CONTINGENCY COST ESTIMATION: CURRENT PRACTICE IN MALAYSIAN CONSTRUCTION INDUSTRY

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Contingency Cost Estimation:

Current Practice in Malaysian Construction Industry

by

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CERTIFICATION OF APPROVAL

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by

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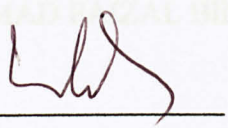

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TRONOH, PERAK

January 2009

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

MUHAMAD FAIZAL BIN HASSAN

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ABSTRACT

In a challenging constructions world nowadays, there are many factors that influencing the successes of a construction project. Contingency cost is one of the factors that influencing the successes of a construction project. Contingency cost is a ubiquitous component in a construction [1]. Therefore, it is important for the construction company to determine their contingency cost wisely to make sure they will success in construction. As far as this matter concern, there is no research has been done to find out the understanding and importance of the contingency cost in Malaysian construction industries. The objective of this study is to investigate the purpose of contractors having contingency cost in their construction project. The second objective of this project is to know the ways constructors in Malaysia estimate the contingency cost. And the final objective of this research is to identify the factors that usually considered by contractors in determining the contingency cost value. For succeeding this research, a survey method had been chosen to get some feedback from contractors from various construction companies in Malaysia on how contractors determine the contingency cost. The surveys contain a set of questionnaire and will be sending throughout mail or by hand to the selected contractors that registered with CIDB (Construction Industry Development Board) Malaysia. The results were then compared to some of the previous study's results which were conducted in Australia. No specific conclusion can be made from the comparison (due to different geological and social factors in Malaysia other countries).Then, the result of this research will be used by next researcher to find out more details about the contingency cost in Malaysian construction industry.

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CHAPTER 1

INTRODUCTION

1. INTRODUCTION

1.1 BACKGROUND OF STUDY

Risk has long been recognized in the construction industry. There are many risks that the contractors have to face to make sure the project will accomplished during the period given. So the contractors required to accept a certain level of risk that will arise during the construction works. Due to these conditions, contractors have to include extra costs in the bidding tender as an allowance for the potential risks. In construction industries this extra cost is called "contingency cost".

There are three types of contingency depending on the phase of the project and the party involved [2].There are designer contingency, contractors contingency and owner contingency.

Designer contingency usually included in the preliminaries budget by estimating party for potential cost increases during the preconstruction phase. As the project grows into detailed construction documents, design contingency is expected to be absorbed by different line items in the budget. As unresolved or risky design issue remain, the contingency left over will become part of the construction budget. The ideal case is to nullify the designer contingency by the time construction starts.

For contractors contingency, it is included in the construction budget to cover the unforeseen events that may occur during the construction phase .It is controlled by the general contractor. Accurate prediction of the contingency cost is vital to contractor's successful financial performance as construction is a high risk business. Contractor contingency can be used to pay for schedule related issues caused by overtime requirement to meet completion date or consequential damages of outside influences such as owner's requirements, permits issue, or design changes that might impact the start and

end dates of the overall construction schedule. Other issues include unexpected expenses that are not covered by insurance, missing project scope items, subcontractors fault and also changes in market conditions such as price increases due to material shortages and unexpected increases in wages.

And finally is the owner contingency. Owner contingency is controlled by the owner and included in the owner's project budget. All changes that were not previously defined in the project scope are funded by owner contingency. For example, change orders may change the scope of work of the project by adding extra works and deleting some works. This require budget to make sure it can be accomplished.

Determinations of the adequate amount of the contingency cost are very crucial for achieving success in the construction. Determining too much contingency cost will cost the contractor lost the project, whereas putting too small value will make the contractors suffer from risk. Therefore it is very necessary to estimate the contingency cost during the tender stage.

There are many techniques that can be used in determining the contingency cost that had been introduced. However, in the practical condition, rarely contractors use one of those methods to estimate the contingency cost. They are more relying on their judgment based on past experiences and intuition. Therefore a research needs to be done to find out the exact ways that contractors used in determining the contingency cost in Malaysia construction industries.

1.2 PROBLEM STATEMENT

Nowadays, many contractors have realized about important of determining these contingency cost. Therefore, they need to find out the way to determine the contingency cost to make sure they are survived in the industries.

There are several methods that can be used in determining the contingency cost in construction. Some of them are method of moments; Monte Carlo Simulation (MCS) [1], factor rating and fuzzy sets. All of these methods have their own ways to determine the contingency cost depend on the construction conditions.

However, in a practical condition, rarely contractors use one of those methods to estimate the contingency cost. Usually they are more relying on the expert judgment in determining the contingency cost, and usually the judgment is based on his past experienced and intuition. Even, often, contingency cost is simply determine by adding; say 10 percents from total project costs. Nevertheless; this method is arbitrary and difficult to justify or defend [2]

Due to the important of estimating contingency cost activity in construction and no formal information on how contractors evaluate the contingency cost, it is necessary to investigate the current practice of the activity in the Malaysian construction industry. This will help the contractors to determine the contingency cost value more precisely in the future.

1.3 OBJECTIVES AND SCOPE OF STUDY

1.3.1 Objectives

Every project has it own objectives that work as drivers to achieve success at the end of the whole progression. The objectives of this research are as stated below:

1) To investigate the purpose of allowing contingency cost in construction project as persist by contractor.
2) To investigate the how contractors in Malaysia construction industries estimate the contingency cost.
3) To identify the factors that usually considered by contractors in determining the cost contingency value.

1.3.2 Scope of study

The scope of study is conducting survey on the perception of Malaysian construction industry about the contingency cost. Before conduction the survey, reliable source of information is required to conduct reliable interview and set up the questionnaires. Study on the literature review can also be done through the internet or journals from the information resource center. The scope of work also includes producing a questionnaire that related to the perception of contingency cost within the Malaysian construction industries.

Questionnaire surveys shall be submitted to any civil contractors in Malaysia as long it is registered with CIDB (Construction Industry Development Board).But it will not involved a contractors that doing high risk construction such as tunnel and international project. The questionnaire will be distributed to about 300 constructions firm and the result of the questionnaire will be analyzed to find out the ways of contractors estimating the contingency cost.

1.4 RELEVENCY OF THE PROJECT

Because contingency cost is one of the most important things that need to be consider in the construction industry therefore, determining the adequate amount of contingency cost is very crucial to make sure the construction project can be accomplished within the time frame given and contractors will not lost their money. As there is no research had been done in Malaysia about the contingency cost, then it is important to know the level of understanding of the contractors about the important ness of this contingency cost. Besides we want to know exactly how they determine the contingency cost.

1.5 FEASIBILITY OF THE PROJECT

This project will mainly be conducted by survey by questionnaire and interview also will be included as an additional to the survey. As only survey and interview will be conduct during this project time period. Then there are no major problems will occur to complete this project in the time period given. For this project we need about 30 samples of questionnaire answered by the contractors to be analyzed to get a good result from the survey .But as we all know, not every single questionnaire will be returned by contractors to us. The possibility of the questionnaire returned is only about 10% of the total questionnaire sent; therefore we need to send about 300 sets of questionnaire for us to get back about 30 samples questionnaire answered by contractors. Besides time needed to analysis and compile all these results from this survey. But as long as author is concern the questionnaire survey will be collected and analyze in the time frame given to make sure the objective of this can be accomplished.

CHAPTER 2

LITERATURE REVIEW

2. LITERATURE REVIEW

2.1 PREVIOUS STUDY

2.1 .1 David Baccarini (2006): The Maturing Concept of Estimating Project Cost Contingency

In the research of David Baccarini (2006), author describe the contingency is probably the most misunderstood, misinterpreted, and misapplied word in project execution. Because of this, there have been several researches about people's understanding of the concept of project cost contingency. In his research, author uses a method of survey. The survey is conducted during a project management conference in Melbourne in August 2004.the conference participants that attending the presentation were the research sample. The key participants in this conference were from construction/engineering and information technology that represents 81% of the sample.

The types of questions in author's survey are about the people understanding about the cot contingency, factors that effect cost contingency, ways to calculate the cost contingency and the people that determine the amount of cost contingency in construction projects. Then, the data that author gets from participants' feedback were analyzed and he comes out with a conclusion.

The conclusion is that the cost performance of building construction project is the key success criterion for the projects sponsor. Besides that, author also fined out that there seems to be absence of awareness in this estimation of project cost contingency. This lack of sophistication in the estimation of project cost contingency is reinforced by poor management practices in term of reviewing the accuracy of contingency .Overall this suggest that there is significant room for improvement in the understanding, estimation and management of project cost contingency.

2.1 .2 David Baccarini: Accuracy in Estimating Project Cost Construction Contingency -A Statistical Analysis

In this journal, it found that the cost performance of building construction projects is a key success criterion for project sponsor. [3] Project cost performance is typically measured by comparing final cost against budget. A key component of the project budget for construction contract is the contingency cost. It is important for project sponsors to know the level of accuracy being achieved in estimating the construction contingency cost.A statistical analysis of the past projects will provide a means for measuring the accuracy of the contingency cost. The cost data for 48 road construction projects completed were statistically analyzed to investigate the accuracy of the contingency. It was found that the average construction contingency cost was lower than estimated by the method. So it is suggested to investigate an alternative estimating method to improve the accuracy of estimation the contingency cost. An investigation of an alternate estimating approached derived from the analysis of the data author get, that there were no significant correlations between project variables and construction contingency cost that might be used to create a prediction model for estimating the contingency cost.

2.1 .3 Suat Gunhan and David Arditi: Budgeting Owner's Construction Contingency

In this journal it stated that contingency is generally defined as the sources of funding for unexpected event. Contingencies are included in construction budgets to help conduct financially successful projects. Projects complexity, the inherent uncertainty in the performance of the parties involved in the construction project, developing funding issues and control the design and construction management costs and schedules make exact budget needs very difficult to forecast accurately. Therefore, contingency funds are included in budgets to provide managers with the flexibility required to address uncertainties and deviations that threaten achieving project objectives.

According to Ford (2002) [4], contingency funds are established as:

1. Emergencies for resolving in future unforeseen expenses
2. Completion is assured by the project dead line by accelerating progress
3. Values are added to the constructed facility, typically by implementing design and scope change.
4. Contingency saving is maximized.

Given the uncertainties associated with these objectives, manager tends to allocate contingency funds intuitively rather than systematically. Although on the other hand, contingency guarantees that design and construction will be completed smoothly because of no delay caused by unavailable funds. Besides the fund tied up as contingency prevent the parties from undertaking other activities such as owners commissioning other projects and contractors bidding new jobs.It is therefore that just enough contingency be allocated to project that will allow the parties to deal with uncertainties, but in the same time not tie up valuable funds that can be used for other activities.This can be achieved only if the party allocating the contingency knows which items are likely to cause problems and consequently takes measure for preventing these problems from accruing.

2.2 Theory

Severity Index

Severity index is calculated based on the response of the survey to reflect the level of severity effect. The severity index and the ranking of problems for each individual party is calculated providing the basis for the statistical measures. Below is the formula to calculate the index:

$$\textbf{Severity Index (I)} = [\sum a_i . x_i] / [4 \sum x_i] \times 100\%$$

Constant expressing the weight given to *i*,

xi = variable expressing the frequency of the response for *i* ;

i = 0, 1,2,3,4 and illustrate as follow;

x0 = frequency of the 'very high extend' response and corresponding to ***a0 = 4***

x1 = frequency of the 'high extend' response and corresponding to ***a1 = 3***

x2 = frequency of the 'moderate' response and corresponding to ***a2 = 2***

x3 = frequency of the 'small extend' response and corresponding to ***a3 = 1***

x4 = frequency of the 'very small extend' response and corresponding to ***a4 = 0***

The severity index calculated will give the results in term of percentage. The higher the percentage, more important the criteria will be. This method is more accurate then mean and variance method as it is more consistent and accurate with respect of the respondent's frequency of respond.

CHAPTER 3

METHODOLOGY

3. RESEARCH METHODOLOGY

3.1 PROCEDURE

In order to make sure the research can be accomplished within the given time frame, here are the procedures to carry out and implement:

3.1.1 Getting some information about contingency cost.

This is the first step that needed to be done. This step is very important as we want to get clear view about this research besides extra information about what is contingency cost is all about. The information about the contingency cost can be getting form readings some journals and surfing the internet.

3.1.2 Designing Questionnaire

Here, the questionnaire has to be a set of questions that easily can be understood by the respondents. In designing this questionnaire, a study need to be made to make sure the questions given in the questionnaire is relevant with this research objective. Questionnaire surveys shall be submitted to construction firms mainly in Peninsular Malaysia included lists from CIDB directory. For a start, a minimum no of 120 samples delivered to the pre-cast contractors, pre-cast manufactories and major main contractor of class A & B. The questionnaire will also covers information related to contingency cost such as the person who determine the contingency cost, how the contractors include the contingency in their Bill of Quantity(BQ) and their satisfaction of using their method.

3.1.3 Survey Questionnaire Process

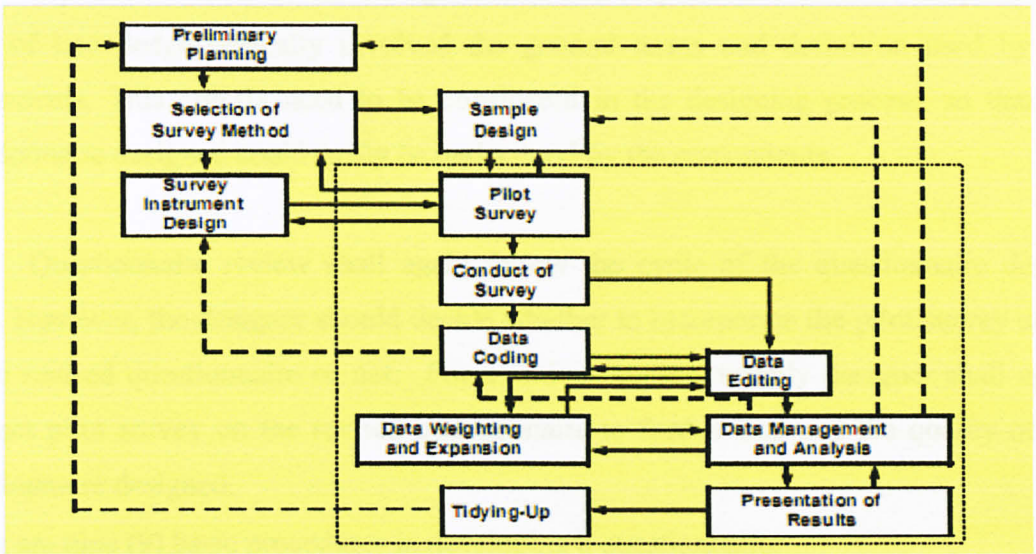


Figure 3.1: Flow Chart for Questionnaire Process

Source: Cooper, Donal and Schindler (2003)

Literature Review & Research:

Literature review is an important process in the project, as it provides the author with the general idea on the project. The methodologies involved in this process are mainly research on internet, library and discussion with Supervisor and Tutor.

Journal is a very useful source of information to the author because it has stated the previous research done by other researchers about the topic. Furthermore, the references provided in the journal are much important for the author to look for other reliable sources of information

Survey / Questionnaire Design:

Generally, the process in designing a questionnaire could be divided into 3 major steps which are considerations & rule of thumb, pilot survey and questionnaire revisions. The methodology in considering the considerations and rule of thumbs in designing the questionnaire are generally adopted by literature review and research. Questionnaire revision is one of the steps, carried out after the pilot survey in order to further enhance the questionnaires from various aspects.

In designing the questionnaire, several considerations need to be considered such as the respondent's level of knowledge, biases and respondent's attitude. Respondent's level of knowledge basically involved the general terms and definition used by the respondents. This criteria need to be considered in the designing process, so that the questionnaire designed could easily be understood by the respondents.

Questionnaire review shall again follow the cycle of the questionnaire design steps. However, the designer should decide whether to incorporate the pilot survey again in the revised questionnaire or not. For a serious survey, usually designer shall again conduct pilot survey on the revised questionnaire to further improve the quality of the questionnaire designed.

There are nine (9) basic procedures in developing a questionnaire:

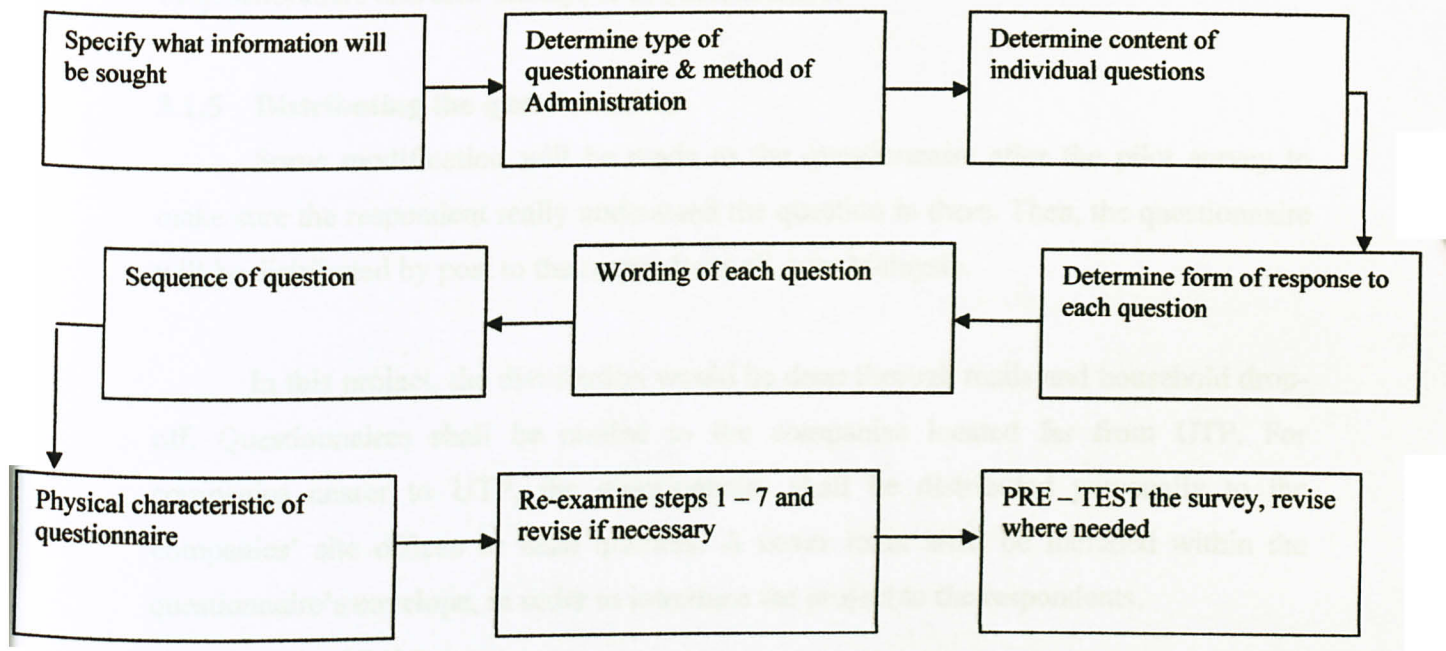


Figure 3.2: Questionnaire developing procedure chart

3.1.4 Pilot survey

Before the questionnaire posted to others respondents, the questionnaire will be send to the respondent near us to make sure the question in there is reasonable and can be understood.

Pilot survey shall be conducted after the final draft of the questionnaire has been completed. The pilot survey shall be conducted both internally and externally. Three internal respondents (UTP's lecturer) and three external respondents (contractor) shall be chosen randomly for the survey. The respondents shall be given a period of time to complete the questionnaire. The questionnaire will then be collected to be analyzed.

A pilot survey is a test of all aspects of design which act like a live dress rehearsal. It consists of some scopes for experimental design. By conducting the pilot survey, it could save few of expensive mistakes. Pilot survey are use to test the wording of questionnaire and also the layout of questionnaire.

3.1.5 Distributing the questionnaires

Some modification will be made to the questionnaire after the pilot survey to make sure the respondent really understand the question in there. Then, the questionnaire will be distributed by post to the respondents all over Malaysia.

In this project, the distribution would be done through mails and household drop-off. Questionnaires shall be mailed to the companies located far from UTP. For companies nearer to UTP, the questionnaire shall be distributed personally to the companies' site offices or head quarters. A cover letter shall be included within the questionnaire's envelope, in order to introduce the project to the respondents.

1. Mail Survey

   After questionnaire fabrication, the questionnaire will be distributed to contractors, consultant, architect, developers and engineers for feedback. Mail surveys are among the least expensive. This is the kind of survey the author can do because the author has the names and addresses of the target population, but not their telephone numbers.

The author chooses this method because mail surveys allow the respondent to answer at their leisure, rather than at the often inconvenient moment they are contacted for a phone or personal interview. For this reason, they are not considered as intrusive as other kinds of interviews.

2. Email Survey

Email survey was chosen as part of the distribution method, also as a back up survey. Email surveys are both very economical and very fast. More people have email than have full Internet access. This makes email a better choice than a Web page survey for some populations. There is practically no cost involved once the set up has been completed. An email questionnaire might be able to gather several thousand responses within a day or two.

3.1.6 Data Collection, Coding, Editing and Expansion.

For data collection, a simple procedure is shown below:

1. Mail a pre-card to sample informing them of forthcoming questionnaire.
2. Mail first packet which include:
    - Cover letter
    - Questionnaire
    - Pre-addressed, stamped return envelope
    - Incentive
    - Return card, mailed flat, commemorative stamps, etc
3. Postcard reminder
4. First follow – up
5. Postcard reminder
6. Phone call reminders
7. Other follow ups if deem appropriate. Up to 6 have proven successful.
8. Control non response error

Data coding and editing is defined as the transferrable of information process from survey forms into computer files. This information is ready for the analysis process. Coding is a process of getting the data from the survey instrument into the computer. Editing information is about cleaning the data and making sure that it is ready for use.

Weighting and expansion of data is a process of having the sample data represent the population from which it was drawn as nearly as possible. Weighting and expansion are two separate processes where weighting is known as an adjusting process that balances within the data to remove biases. While expansion is define as inflating the size of the sample data set to represent the size of the population.

3.1.7 Interviews

In order to get others information for making the research more reliable, some interviews with the parties involved in deciding the contingency cost is needed. This will add some extra value to the research.

Generally, there are two methods to interview respondent namely personal interview and telephone interview. Personal interview requires the author to go to the respondents' place, and conduct a direct interview with the person. Extra interpersonal communication skills are required in order to gain good impression from the respondents. It is important that the respondents do not feel uncomfortable during the interview session, as it would greatly impact the result of the interview session. However, respondents are most likely to welcome the interviewee once they agreed to be interview.

Telephone interview is easier and faster to be conducted as the author is not required to travel a lot. Comparatively, it is cheaper than personal interview. However, most of the time, telephone interview could not establish a good relationship from both of the parties (the interviewee and the respondents) as they are no direct communication from both of them.

For this study, the author decided to use the direct interview method, as the desired answer from the respondents. Logically, it is quite hard to make the respondents understand the desired answer needed by only talking in the telephone. Furthermore, the respondents would most likely try to answer the questions asked by the author as fast as he/she can in order to end the conversation. Therefore, personal interviews seemed to suit the need in this study the most compared to telephone interviews.

3.1.8 Analyzing data

Analysis involved in the study is analytical and descriptive analysis. Analytical analysis shall be carried out if the responds is 30 or more. However, if lower responds is obtained, descriptive analysis shall be carried out. Descriptive statistics "describe" data that have been collected. Commonly used descriptive statistics include frequency counts, ranges (high and low scores or values), means, modes, median scores, and standard deviations.

3.1.9 Data Presentation

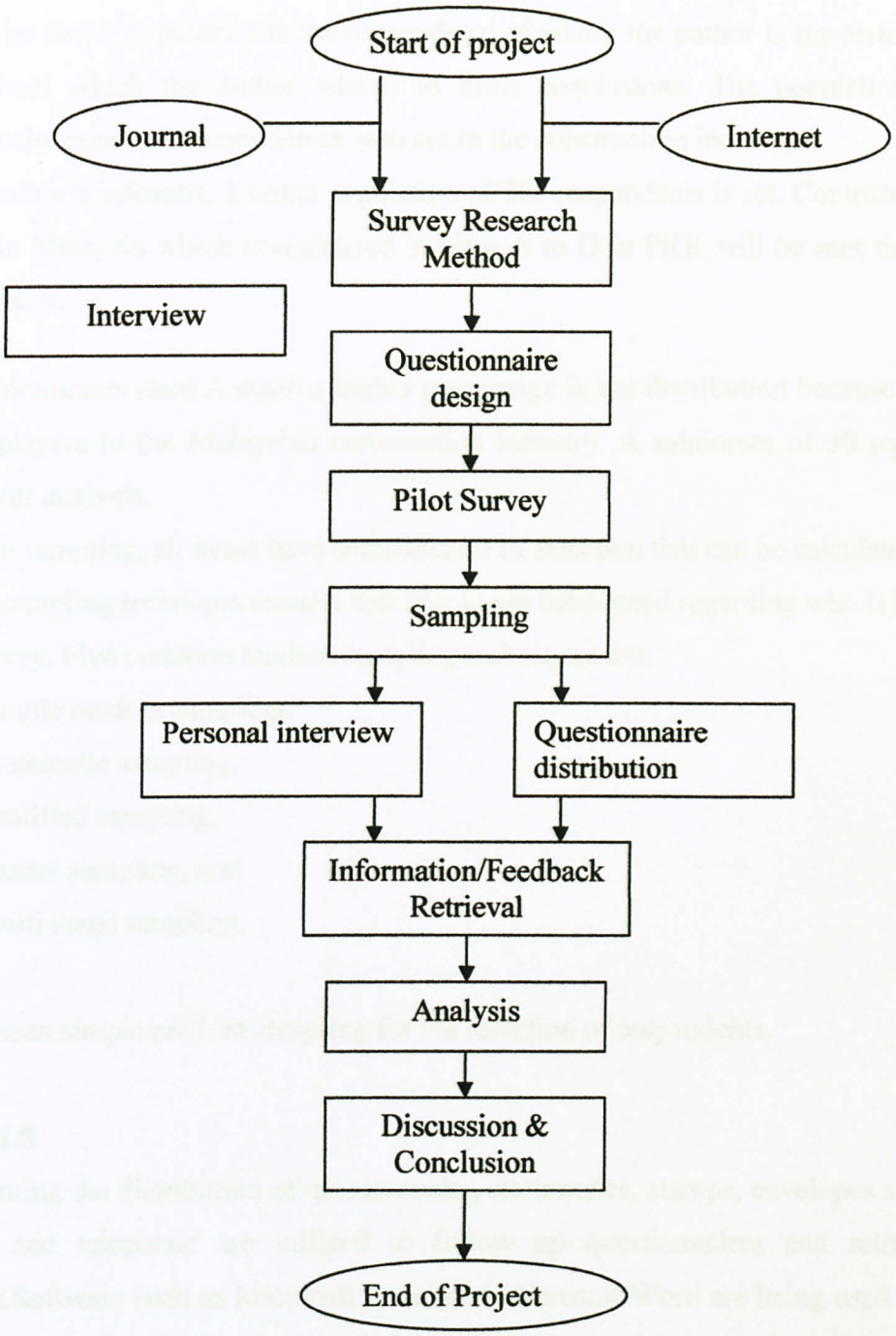
Data could be present by using few types such as table, summary statistic and graphics. Table could be used when project needed exact numeric values and localized comparison. Summary statistics can be used like below:

Number of points	11
Mean of X	9.0
Mean of Y	7.5
Regression	$y = 3 + 0.5x$
Correlation coefficient (r)	0.82
Level of explanation (r^2)	67%

More than 10 data points are needed in order to present data using the graphic method. Graphic method is used to show big picture and not fine data. There are 2 types of graphic method which are:

1. Graphics for categorical variables
   Bar & Column charts, Pie chart
2. Graphics for continuous variables
   Line graphs, Area charts, Scatter plots, 3D plots

Research Methodology Flow Chart.



3.2 SAMPLING

3.2.1 Target Population

The target population is the respondents of whom the author is interested in; the group about which the author wishes to draw conclusions. The population of the questionnaire consists of contractors who are in the construction industry.

For the author's selection, a target population of 300 respondents is set. Contractors from all over in Malaysia which is registered in class A to D in PKK will be sent the sets of questionnaire.

Contractors class A stand a higher percentage in the distribution because they are the key players in the Malaysian construction industry .A minimum of 30 replies are required for analysis.

In random sampling, all items have some chance of selection that can be calculated.

Random sampling technique ensures that bias is not introduced regarding who is included in the survey. Five common random sampling techniques are:

1. simple random sampling,
2. systematic sampling,
3. stratified sampling,
4. cluster sampling, and
5. multi-stage sampling.

I have chosen simple random sampling for the selection of respondents.

3.3 TOOLS

During the distribution of questionnaire, stationeries, stamps, envelopes are being used.Fax and telephone are utilized to follow up questionnaires and retrieval of feedbacks.Software such as Microsoft Excel and Microsoft Word are being used to input the data from the feedback and to process the descriptive analysis.

3.5 Gantt Chart for Final Year Project 1

No.	Detail/ Week	1	2	3	4	5	6	7	8	9	10	11	12	12	13	14
1	Selection of Project Topic											Mid-semester break				
2	Preliminary Research Work															
	Introduction															
	-Background Study															
	-Problem Statement															
	-Objective															
	-Scope of Study															
	Literature Review															
	Methodology															
	-Research Methodology															
	-Flow Chart															
	Conclusion															
3	Submission of Preliminary Report				●											
4	Project Work															
	- Drafting questionnaire					●										
	- Finalizing questionnaire						●									
	- Pilot Survey							●								
	- Analyzing data & modifying questionnaire								●							
5	Submission of Progress Report									●						

6	Seminar (compulsory)									●						
7	Project work continues									■	■		■	■	■	■
	- Distributing questionnaire to the contractors															
	-Compiling all the feedback from the contractors															
8	Submission of Interim Report Final Draft													●		
9	Oral Presentation														●	

● Suggested milestone

■ Process

3.6 Gantt Chart for Final Year Project 2

No.	Detail/ Week	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	Interviews														
2	Compiling the feedback from contractors														
3	Analyzing Data														
4	Final Report														

Process

CHAPTER 4

RESULTS & ANALYSIS

4. RESULTS AND ANALYSIS

GENERAL/BACKGROUND INFORMATION

4.1. Data Collection

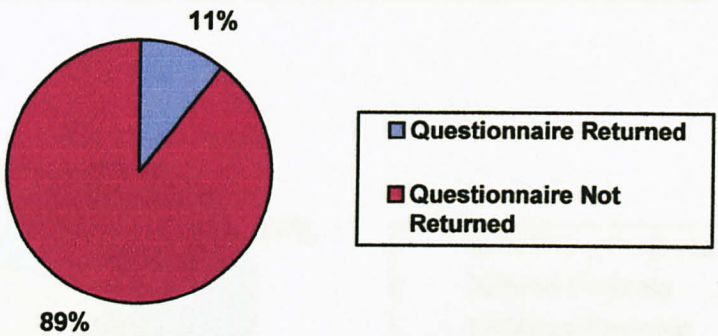


Chart 1: Data Retrieval

For this research, total 300 questionnaires had been sent to the contractors all over Malaysia. Out of this 300, only 32 contractors replied this questionnaire back to author. The respondents were given the option of returning the questionnaire forms by mail or Fax. These 32 respondents only reflect 11% from the total questionnaires sent. Though only 19.4% of the respondents replied, this low percentage had been expected for a mailed and questionnaire-based survey research.

4.2. Respondents' Main Business

Table 1: Respondent's Main Business

Respondent's Main Business	Nos.
Building Projects	29
Road Projects	19
Bridge Projects	13
Drainage Projects	12
Other	4

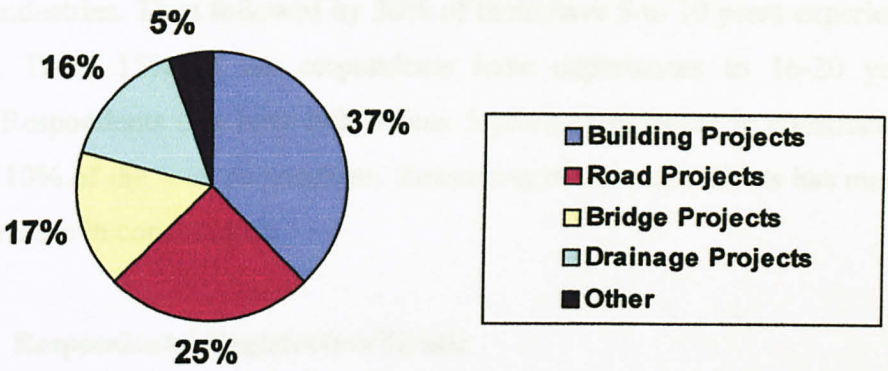


Chart 2 : Respondent's Main Bussiness

Although there are only 32 respondents, but the respondents' main business are more than 32 because of the constructions nature in Malaysia. Usually one company can handle more than one type of projects. By the chart above, we know that 37% of the respondents are involving in a construction of buildings, followed by 25% involved in a road projects.17% of the respondents also manage to do a bridge projects besides 16% can handle a drainage projects. And lastly only 5% of them can do other projects like piping or dam constructions.

4.3. Company Experiences In Construction

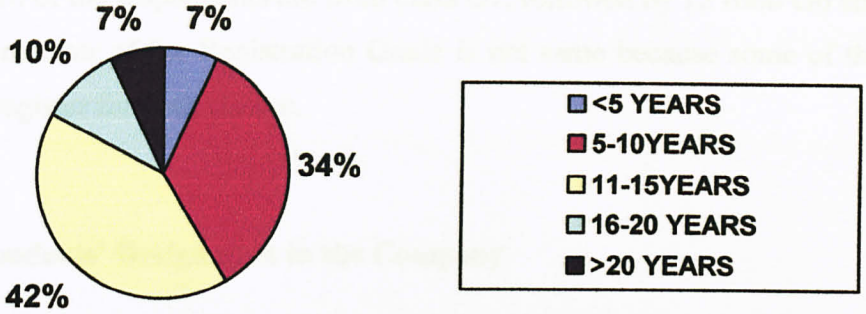


Chart 3 : Respondents' Experiences in Constructions

Chart above shows, most of the respondents have about 11 to 15 years in construction industries. Then followed by 30% of them have 5 to 10 years experiences in constructions. Then, 15% of the respondents have experiences in 16-20 years in construction. Respondents that have below than 5 years experiences in construction are represents by 10% of the total respondents. Remaining of the respondents has more than 20 years experience in construction.

4.4. Respondents' Registration Grade

Table 2: Respondents' Registration Grade

PKK	Nos
A	9
B	15
C	1
D	0
E	0
F	0

CIDB Registration Grade	Nos
G7	16
G6	12
G5	0
G4	0
G3	1
G2	0
G1	0

Table before shows, from total respondents replied 9 of them are from class A of PKK, followed by 15 from class B and one of them is from class C. For CIDB Registration Grade, 16 of the respondents are from class G7, followed by 12 from G6 and one from G3. Total number of the Registration Grade is not same because some of the respondents did not register for both classes.

4.5. Respondents' Designation in the Company

Table 3 : Respondents' Designation In the Company

Designation	Nos
Project Manager	17
Director	7
General Manager	4
Quantity Surveyor	2
Project Engineer	1
Construction Superintendent	1

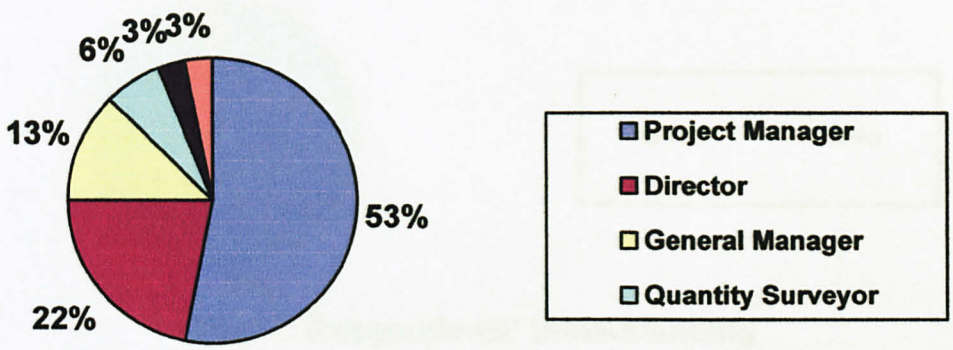


Chart 4 : Respondents' Designation in the Company

Chart above, shows that most of the respondents' designation that replied the questionnaire is a Project Manager.That is about 53% of the total questionnaire replied. This is a good indicator for this research as Project Manager is the person that really know about the projects that involving the respondents company. It than followed by 2% of them is Director. Then, 13% of them are a General Manager. All of this three are from top management level, which is good for an opinion based survey analysis. Only 6% of them are come from Quantity Surveyor and 3% come from Construction Superintendent and project engineer.

RESPONDENTS' UNDERSTANDING AND PRACTICE OF COST CONTINGENCY.

4.6. Understanding of Cost Contingency

Table 4: Respondents' Understanding of Cost Contingency

Understand	Nos
Yes	31
No	1

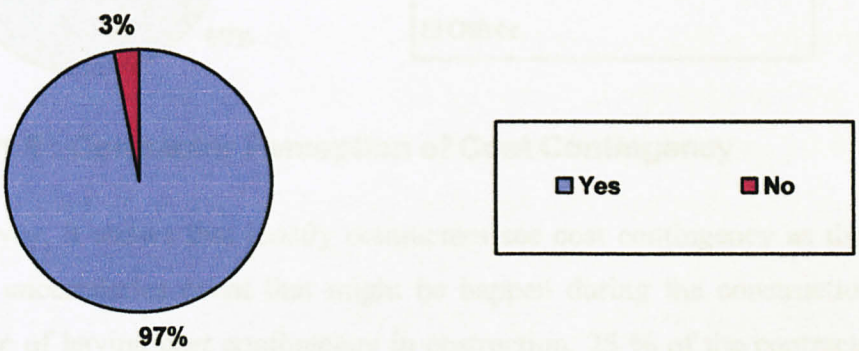


Chart 5: Respondents' Understanding

From the chart above, it shows that 31 out of 32 (97%) of respondents is understand what is cost contingency. This shows that people in construction industry in Malaysia is aware of the cost contingency and will allocate them in a tender bidding process.

4.7. Contractor Perception of Cost Contingency

Table 5: Contractor Perception of Cost Contingency

Perception	Nos.
Money for uncertainty event	28
Reserve/Allowances Money	10
Cost Overrun	1
Other	1

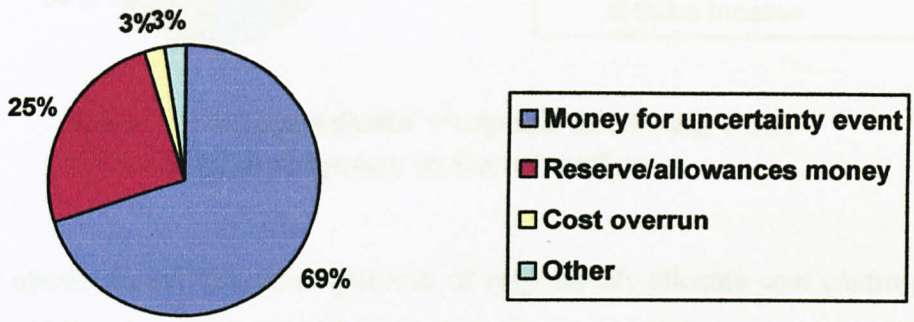


Chart 6 : Contractor Perception of Cost Contingency

From the survey, it shows that mostly contractors see cost contingency as their money reserved for uncertainties event that might be happen during the construction. This is a real purpose of having cost contingency in costruction. 25 % of the contractor also see cost contingency as reserve/allowances money .Only 6% of the contractors have wrong perception of cost contingency in costruction.

4.8. Purpose of having Cost Contingency

Table 6 : Purpose of having Cost Contingency in Construction

Purpose	Nos.
Risk Management	21
Avoid Lost	14
Company Policy	4
Other	2
Extra Income	1

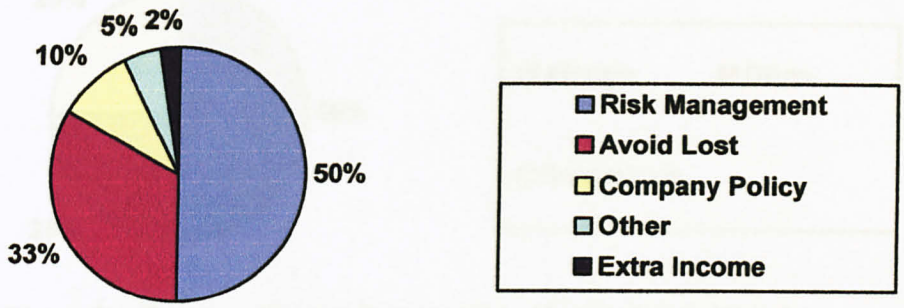


Chart 7 : Respondents' Purpose of having Cost Contingency in Construction

Figure above shows that, main purpose of respondents allocate cost contingency in their tender bidding process is for risk management purpose. It is represent by 50% of the total respondents.Then followed to avoid lost (33%).Besides that, there are 10% of respondents take the cost contingency as company policy,so that they will include the cost contingency in all their tender bidding .Only 2% of them are claiming to have extra income for their company and 5% of the remaining respondents are choosing others as their purpose of having cost contingency in tender bidding process.

4.9. Frequently of having Cost Contingency in projects

Table 7: Frequently of allocating Cost Contingency in projects

Frequently	Nos.
Always	16
Often	8
Sometimes	8

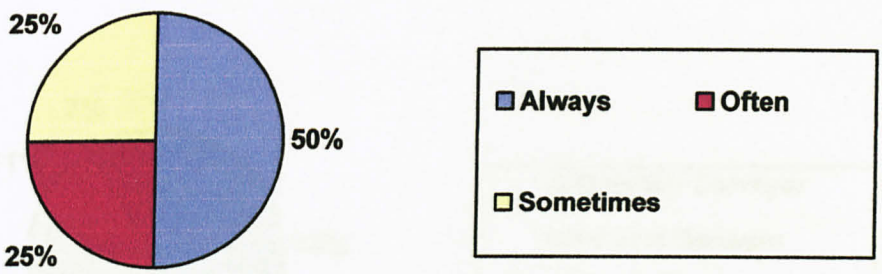


Chart 8 : Respondents' frequently of allocating Cost Contingency

From figure above, we know that 50% of the respondents always allocate cost contingency in their projects. Then 25% of them sometimes allocate the contingency cost and often allocate the contingency cost in their projects.

4.10. Person responsible in evaluating Cost Contingency value

Table 8: Person Responsible in Evaluating Cost Contingency Value

Position	Nos.
Quantity Surveyor	21
Project Manager	14
Project Engineer	5
Other	3
Construction Superintendent	1

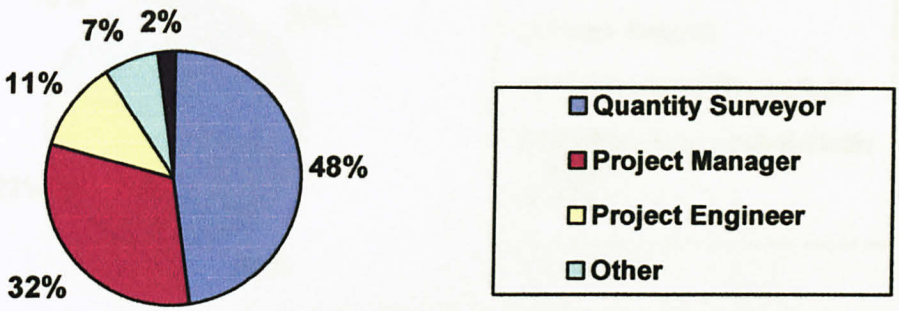


Chart 9 : Person in charge in determining Cost Contingency Value

Figures above show, mostly Quantity Surveyor is a person in charge in determining the cost contingency value(48%).Followed by Project Manager(32%), Project Engineer(11%), other (7%) and Construction Superintendent (2%).

4.11. Method used in estimating value of Cost Contingency

Table 9: Method used in estimating Cost Contingency Value

Method Used	Nos.
Judgment / Intuition	14
Track Record	14
Professional Consultant	11
Statistical or Probabilistic Method	9
Other	1

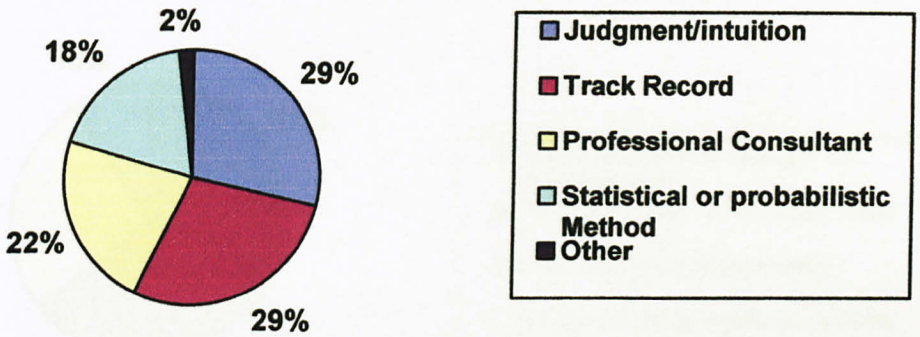


Chart 10 : Method used in estimating Cost Contingency value

Figures above show that mostly contractors in Malaysia use a judgment/intuition and a track record from their previous project to estimating the cost contingency value. This indicate by 29% from the total respondents replied the questionnaire. Then each 23% of them are using professional consultant, track record and statistical /probabilistic method.

4.12. Ways of contractors included the cost contingency in project's cost

Table 10: Ways of contractors included the cost contingency in the project's cost

Method	Nos.
As separate Item in the Bill of Quantity (BQ)	13
As percentage from total cost	14
Included In the Item cost	11
As percentage from each item	4

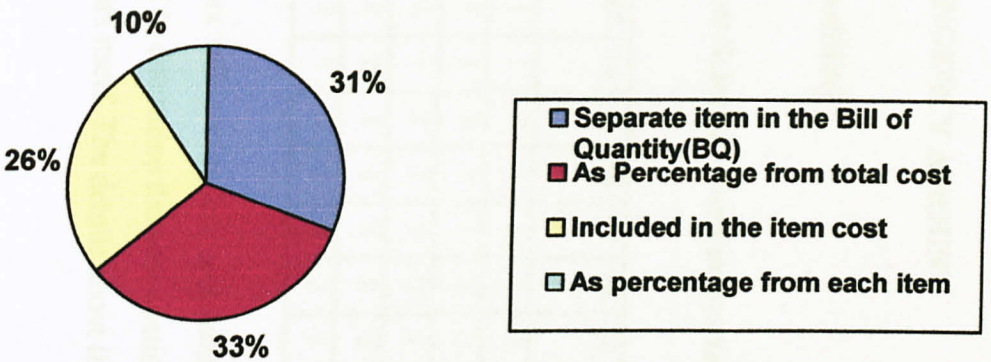


Chart 11 : Ways cost contingency included in the project's total cost

Figures above show the ways of contractors normally allocate the cost contingency in their project cost. Most of them include it as percentage from project total cost (33%).Usually the company will reveal the percentage their take to determine the contingency cost. This is to make sure they can compete in a tender bidding process. Then the ways follows by an separate item in a bill of quantity (31%).Only 26% of them include the cost contingency in the item cost and 10% include them in the percentage from each item.

FACTORS INFLUENCING COST CONTINGENCY AMOUNT

4.8.1 Analyzing using Average Index(Min)

Table 11: Details of Contractors Selection For Factors Influencing Cost Contingency Amount

Company no. / Factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	Total	Mi
Type of Project	2	1	3	1	3	2	1	2	2	1	2	1	1	1	1	3	1	1	3	1	1	1	1	2	2	1	2	2	2	1	3	2	53	1.6
Project Total Cost	1	2	2	1	2	2	1	2	1	2	2	1	2	1	2	3	1	2	2	1	3	2	1	3	2	1	2	2	2	3	3	2	59	1.8
Location of project	1	2	1	1	1	2	2	1	2	1	2	1	2	1	2	3	1	2	1	2	1	2	2	1	3	2	1	3	2	1	1	2	52	1.6
Project duration	2	3	2	1	3	2	2	3	2	2	2	1	2	2	1	2	2	2	2	1	2	2	1	3	2	3	2	3	2	2	2	2	65	2.0
Type of Client	2	2	1	2	3	3	1	2	2	2	2	3	2	3	2	1	3	3	1	3	3	2	3	3	3	1	3	3	3	3	3	2	75	2.3

Table above show the details about the factors influencing the cost contingency amount in construction industry in Malalaysia. For number 1, it indicates that the factor is very important to determine the cost contingency. Number 2, the factor is just important and for number 3 that mean the factor is not important to the contractors itself. The details about this result will be discussed later in this report.

Table 12: Summary of Factors Influencing The Amount Of Cost Contingency

Scale / Factor	1 [Not Important]	2 [Important]	3 [Very Important]	Index Average	Category
Type of Project	5	11	16	2.34375	Important
Project Total Cost	5	17	10	2.15625	Important
Location of project	3	14	15	2.37500	Important
Project duration	6	21	5	1.96875	Important
Type of Client	16	11	5	1.65625	Important

By determining the importance of each factor using Index average (Min), it shows that all of the factors above is important to determine the amount of cost contingency in construction.

4.8.2 Analyzing using Severity Index

Table 13: Details of Factors Influencing Cost Contingency Amount

		1	2	3					
No.	Factors	Not Important	Important	Very important	Total	Mean	Category (Based on Abd Madjid and McCaffer, 1996)	Severity index for ranking (%) based on Abdulmohsen al hammad and sadi assaf, 1996	Ranking
1	Type of project	5	11	16	32	2.34375	Important	78.125	2
2	Project total cost	5	17	10	32	2.15625	Important	71.875	3
3	Location of project	3	14	15	32	2.37500	Important	79.167	1
4	Project Duration	6	21	5	32	1.96875	Important	65.625	4
5	Type of client	16	11	5	32	1.65625	Important	55.208	5

Chart 12: Severity Index Factor

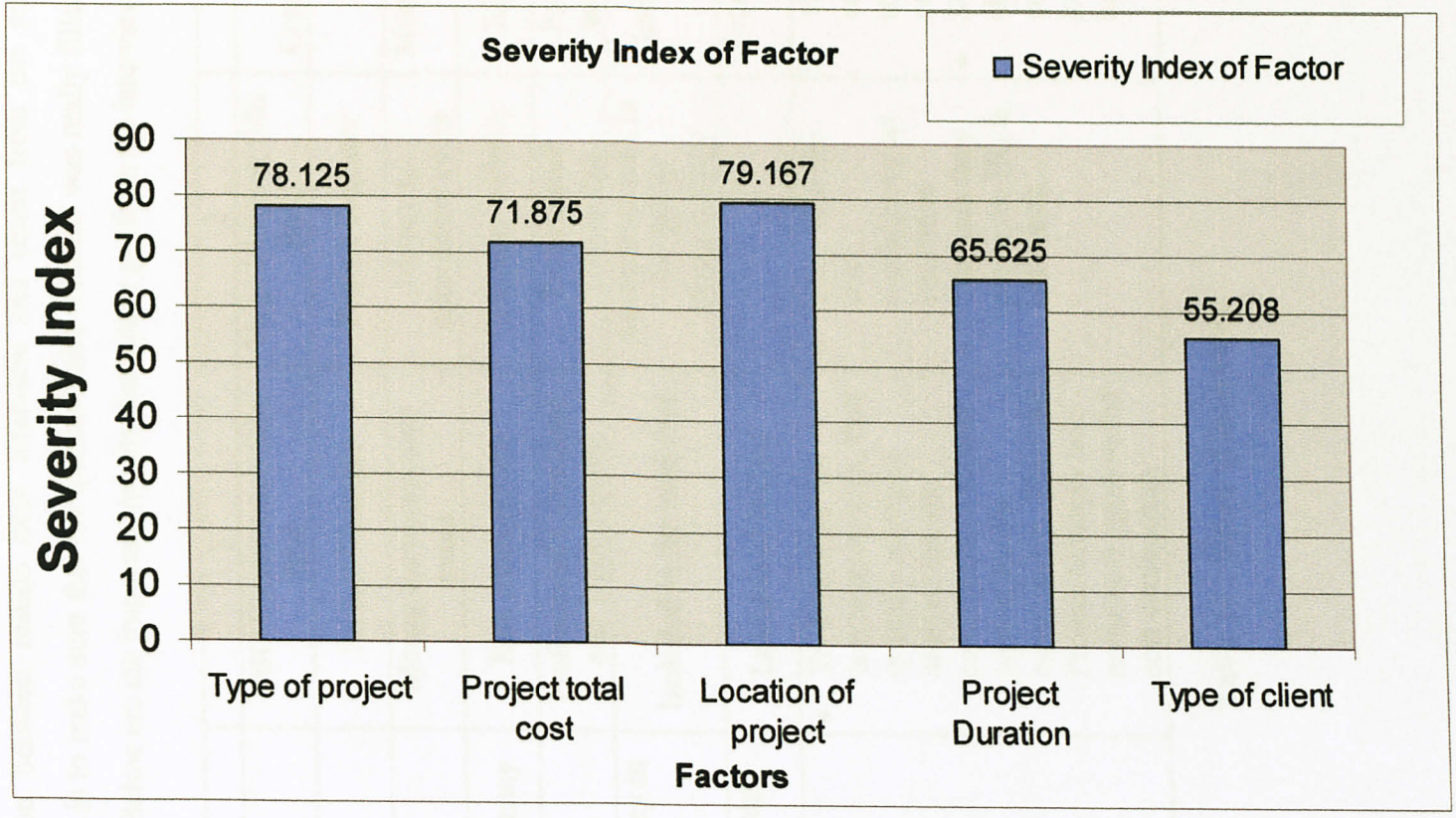


Table above shows the percentage of factors that influencing the amount of contingency cost base on this research. The highest factors that usually selected by contractors in determining the cost contingency value is the location of the project itself. It then follows by the type of the construction project, project total cost and the project duration. From this list, the least important factors to determine the cost contingency are the type of client of a construction project.

4.4 INTERVIEWS

For this research, three interviews had been done. The purpose of these interviews is to get some extra information about this research. Besides that author also want to make a comparison between results from interview and result from the returned questionnaire. This is to make sure that the questionnaire returned was really filled by a competent person. Below are the important results that author get from the interviews.

Interview	1	2	3
Company Name	HBO Construction Sdn. Bhd.	Mega Manjung Sdn. Bhd.	Daya Mercu Construction Sdn Bhd
Person Designation	Project Manager	Project Engineer	Site Engineer
Meaning of Cost Contingency	Money for uncertainty event	Money for uncertainty event	Money for uncertainty event
Purpose of having Cost Contingency	Risk Management	Company's Policy	Risk Management
Method use to determine Cost Contingency	Professional Consultant and Track Record	Professional Consultant	Judgment/Intuition and Track Record
Ways including Cost Contingency in project cost	Included in the total cost	As separate item in the Bill of Quantity(BQ)	Included in the total cost
Most Important factors influencing Cost Contingency value	Location of Project	-	Type and Location of project
Extra information	• To determine the contingency cost, first quantity surveyor analyze the site condition and all cost needed for the construction. Then the Project Manager will revise and approve the cost contingency	• They take the cost contingency as insurance. • The item they put in the BQ is insurance.	• To cover cost contingency, they try to get Variation order. • Several factors also need to be considered such as local villagers and local authorities.

Table 14 : Detail of interviews

4.5 DISCUSSIONS:

4.5.1 Small Number of respondents:

From 300 questionnaires sent, only 32 questionnaires are answered which is 11% from the total questionnaires. The reasons that lead to such small number of respondents could be explained by:

i. The downturn in global economy. Because of this economy downturn, it is hard for contractors to find a construction. This reflects to the shut down of several construction companies. So, the posted questionnaire maybe address to the company that had been shut down.
ii. Not updated CIDB websites. It is found that the CIDB websites is not updating the contractors address. So, the company might have move. This can be counted as one of the reason because author had receive a replied questionnaire that the stated the previous contractors had move to another address.
iii. The questionnaire looks numerous as author print the questionnaire on one sided only. Total of 3 pages of this questionnaire might be the reason as the questionnaire look like many questions need to be answered in the questionnaire.
iv. Too many questions asked in the questionnaire. Author find out that there are too many questions that not related to the project objective asked in this questionnaire. This might reduce the interest of the respondents to reply this questionnaire back.

As for the conclusion of this discussion, the questionnaire design should also been improve such as only asking the important things that related to project research. Besides it is more productive if the questionnaire printed for double sided. It may give interest to the respondents to answer the questionnaire as they do not have to spend much time to fill the questionnaire.

4.6 FINDINGS

a. Not all contractors that registered for class B for PKK registered for class G6 with CIDB. This information author get form the interview that had been conducted with the representative from HBO Construction Sdn Bhd.The class in CIDB usually based one the current budget of the company.

b. There are many perceptions out there about cost contingency in construction. This reflects by the result of this research as although only 32 respondents replied the questionnaire, but usually there are more than 32 answers for each question.

c. Many factors can be included as the factors that influencing cost contingency amount. This author just realize when conducting the interview as the company representatives give their idea about the factors. This hard to be obtained in the questionnaire as respondent maybe just wants to fill the questionnaire quickly.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5. CONCLUSIONS AND RECOMMENDATIONS

As far as this survey had been conducted, there are not many problems had occur, but the main problem is the number of respondents who replied the questionnaire. As the questionnaire is look like easy to fill, but maybe there are lack of awareness in the construction industry about the important of this research.

From the questionnaire replied, it shows that the level of understanding of contractors about this cost contingency is very high. Most of them really understand the meaning and the purpose of having cost contingency in their project cost. From this research, it found that usually contractors taking the cost contingency as their company risk management.

Besides that, it shows that most of the respondents still relying on the intuition to determine the cost contingency value. Only some of them are using a professional consultant or statistical/probabilistic method. It shows that, most of the contractor still taking the cost contingency for granted as something not really important in the construction industry.

For the factors that influencing the cost contingency it shows that, location of a project is the most important factor in determining the cost contingency value. Other factors like type of project, project total cost, project duration and type of client also considered as the important factors.

As for the conclusion, all of the objectives of this research had been achieved.

CHAPTER 6

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APPENDICES

Appendix 1: Questionnaire's Cover Letter

Project Manager
Ramunia Fabricators Sdn Bhd
Level 22,Plaza Permata,
Jalan Kampar
50400 Kuala Lumpur

Date: 21/1/2009

Dear Sir/Madam,

Estimating Contingency Cost In Construction By Contractors.

Determining the adequate amount of contingency cost is very crucial for achieving success in the construction. Therefore a research is initiated to find out the exact method and practices contractors use in determining the contingency cost in Malaysian construction industries.

With referred to above matter, we would like to seek for your company's help in this university survey regarding the ways contractors estimate the contingency cost in construction works.

For this, we have devised a questionnaire for you to fill and it will take no more than 15 minutes of your time. With your cooperation, we will be able to find the methods and techniques that are usually used by the contractors in estimating the contingency cost and to identify the area of improvement in determining this cost.

It would be very helpful if you could complete and return the questionnaire attached as soon as possible , if possible by 15th February 2009.As an enclosure, please find a self-addressed and stamped envelope to return the questionnaire. Alternatively, you could also return it by fax on 05 – 365 6716. (Attn: Assoc. Prof. Ir. Dr. Arazi Idrus). Should you require further information regarding this questionnaire, please do not hesitate to contact **Mr. Faizal at 013-625 5 625 or Mr. Arif at 017- 548 3 521.**

We thank you in advance for your support.

Yours truly,

.....

(Assoc. Prof. Ir. Dr. Arazi B. Idrus)
Associate Professor/Research Cluster Leader
Department of Civil Engineering,
University Technology of PETRONAS.

c.c: AP Ir. Dr. Fadhil Nuruddin, Head of Civil Engineering Department.

Appendix 2: 1st Draft Questionnaire

Section A: Background Information

Company Information

1. Name of Company: _____

2. Company Address :

   _____

   _____

   _____

3. Type of Construction Projects :
   [ ] Building
   [ ] Roads
   [ ] Bridge
   [ ] Drainage
   [ ] Others: _____

4. Company experienced in construction (years) :
   [ ] < 5
   [ ] 5-10
   [ ] 11-20
   [ ] > 20

5. Class of Contractor : _____

6. No. of Projects completed : _____

Respondent's Information

1. Designation:
   [ ] Project Manager
   [ ] Construction Manager
   [ ] Project Engineer
   [ ] Quantity Surveyor
   [ ] Others: _____

2. Working experienced : _____years

3. No. of Projects Involved : _____

Section B: Perception of Cost Contingency

1. What is cost contingency:
   [ ] Reserve Money
   [ ] Risk money
   [ ] Profit
   [ ] Unexpected money
   [ ] Do not know
   [ ] Others: _____

2. Is cost contingency taken into account in any of your project
   [ ] Yes
   [ ] No

3. Why need cost contingency in project:
   [ ] Avoid lost
   [ ] Extra Income
   [ ] Risk management
   [ ] Company's policy
   [ ] Do not know
   [ ] Others: _____

4. Factor of cause cost contingency
   [ ] Economy
   [ ] Management
   [ ] Safety
   [ ] Labor
   [ ] Do not know
   [ ] Others: _____

5. How to include cost contingency in the project's cost
   [ ] Item in the Bill of Quantity
   [ ] Included in the item cost
   [ ] Percentage from total cost
   [ ] Percentage from each item
   [ ] Do not know
   [ ] Others: _____

6. Factor of estimating value of cost contingency
   [ ] Project total cost
   [ ] Type of project
   [ ] Location of project
   [ ] Project duration
   [ ] Do not know
   [ ] Others: _____

7. Responsible person in setting the cost contingency limit
   [ ] Client

[ ] Managing Directors
[ ] Project Manager
[ ] Finance Manager
[ ] Do not know
[ ] Others: _____

8. Method used in estimating value of cost contingency
   [ ] Track record
   [ ] Percentage of project's value
   [ ] Software
   [ ] Professionals consult
   [ ] Do not know
   [ ] Others: _____

9. How much cost contingency covered by applying the method(percents) :
   [ ] < 20
   [ ] 20 – 50
   [ ] 51 - 75
   [ ] 76 – 100
   [ ] Do not know

10. Satisfaction of the method
    [ ] Yes
    [ ] No

Appendix 3: Pilot Survey Questionnaire

Contingency Cost Estimation in Malaysian Construction Industry.

Determination of the appropriate amount of the contingency cost is very crucial for achieving success in the construction. An over-estimation of contingency cost will result in the contractor losing the project bidding, whereas putting too small a value will cost losses to the contractor during implementation of the project. Therefore it is very important to estimate the contingency cost as accurate as possible during the tender stage.

There are many methods that can be used in determining the contingency costs. However, in the practical condition, rarely contractors use one of those methods to estimate the contingency cost. They rely more on their judgment based on past experiences and intuition. Therefore a research is made to investigate the current practice and technique used by contractors in determining the contingency cost in Malaysian construction industries

The questionnaire below is divided into 3 sections which are A, B and C. Please answer the questionnaire by referring the instructions in each section.

Section A: General / Background Information

Respondent can tick more than one for each [ ] provided or fill in the blanks.

I. Company Information:

7. Name of Company: _____

8. Company's main business:
   [ ] Building projects [ ] Road projects [ ] Bridge projects
   [ ] Drainage projects [ ] Other: _____

9. Company experienced in construction (years) :
   [ ] < 5 [ ] 5-10 [ ] 11-20 [ ] > 20

10. Class of Contractor :
    a) PKK [ ]A [ ]B [ ]C [ ]D [ ]E [ ]F
    b) CIDB [ ]G7 [ ]G6 [ ]G5 [ ]G4 [ ]G3 [ ]G2 [ ]G1

II. Respondent's Information

4. What is your designation with the company?
   [ ] Project Manager [ ] Construction Superintendent
   [ ] Project Engineer [ ] Quantity Surveyor
   [ ] Other: _____

5. Respondent's experienced in construction(years):
   [ ] < 5 [ ] 5-10 [ ] 11-20 [ ] > 20

Section B: Respondent's Understanding and Practice of Cost Contingency Allocation.

Respondent can tick more than one for each [ ] provided or fill in the blanks.

11. Do you understand what is Cost Contingency:
    [ ] Yes [ ] No

12. Cost contingency is?
    [ ] Reserve Money [ ] Risk money [ ] Profit
    [ ] Unexpected money [ ] Other: _____ [ ] Do not know

13. Is cost contingency taken into account in any of your project
    [ ] Yes
    [ ] No
    [ ] Do not know

14. Who is responsible in evaluating the cost contingency value:
    [ ] Quantity Surveyor [ ] Project Engineer
    [ ] Construction Superintendent [ ] Project Manager
    [ ] Other :_____ [ ] Do not know

15. Why need cost contingency in project:
    [ ] Avoid lost [ ] Extra Income [ ] Risk management
    [ ] Company's policy [ ] Other: _____ [ ] Do not know

16. How do you include cost contingency in the project's cost
    [ ] As separate item in the Bill of Quantity (BQ)
    [ ] Included in the item cost [ ] As percentage from total cost
    [ ] As percentage from each item [ ] Other: _____
    [ ] Do not know

17. Technique(s) used in estimating value of cost contingency
    [ ] Track record [ ] Percentage of project's value
    [ ] Software [ ] Professionals consult
    [ ] Others: _____ [ ] Do not know

18. Level of satisfaction of using the technique(s):
    [ ] Low
    [ ] Moderate
    [ ] High

19. How much do you normally allocate cost contingency for your project? (percent):

Project	Percentage:					
	<2	2-5	5-7	7-10	>10	Do not know
a) Road and infraworks						
b) Buildings						
c) Bridge						
d)Substructures						
e) Other						

20. Does the percentage adequate to cover the contingency required?

[ ] Yes
[ ] No

Section C: Factor Influencing Contingency Amount

For this section, please rate the influencing factors by ticking the appropriate number according to the scale given below :

[1] Don't Agree [2] Agree [3] Very Much Agree

1. Factors influence value of cost contingency in bidding tender:

i.	Project total cost	[ ] 1	[ ] 2	[ ] 3
ii.	Type of project Easy installation	[ ] 1	[ ] 2	[ ] 3
iii.	Location of project	[ ] 1	[ ] 2	[ ] 3
iv.	Project duration	[ ] 1	[ ] 2	[ ] 3
v.	Type of client	[ ] 1	[ ] 2	[ ] 3
vi.	No. of competitors in tendering stage	[ ] 1	[ ] 2	[ ] 3
vii.	Profit margin	[ ] 1	[ ] 2	[ ] 3

Other factors, if any (important):

_____
_____
_____

Section D: Suggestions

Do you have any suggestions on how to improve this questionnaire? Please feel free to write it on the space below.

_____
_____
_____
_____
_____
_____
_____
_____

Appendix 4: Final Questionnaire

Contingency Cost Estimation in Malaysian Construction Industry.

Determination of the appropriate amount of the contingency cost is very crucial for achieving success in project management. An over-estimation of contingency cost will result in the contractor losing the project bidding, whereas putting too small a value will cost losses to the contractor during implementation of the project. Therefore it is very important to estimate the contingency cost as accurate as possible during the tender stage.

There are many methods that can be used in determining contingency costs. However, in practice, rarely contractors use one of those methods to estimate the contingency cost. They rely more on their judgment based on past experiences and intuition. Therefore a research is made to investigate the current practice and methods used by contractors in determining the contingency cost in Malaysian construction industries

The questionnaire below is divided into 4 sections which are A, B, C and D. Please answer the questionnaire by referring the instructions in each section.

Section A: General / Background Information

Respondent can tick more than one for each [ ] provided or fill in the blanks.

I. Company Information:

11. Name of Company: _____

12. Company's main business:
    [ ] Building projects [ ] Road projects [ ] Bridge projects
    [ ] Drainage projects [ ] Other: _____

13. Company experienced in construction (years) :
    [ ] < 5 [ ] 5-10 [ ] 11-15 [ ] 16-20 [ ] 20>

14. Class of Contractor :
    c) PKK [ ]A [ ]B [ ]C [ ]D [ ]E [ ]F
    d) CIDB [ ]G7 [ ]G6 [ ]G5 [ ]G4 [ ]G3 [ ]G2 [ ]G1

II. Respondent's Information

6. What is your designation with the company?
    [ ] General Manager [ ] Project Manager
    [ ] Construction Superintendent [ ] Project Engineer
    [ ] Quantity Surveyor [ ] Other: _____

7. Respondent's experienced in construction(years):
    [ ] < 5 [ ] 5-10 [ ] 11-15 [ ] 16-20 [ ] 20>

Section B: Respondent's Understanding and Practice of Cost Contingency Allocation.

*Respondent can tick **more than one** for each [ ] provided or fill in the blanks.*

21. Do you understand what is Cost Contingency:
[ ] Yes [ ] No

22. What is cost contingency?
[ ] Reserve /Allowances Money
[ ] Money for uncertainty event
[ ] Other: _____
[ ] Profit
[ ] Cost overrun
[ ] Do not know

23. What is the purpose of having cost contingency in project?
[ ] Avoid lost
[ ] Company's policy
[ ] Extra Income
[ ] Other: _____
[ ] Risk management
[ ] Do not know

24. Is cost contingency taken into account in any of your project
[ ] Always
[ ] Often
[ ] Sometimes
[ ] Do not know

25. Who is the person that is responsible in evaluating the cost contingency value:
[ ] Quantity Surveyor
[ ] Construction Superintendent
[ ] Other :_____
[ ] Project Engineer
[ ] Project Manager
[ ] Do not know

26. What is(are) the method(s) used in estimating value of cost contingency
[ ] By judgment / institution
[ ] Professionals consultation
[ ] Statistical or probabilistic method
[ ] Do not know
[ ]Track record
[ ] Special software (please state: _____)
[ ] Others: _____

27. How do you include cost contingency in the project's cost
[ ] As separate item in the Bill of Quantity (BQ)
[ ] Included in the item cost
[ ] As percentage from each item
[ ] Do not know
[ ] As percentage from total cost
[ ] Other: _____

28. Level of satisfaction of using the technique(s):
[ ] Low [ ] Moderate [ ] High

Section C: Factor Influencing Contingency Amount
For this section, please rate the influencing factors by ticking the appropriate number according to the scale given below:

[1] Not important **[2] Important** **[3] Very important**

1. Factors influencing value of cost contingency in bidding tender:

a) Type of risk	[ ]1	[ ]2	[ ]3
b) Type of project	[ ]1	[ ]2	[ ]3
c) Project total cost	[ ]1	[ ]2	[ ]3
d) Location of project	[ ]1	[ ]2	[ ]3
e) Project duration	[ ]1	[ ]2	[ ]3
f) Type of client	[ ]1	[ ]2	[ ]3
g) Other (Please specify and rate)			

_____

_____

Section D: Allocation of Cost Contingency

For this section, please answer the question below by ticking and filling the boxes provided:

How much do you normally allocate for cost contingency in your projects and how much is the maximum? (Percent):

Project	Percentage:					
	Normally					Maximum
	0	1-3	4-6	7-10	>10	
a) Road and infraworks						
b) Buildings						
c) Bridge						
d) Substructures						
e) Other						

Section E: Feedback

1. Do you prefer to know result of the research?
   [ ] Yes [ ] No

2. Would you willing to be contacted to provide additional information to support this research?
   [ ] Yes, my contact telephone number is _____ ext: _____
   [ ] No

Thank you for your time and cooperation in completing the questionnaire. Your response will be used for research purpose only. It would be appreciated if you could return this questionnaire as soon as possible, if possible by 15th February 2009.

Appendix 5: Interview Pictures

Picture 1: Interview with HBO Construction Sdn Bhd Representative

Picture 2 : Interview with Mega Manjung Sdn Bhd