

Quantity surveying estimating methods impact



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In view of the fact that the profession was being introduced in the country, Quantity Surveyors are construction professionals which being patronized under the Institution of Surveyors, Malaysia and its Board of Quantity Surveyor Malaysia. Advices are given by Quantity Surveyors on aspects of financial and contractual administration (ISM, 2004).

ISM (2004) define, the Quantity Surveyor as the experts of capable in cost and management of construction projects and also need to price the Bills of Quantities, negotiating and agreeing schedule of rates. According to Andrew Doyle and Will Hughes (1997), the Quantity Surveying profession is constantly scrutinised, with regular demands for higher accuracy estimating.

Besides, Mohammad Barzandeh (2009) defines estimating as the process of calculated guessing by looking into the future costs of a construction project before start work. It happens before construction has started. The Quantity Surveyor is responsible for these estimates which serve to make sure that construction project will have a successful financial outcome. Phuwadol Samphaongoen (2009) states construction cost estimating as a cumbersome process. An accurate estimate takes a long time for the Estimator to complete it. Contractor's Estimator has to prepare cost estimates quite often for new projects. According to Skitmore, et al (1990), the aim of construction price estimating is to provide an estimate of the market price for the construction contracts.

In the other hand, Holm et al (2005) defines cost estimating as the process of analysing a specific scope of work which predicting the cost of performing the work. Cost estimating also involves collecting, analysing and

summarising all available data related to a construction project. Hira N.

Ahuja & Walter J. Campbell (1998) define a simple definition of an estimate which is “ a prediction of probable cost”. According to Mohammad Barzandeh (2009), estimating is one of the most important functions for a successful construction project. These Estimates also influence the decisions made for budgeting and assist in Clients’ decisions for selection of the Contractor.

1. 2 Problem Statement

Cost overrun is a very common phenomenon as most of the construction projects in Malaysia facing this problem. Cost overrun occurs when the final cost or expenditure of the construction project beyond the original estimation cost. Cost overrun occurs in both developing and developed countries. (A. S. Ali & S. N. Kamaruzzaman, 2010)

Besides, Kai Zhu (2005) emphasises, cost estimation and planning is a very important and fundamental aspect in the construction process, it facilitates effective and efficient control of the construction projects. Despite their importance, often in practice because of time constraints, its requirements are not usually fulfilled which in the long run affect a projects quality, duration and budget.

According to Kai Zhu (2005), one of the factors that cause cost overrun in Malaysia construction industry which is the inaccuracy of cost estimation prepared by Quantity Surveyors, the possible consequence of cost overrun is abandon of construction project due to underestimate. On the other hand, overestimated cost could result loss of opportunities by the Client and loss of

contract award by the Contractor, both the Client and the Contractor could incur significant losses due to underestimated cost.

In addition, Stephen D. Schuette et al (1994) emphasises that inaccurate construction project estimates might have a detrimental effect on all parties involved. Many additional factors which might affect the future events of construction project such as labour productivity, material availability, financial markets, weather, constructability issues, equipment availability, contract types, ethics, quality issues, control system, management ability and others.

1.3 Objectives

Objectives:

To identify the factors that affecting the accuracy of estimation by Quantity Surveyor during pre-tender and tender stage.

To identify the impact of inaccuracy in estimation to the Client and/or the Contractor.

To make recommendation for minimise the inaccuracy of estimation during pre-tender and tender stage.

1.4 Rationale of study

Keith Potts (2011) states, the estimating process is very important, as it enables construction companies to determine their direct costs and provides a bottom line cost below which it would not be economical for them to carry out the construction work. Leng (2005) also states, cost estimation is one of the most important activities of the entire project duration. An over-estimate

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could lead to tender not being accepted by the Client and losing potential work. An under-estimate could lead to Contractor losing money.

According to Hira N. Ahuja & Walter J. Campbell (1998), cost estimate play the major role in the decision-making process which leads from concept to completion of a construction project. Cost estimating has become very important under economic conditions with high inflations and fiscal constraints.

As mentioned by Keith Potts (2011), the basic challenges faced by the Contractor's Estimator is to estimate the costs of constructing a project schedule for the specific construction activities and after that build the construction project within the estimated cost and schedule. Contractor to build a construction project profitably, the cost estimating and cost control skills are very essential for the Contractor.

Kai Zhu (2005) recommends that the factors which affect the accuracy of estimation should be identifying in order to increase the accuracy of estimation. Besides, accurate cost estimation minimise the risk of cost overrun, provides confidence on construction project outcomes to the management and contributes to the strategic management of the organization. According to Zaitoun Shadeed Al-Khaldi (1990), there are many factors that affect the accuracy of construction cost estimating and it should be taken into account in the early stage of an estimate. Some of the factors can increase costs and the possibility of contractual disputes between the various parties involved.

1.5 Research Methodologies

As stated by Richard Fellows & Anite Liu (2008), there are two major approaches being employed for data collection, which are primary data and secondary data. Primary sources allow the researcher to obtain as close as possible to what actually happened during a historical event or time period. A secondary source is a work which interprets or analyses an historical event or phenomenon. It is generally at least one step removed from the event and is normally based on primary sources.

According to Richard Fellows & Anite Liu (2008), primary sources can be categorise into qualitative, quantitative or a mixed method research. In qualitative approaches seek to obtain insight and to understand people's perception. Quantitative approaches tend to relate to positivism and seek to obtain factual data, to study relationship between facts and how such facts and relationships accord with theories and the searching from any research executed previously. Interview will be conducted in order to derive primary data. Besides, Quantitative approach such as questionnaires will be employed and conduct through postal delivery and e-mail.

According to Denscombe (2007), secondary data provide the researcher theoretical background and knowledge. Secondary data will be collected by literature review method, which include reading journal, articles, published electronic, thesis or dissertation done by other students, news and books. For this project dissertation, majority of the secondary data is collected through books, articles and journals.

Chapter 2: Literature Review

2. 1 Factors affecting the accuracy of estimating

According to Hira N. Ahuja & Walter J. Campbell (1998), accuracy in estimating relies on freedom of avoidable mistakes. Estimates errors may also be attributed to technical errors in calculations or simply to careless “ blunders”. Some ordinary blunders are misplacing a decimal point, failing to include the total of every estimate sheet in the final summary, errors in transferring figures from one sheet to another, simple multiplication or addition mistakes and misreading a number because of unclear handwriting. Any one of these types of errors can lead a significant effect on the accuracy of an estimate.

2. 1. 1 Construction items

2. 1. 1. 1 Complexity of project

Michael kitchens (1996) emphasises that the construction industry has become increasingly complex through the years as a result of improvement and advance in technology, natural evolution and litigation. H. van Meerveld, et al (2009) states that the level of complexity of a construction project is a function of three features which include organisational complexity, resource complexity and/or technical complexity. Cost estimation might influence by organisational complexity, resource complexity and/or technical complexity.

As mentioned by Michael kitchens (1996), organisational complexity is the number of people, departments and organisations that are involved.

Organisational complexity might lead to a loss of information due to communication becomes more difficult when more people are involved. The

information that is lost can sometimes be necessary for acquiring an estimate. Organisational complexity can also indicate that Estimators work simultaneously on the same project. In this case, Estimators have to put more effort into coordinating this simultaneous work.

According to H. van Meerveld et al. (2009), resource complexity is the volume of resources involved constantly assessed through the budget of the construction project. Resource complexity means that the overall amount of work needed to estimate increases which also increase the chance of making mistakes or errors.

H. van Meerveld et al. (2009) note that technical complexity is the level of innovation involved in the product or the construction project process or novelty of interfaces between different parts of that process or product. Technical complexity means that Estimators will have to make manual adjustment to acquire a more accurate estimate on the particular construction project. In projects that are more complex are subject to a higher chance for the change of design. The Estimator has to re-estimate the complete project or parts of it depending on the sort of design changes.

H. van Meerveld et al. (2009) state that in general there are two issues influence the estimating activities on more complex projects, which include a higher demand for coordination and structure to prepare an estimating for the construction project. Besides, if complexity increases estimating will need more effort to acquire an estimate and the probability of making mistakes increases.

However, according to A. Ashworth et al., the complexity of modern construction industry and the variety of processes used have limited the availability of reliable feedback of information. In practice, the Estimator will have to use his own standard outputs and couple these with an expectation of future performance.

2. 1. 1. 2 Labour productivity

As stated by Donald F. McDonald et al (2004), on construction projects there are numerous circumstances and events that may cause productivity to decline which the Estimator might not anticipated when estimating the construction cost. Estimating labours and equipments costs requires more knowledge of construction techniques and experienced judgment as compare with estimating material cost. As estimating labours and equipment cost has the greatest uncertainty is in predicting the productivity of the labours and equipment that used on the construction project.

According to Aiyetan Ayodeji Olatunji (2010), construction productivity is influenced by many factors which including material, equipment, tools, construction methods, management skills in terms of adequacy and accurate application. Donald F. McDonald et al (2004) mention that as a result of poor project management may be caused by the failure to properly schedule and coordinate the work and the Estimator might not expected that event of the poor project management.

According to Donald F. McDonald et al (2004), work that is not scheduled properly which might lead to shortage of critical construction equipment or labours and incorrect mix of labour crews may result in decreased

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productivity of the labour because the labour may not be able to work as efficiently as they could. Improperly planned and implemented project initiation procedures might also lead to lost labour productivity.

Donald F. McDonald et al (2004) also states that if material, tools or construction equipment are not available to particular labour at the right location and timing, the productivity of the particular labour probably suffer as they may be unable to proceed in a consistent manner. Productivity of the labour might suffer if the wrong tools or improperly sized equipment is provided. In addition, poor site layout design can affect the productivity.

In addition, Lee Holm et al. (2005) emphasise that estimating should be vary depend on site conditions, labour size, labour experience and equipment selected for the particular construction project. As lost productivity of labours are not tracked normally or cannot be discerned separately and contemporaneously.

2. 1. 1. 3 Insufficient time

David G. Carmichael (2002) emphasises that construction projects involving design time of months or years which request the Contractors to digest the tender documents and submit the tender within a relative short period. The planning, estimating, developing a work method, studies and others are prepared within a short period or an insufficient time is allowed. The Contractors is required an appropriate tender period to develop thorough the tender.

David G. Carmichael (2002) states that as insufficient time is given to the Contractor for estimating and pricing the tender in rushing process, the Contractor might miss out any prior consideration. Binnington Copeland & Associates (2012) also state that as the failure to allow the Estimator adequate time to carefully consider and pricing for risks which might result in excessively high tender prices where substantial contingency is allowed by the Estimator to cover unexpected situation, as the Estimator had not enough time to deal with it. Besides, according to David G. Carmichael (2002), this presents a challenge to the Estimator who has to prepare and complete several estimates and tenders in a relative short period of time.

Tang Wai Kuen, Raymond (2005) emphasises that insufficient time for cost estimating is the prior factors which cause inaccurate cost estimating incur, as construction programmes are very tight and designs are frequently changed. The performance of cost management adversely affects the Estimator to estimates as insufficient time is provided.

2. 1. 1. 4 Inadequate information

According to Aiyetan Ayodeji Olatunji (2010), majority of the Contractors' Estimator facing problem when tendering for a construction project which the information provided is insufficient. Under this circumstance, the Estimator must make his or her own estimation and assumption on it, if inaccurate estimation has been made, it may lead the Contractor overestimate or underestimate. Overestimate might cause the Contractor unable to award the construction project, underestimate might cause the

Contractor unable to gain profit from the particular project or more worst still abandon of work due to insufficient financial to run the construction project.

2. 1. 1. 5 Lack of availability of equipment

There are two major circumstances which faced by the Estimator when estimating or pricing the tender. Firstly, the Estimator might require estimating the fluctuation of the price of equipment for relative long of period as the construction period normally last for few years. Secondly, during tendering stage the Estimator might require deciding whether own the equipment or hire the equipment from specialist company if the project require certain equipment which the Contractor does not own the equipment (Zaitoun Shadeed Al-Khalidi, 1990).

According to Zaitoun Shadeed Al-Khalidi (1990), the Estimator has to evaluate and select one particular piece of equipment, it is essential to determine its hourly cost very accurately. Some factors have to be considered during this stage, which are number of hours used per day, month and year, severity of job conditions, the way the equipment has been maintained and the demand for equipment owned by the Contractor when it is sold. In addition, the price of the equipment might be increase due to inflation or many mega projects are run concurrently which might cause the unavailability of the equipment.

2. 1. 1. 6 Incomplete drawing and detail design

Lee Holm et al. (2005) emphasise that the accuracy of estimate also will depend upon the completeness of the contract documents provided and

others. In addition, the factors of incomplete drawing and detail design as the factors which cause inaccuracy of estimation in construction project. During tendering, the Contractor's Estimator is carrying out the estimating work due to drawing is unclear and none very detail shown in the drawing. The Estimator has to make his or her own assumption for estimating and pricing the tender. This factor will increase the chance of inaccuracy estimation for the particular construction project.

2. 1. 1. 7 Computerised estimating software

The actual use of the computer for estimating is varied within the construction industry. Some companies use the computer for all construction projects with a high degree of sophistication and some other companies do not use the computer at all. (Stephen D. Schuette & Roger W. Liska, 1994)

Phuwadol Samphaongoen (2009) defines detailed cost estimating as a cumbersome process that involves a lot of data and calculations, improvement in technology that could assist the estimating process of construction cost; it could reduce the Estimators' work load. Computers are considered to be effective tools for assisting Estimators during the pre-tendering and tendering stage. Computers provide many benefits to the Estimator, which including reducing estimation errors, the time required and others.

Stephen D. Schuette & Roger W. Liska (1994) state that the early uses of computers by the construction companies were limited to accounting functions only. The improvement in micro-computering have increased knowledge of computer capabilities construction managers have begun to

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use computers in everyday construction operations to make quick and accurate decisions.

Phuwadol Samphaongoen (2009) states estimating technologies which include spreadsheets, builds soft, microsoft excel, cost estimating software, digitizing tablets, on-screen digitizing systems and the yet to be matured 3-D CAD parametric estimating software and others. During the detailed cost estimating process various software packages are available to assist the Estimator. The capabilities of software packages vary greatly, as some of the software is include labour, equipment and material cost databases, after the database is set up which could facilitates the estimating process.

According to Phuwadol Samphaongoen (2009), a spreadsheet is a computer application which simulates a paper worksheet. It arrange for the user with cells that are compiled into rows and columns. Each of the cells can contain either text, numerical values or formula, it can be defined in cells to obtain calculated value from the related cells. Complicated mathematical calculations can be automated with a change or alter of a single cell with the use of formula in the spreadsheet. Estimator uses the worksheets to accelerate the estimating process. A template can be set up by the Estimator with saved formula in the spreadsheet. Quantity take-off calculations can perform within a spreadsheet by the Estimator. Although a spreadsheet requires a lot of input from the Estimator, it could remove the cumbersome and error prone manual calculations during the quantity take-off and pricing.

As stated by Mofti Bin Marjuki (2006), Global Estimating is an estimating program which has been tailored for commercial use in the construction

industry. Bills of Quantities or detailed Estimates and Cost Plans can be produce through this program. Designed primarily for use by commercial building Contractors and professional Quantity Surveyors it includes features which allow it to be used in other industries where estimating is required. The grouping columns in this program are very powerful as it can be re-sorted or analysed the entered information. For example, the estimate can be summarised to produce totals by area, block, stage, cost centre, accounting group, or any user defined set of codes.

Mofti Bin Marjuki (2006) mentioned Microsoft excel can be used for contains or store industry standard cost data in the CSI format for all cost categories covering general construction. Unit prices include material and labor including labor hours. This software provide easily modify and add cost data to suit local conditions and business. Besides that, Microsoft excel instantly creates user-modifiable, onscreen or printed estimate reports including price quotation. In addition, this software can save time, improve accuracy and achieve greater success.

Phuwadol Samphaongoen (2009) notes that a digitizing tablet is a computer input device which uses a stylus and a tracking surface to capture the drawing on to the computer system. The drawing traced on the tracking surface transfers point coordinates to a computer; it can be used for many different purposes which including construction cost estimating. Digitizing tablets' purpose in construction cost estimating is to digitize the paper-based blueprints provided by Estimator or the designer.

For example, the Estimator can get the length, perimeter and area out of the drawing by the scale provided in the blueprints. These parameters are available when using the digitizing tablet through software package. After the paper blueprints have been digitized and the quantities for all work items have been determined, the Estimator might those quantities to estimate the prices of items, but quantity takeoff using the digitizing tablets may cause errors from unstable hand during tracing the drawing. Digitizing require a large number of blueprints which is very time-consuming process to the Estimator. (Phuwadol Samphaongoen, 2009)

Phuwadol Samphaongoen (2009) mentioned that 3-D computer aided drawing (CAD) models allow estimators visualize what is going to be built in the 3-D environment. The ability to digitally extract and transfer data can speed up and facilities the cost estimating process. A building model allow the user seen in many different views which include details of elements, dimensions can be extracted and transferred to the estimating software.

In the other hand, Stephen D. Schuette & Roger W. Liska, (1994) state that the duties of the Estimator might change if the Estimator's company implements the use of the computer in the estimating process. Before computerisation estimating process the Estimator spent the greatest amount of time determining the quantities of materials and performing math calculations. Computers accomplish these tasks rapidly and accurately permit the Estimator to give more attention and concentration to alternative construction methods, material supplier negotiations, predicting the productivity of labours, developing accurate cost information and bidding strategies.

Everything that comes out of the computer, the Estimator should not accept it blindly or rely totally on the computerised system as the computer cannot make judgment. The result of the computerised estimate software should always review by Estimator to avoid errors and mistakes; as computerised estimate software is not immune to technical faults which are likely not to be detected easily and early as recommend by Stephen D. Schuette & Roger W. Liska (1994).

Besides, Stephen D. Schuette & Roger W. Liska (1994) state that computerised estimate software could also be susceptible to technical limitations such as inability to work under certain conditions, inability to work well with other tools and limited to technical support. It might trigger severe consequences on estimating processes due to the Estimators lack of knowledge on those computerised estimate software.

The manifestations of tool based error are which included: software construction, faults from programme performance frameworks, errors from a secondary source, end-users' inappropriate use, inability to interact perfectly with other applications and others (Oluwole Allfred Olatunji, 2010).

In addition, Oluwole Allfred Olatunji (2010) mentions that computerised estimate software could obsolesce of standards due to evolution of information technology in the estimating industry, especially description libraries and databases used for automatic estimating. Estimators or applications must be updated frequently when built into a programme as reference standards for reviewed, otherwise that the program possibility miss-apply the standards.

2. 1. 1. 8 Experience or qualification of Quantity Surveyor Estimator

According to Skitmore et al. (1990), 'expert' Quantity Surveyors in the UK provided evidence of significant differences in estimating accuracy between the individual surveyors involved. Lee Holm et al. (2005) emphasise that the accuracy of estimate also will depend upon the completeness of the experience of the Estimator and others. As stated by Hira N. Ahuja & Walter J. Campbell (1998), the Estimator's knowledge can provide a measure of insight and accuracy that is unobtainable from any other information sources.

According to Skitmore et al. (1990), construction contract price estimating practice is, with very few exceptions, heavily dependent on the skill of the Estimator. This skill is associated with the other factors affecting the quality of Estimator which are the nature of the target, information, technique and feedback and the personal attributes of the forecaster himself combining to provide the general term of "expertise".

Besides that, Mudd (1984, p. 1-2) has described that Contactor's Estimator should associated with certain qualities. These include: good basic numerate and literate education, reasonable time spent on site, interpret drawings, ability to communicate, facility to make accurate mathematical calculations, application of logic and common sense, patience, able to cope with a vast volume of paper, a working knowledge of all the major trades, close relationship with those peoples who are responsible for construction, a knack of picking up useful information, flexibility and others.

2. 1. 1. 9 New/innovative techniques or materials

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The implementation of Industrialised Building System (IBS) is still not widespread in the industry despite the government has encouraged the implementation of IBS towards reducing percentage of foreign works and improving quality, productivity, safety and competitiveness through IBS construction method. IBS is a construction process that utilises techniques, products, components or building system which involved prefabricated components and on-site installation (CIDB 200).

Salihudin Hassim, Mohd Saleh Jaafar and Saiful Azri Abu Hasan Sazalli (2009) emphasise that since the first project of IBS in year 1964 till today, IBS in Malaysia is not well accepted by the construction parties because of failure to adequately deal with risk in the IBS projects. The failure to keep in cost estimate in IBS project is still common in Malaysia and it is one of the reasons that limit the development of IBS in Malaysia construction industry.

2. 1. 1. 10 Availability of historical price data

Martin Brook (2008) states that estimating method used for cost planning and estimating which relies on historical cost data during early stages, whereas current price apply by analytical estimating approach to resource for a well-developed design. According to Hira N. Ahuja & Walter J. Campbell (1998), most established companies make it a policy to keep records of actual costs incurred on their various construction projects.

As mentioned by Hira N. Ahuja & Walter J. Campbell (1998), the estimator can determine if his estimated costs were accurate or otherwise through comparing records of estimated costs. If the estimating is not accurate, whether the discrepancy was due to Estimator own lack of expertise or <https://assignbuster.com/quantity-surveying-estimating-methods-impact/>

rather or incur some unforeseen cost-incurring conditions. In addition, these cost records serve another function, which is providing reliable cost data for preparing future estimates.

Tang Wai Kuen, Raymond (2005) mentions that there are several historical databases available that provide current values for estimating costs of the several units of work for a project. The example of historical price data such as databases are collect from records of actual project costs or company's own past experience and on-going price quotations from suppliers and are published annually in the form of books, CDs and computer-based extranets.

Stephen D. Schuette & Roger W. Liska (1994) suggested that it is important that accurate database information be received to develop the estimating information data bank. In the other hand, according to Tang Wai Kuen, Raymond (2005), applying published data or software database pricing without first adjusting for the particular aspects of the project it might cause underestimate or overestimate. As every project in construction is unique as every project with a distinct set of local factors, for examples; size of project, level of competition, flexibility of specifications, work site, working hour restrictions and others.

As stated by Tang Wai Kuen, Raymond (2005), review each line item by the professional Estimator is required when the estimating system attached to a price database, such review for the Estimator to make sure it is applicable. Inaccurate estimates can be caused by the Estimator applying these database prices blindly. Historical can be constitute a major cause of inaccurate cost estimate, if the Estimator store incorrect or inaccurate data

as price database, in future the Estimator prepare cost estimation relies on inaccurate or incorrect database cause occurrence of inaccurate estimate.

On the other hand, Hira N. Ahuja & Walter J. Campbell (1998) emphasis, estimating publications have increase greatly, these guides are invaluable to Estimators who do not have access to actual job records. Published data are useful during all stages of estimate development. Although it is certainly not recommended that published data alone be used for an entire estimate, but it is undoubtedly useful in filling in the gaps in cost information where no other source is unavailable.

2. 1. 2 Financial factors

Aiyetan Ayodeji Olatunji (2010) states that the performance of construction projects negatively affects by financial risk, financial risks might include high inflation and increased construction of the project. These factors affect particular projects where materials and goods are required for construction have to be imported from foreign country. The exchange rate changes on a daily basis are high so that the interest rate subject to change, it increases the percentage or chances of inaccuracy estimation occur. As mentioned by Laeeq Hassan (2010), financial risk associated with construction projects which include paucity of funds, delay in payment and others. All construction parties or compani