of the project	2.44	16	Low
f) Loss of reputation to the consultant	4.04	7	High
g) Incompetent view by project owner	4.10	4	High
h) High cost of supervision	4.06	5	High
i) High cost of contract administration	4.03	9	High
j) Delayed payments to supplier	3.79	13	High
k) Delayed payments to sub-contractors	3.81	12	High
l) Poor quality workmanship	3.36	15	High
m) Demotivated productivity	3.38	14	High
n) Loss profit	4.62	1	High
o) Jeopardize chances of winning further job	4.41	2	High
p) Bad company reputation	4.04	7	High

From Table 9 can notice that loss profit is ranked as the highest impact when cost overruns in housing projects. Following by jeopardize chances of winning further job ranked as 2, budget short fall (3), incompetent view by project owner (4), high cost of supervision (5), delays during construction and bad company reputation (7), high cost of contract administration (9), supplementary agreement (10), additional cost (11), delayed payments to sub-contractors (12), delayed payments to supplier (13), demotivated productivity (14), poor quality workmanship (15) and the last one is adversarial relationship between participants of the projects (16).

4.4 Part D: To study the methods used to overcome the cost overruns problems in housing projects (Objective 3)

Part D questions pay more attention to the method used to overcome the cost overruns problems in housing project. In this section, the researcher has posed 19 questions which had a Likert scale option. After collecting the data, the summary of methods to overcome cost overruns problems in housing projects as shown in Table 10.

Table 10: Summary of methods to overcome cost overruns problems in housing projects

Methods	Mean	Ranking	Agreement Level
a. Control of Material			
i. Buy materials of right specifications	3.81	6	High
ii. Buy with the actual quantity	3.84	5	High
iii. Buy of long-life materials	3.62	9	High
iv. Good storage	4.22	3	Very High
v. Correct maintenance	4.40	1	Very High
vi. Long-shelf life	3.67	8	High
vii. Right order	3.75	7	High

viii.	Check deliveries	3.86	4	High
ix.	Good protect	4.28	2	Very High
b.Control of Labor Cost				
i.	Optimize employee scheduling	4.74	1	Very High
ii.	Reduce perquisites	3.39	4	High
iii.	Reduce pay overages	3.34	5	High
iv.	Reduce employee turnover	4.69	2	Very High
v.	Incentivize performance	3.99	3	High
c.	Control of Equipment Cost			
i.	Reduce maintenance fee	1.86	5	Very Low
ii.	Monitor usage	3.24	4	High
iii.	Monitor performance	3.93	2	High
iv.	Offer high quality training	4.50	1	Very High
v.	Convert uses electric machines	3.68	3	High

From Table 10 can notice for the control of material, correct maintenance is ranked as the highest method to overcome cost overruns problem in housing projects. Following by good protect ranked as 2, good storage (3), check deliveries (4), buy with the actual quantity (5), buy materials of right specifications (7), long-shelf life (8) and the last one is buying of long-life materials (9). While for the control of labor cost, optimize employee scheduling is ranked as the highest method to overcome cost overruns problem in housing projects. Following by reduce employee turnover ranked as 2, incentivize performance (3), reduce perquisites (4) and the last one is reducing pay overages (5). Lastly, for the control of equipment cost, offering high quality training is ranked as the highest method to overcome cost overruns in housing projects. Following by monitor performance ranked as 2, convert uses electric machines (3), monitor usage (4) and the last one is reducing maintenance fee (5).

5. Conclusion

The purpose of this study was to meet the three objectives that have been set at the beginning of the study. The first objective is achieved by determining the factor of poor scheduling is the factor that causing cost overruns in housing projects. This statement is proved by (Ahmed & Aftab, 2020). While for the second objective is also achieved by losing profit is the main impact when cost overruns occur in housing projects and is proven by (Nega, 2008). Lastly the third objective is achieved by determining the methods used to overcome the cost overruns problems in housing projects. Correct maintenance ranked as the main method in control of materials and is proved by (Morsy, 2014). Optimizing employee scheduling ranked as the most effective methods in controlling the labor cost and proven by (Haruna, 2017) and last section, offering high quality training is reached the highest rank in control of equipment cost and is proved by (Yip, 2014). As conclusion, hopefully the local contractor can refer the related factors, impacts and methods to minimize the cost overrun problem in housing projects. Moreover, the local government can refer the research in order to improve the policy in construction field in order to prevent unstable pricing in construction industry especially housing projects that involved the folk as the buyer.

Acknowledgement

References

Ade Asmi Abdul Azis, A. H. (2012). Controlling Cost Overrun Factors in Construction Projects in Malaysia. Research Journal of Applied Sciences, Engineering and Technology, 2621-2629.

Ahmed & Aftab. (2020). Ranking of the Factors Causing Cost Overrun in Infrastructural Projects of UAE. International Journal of Sustainable Construction Engineering and Technology, Vol. 11 No.2 204-211.

Azhar, N. (2008). Cost Overrun Factors In Construction Industry of Pakistan. First International Conference on Construction In Developing Countries , (pp. 499-501). Karachi,, Pakistan.

Baloyi, & Bekker. (2011). Causes of construction cost and time overruns: The 2010 FIFA World Cup stadia in South Africa. Acta Structilia, 51-67.

Bentil, E. (2017). The Level of Existence and Impact of Cost and Time Overruns of Building Construction Projects in Ghana . Civil and Environmental Research , 36-46.

Boone, H. N. (2012). Analyzing likert data. Journal of extension, 1-5.

Brace, I. (2018). Questionnaire design: How to plan, structure and write survey material for effective market research. London: Kogan Page Publishers.

Bush, T. (2020, June 22). Desciptive Analysis: HOw-To,Types, Examples. Retrieved from Pestle Analysis: https://pestleanalysis.com/descriptive-analysis/#Measures_of_Central_Tendency

Calzon, B. (2021, March 25). Your Modern Business Guide To Data Analysis Methods And Techniques. Retrieved from Datapine: https://www.datapine.com/blog/data-analysis-methods-and-techniques/

Cumberlege, M. D. (2021). The impact of cost overruns and delays in the construction business. IOP Conference Series Earth and Environmental Science, 2-4.

Datt, P. C. (2015, February 7). Reliability Set in SPSS using Cronbach Alpha. Retrieved from Project Guru: https://www.projectguru.in/reliability-test-in-spss-using-cronbach-alpha/

E.Fincham, J. (2008, April 15). Response Rates and Responsiveness for Surveys, Standards, and the Journal. American Journal of Pharmaceutival Education, 72(2):43. Retrieved from American Journal of Pharmaceutical Education.

Elhag, T. (2005). Critical determinants of construction tendering costs: Quantity surveyors' standpoint. International Journal of Project Management, 538-545.

Ellis, G. (2020, April 3). Autodesk Construction Cloud. Retrieved from 6 Common Causes of Cost Overruns in Construction Projects.: https://constructionblog.autodesk.com/cost-overruns-construction/

F.A., R. (2012). Factors causing cost variation for constructing wastewater projects in Egypt. Alexandria Engineering Journal, 51-66.

Gbhabo, P. T. (2017). Effects of Cost Overruns and Schedule Delays in Sub-Saharan Africa. European Journal of Interdisciplinary Studies Articles.

Groover, H. (2021, May 15). Skyrocketing lumber prices add costs for new Seattle-area homes. Retrieved from The Seattle Times: https://www.seattletimes.com/business/real-estate/skyrocketing-lumber-prices-add-costs-for-new-seattle-area-homes-will-buyers-continue-to-pay/

Haruna, A. A. (2017). Problems Faced by Nigerian Contractors in Controlling Cost of Building Project. American Journal of Environmental Policy and Management, 19-23.

Horstman, P. (2016, January 25). Construction Cost VS Project Cost. Retrieved from Carbon Design & Architecture: https://www.carbonae.com/blog/construction-cost-vs-project-cost

Insider, L. (n.d.). Construction Cost Definision. Retrieved from Law Insider: https://www.lawinsider.com/dictionary/construction-cost

Islam, M. S. (2019). A knowledge-based expert system to assess power plant project cost overrun risks. . Expert Systems with Applications, 12-32.

Ivars, A. (1983). Cost relevance analysis for overrun control. International Journal of Project Management, 142-148.

Jabatan Perumahan Negara. (2020). Statistics of Provate Housing Projects by Category. Retrieved from https://ehome.kpkt.gov.my/index.php/dl/55484a76616d567249464e6861326c304c7a49774d6a4176546d39325a5731695a5849765531524256456c5456456c4c4c6c424552673d3d

Jansen, D., & Warren, K. (2020, June 15). What (Exactly) Is Research Methodology. Retrieved from GradCoach: https://gradcoach.com/what-is-research-methodology/

JUBM (2020). Construction Cost Handbook Malaysia. Arcadis Sdn. Bhd. Selangor.

Kabir, S. M. (2016). Methods of Data Collection. Bangladesh: Book Zone Publication.

Kamaruddeen, A. M. (2020). A Study on Factors Causing Cost Overrun of Construction Projects in Sarawak, Malaysia. Civil Engineering and Architure, 191-199.

Kenpro. (2012). Sample Size Determination Using Krejcie and Morgan Table. Kenpro.

Mohajan, H. (2018). Qualitative Research Methodology inSocial Sciences and Related Subjects. Journal of Economic Development, Environment and People, 7(1) 23-48.

Moidunny, K. (2009). The Effectiveness of the National Professional Qualification for Educational Leaders (NPQEL). Unpublished Doctoral Dissertation, Bangi: The National University of Malaysia.

Morsy, H. M. (2014). Cost Control Techniques & Factors Leading to Cost Overruns in Construction Projects. Retrieved from Academia: https://www.academia.edu/11454995/Cost_overruns_in_construction_projects

Nabil Al-Hazim, Z. A. (2017). Delay and Cost Overrun in Infrastructure Projects in Jordan. Procedia Engineering, 18-24.

Nega, F. (2008). Causes and Effects of Cost Overrun in Public Building Construction Projects in Ethippia. Unpublished doctoral dissertation, Addis Ababa University, Ethiopia, 34.

Ong, T. (2013). Factors Affecting the Price of Housing in Malaysia. Journal of Emerging Issues in Economics, Finance and Banking, 414-429.

Patel, A. (2016). Effects and Causes of Cost Overruns on Building Construction Projects. Retrieved from Academia: https://www.academia.edu/25113497/effects_and_causes_of_cost_overrun_on_building_construction_projects?auto=download

Quan N.H *et al.* (2018). Mixed methods appraisal tool (MMAT).

Rahman, I. A. (2012). Time and cost performance of costruction projects in southern and cenrtal regions of Penisular Malaysia. 2012 IEEE Colloquium on Humanities, Science and Engineering (CHUSER), 52-27.

Renuka, S. &. (2018). Effect of critical risk factors causing cost deviation in medium sized construction projects. . Journal of Construction in Developing Countries, 63-85.

Roger, W. (2015). Quantitative research. Nursing Standard (2014+), 44.

Samarghandi, H. M. (2016). Studying the Reasons for Delay and Cost Overrun in Construction Projects: The Case of Iran. Journal of Construction in Developing Countries, 51-84.

Sharma, S. (2014). Cost Overrun Factors and Project Cost Assessment in Construction Industry - A State of the Art Review. International Journal of Civil Engineering, 139-154.

Venkateswaran, C. B. (2017). Time delay and cost overrun of road over bridge (ROB) construction projects in India. Journal of Construction in Developing Countries, 79-96.

Wisdom, J., & Creswell, J. W. (2013). Mixed method: Integrating Quantitative and Qualitative Dta Collection and Analysis While Studying Patient-Centered Medical Home Models. Lincoln: University of Nebraska, 1-3.

Yip, H. L. (2014). Predicting the maintenance cost of construction equipment: Comparison between general regression neural network and Box–Jenkins time series models. Automation in Construction, 38, 30-38.

Yunus, F. A. (2014). Kesahan dan Kebolehpercayaan Instrumen Pemindahan Pembelajaran. First Technical and Vocational Education International Seminar 2014, 1-9.

Zayyana *et al.* (2014). Cost overrun in the Malaysian construction industry projects: A deeper insight. International Journal of Project Management, 1471-1480.