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Fundamental Variables of Final Account Closing Success in Construction Projects in Malaysia

Zarabizan Zakaria, Syuhaida Ismail, Aminah Md Yusof

***Abstract*—**Project management process starts from the planning stage up to the stage of completion (handover of buildings, preparation of the final accounts and the closing balance). Seeing as this process is not easy to be implemented efficiently and effectively, the issue of unsuccessful delivery as per contract in construction has become a major problem for construction projects. These issues have been blamed mainly on inefficient traditional construction practices that continue to dominate the current industry. This is due to several factors, such as environments of construction technology, sophisticated design and customer demand, that are constantly changing and influencing, either directly or indirectly, to the practice of management. Among the identified influences are physical environment, social environment, information environment, political and moral atmosphere. Therefore, this paper is emerged to determine the fundamental variables in the final account closing success in construction project. This aim can be achieved via its objectives of identifying the key constraints to the closing of final accounts in construction projects in Malaysia, investigating solutions to the identified constraints and analysing the relative levels of impact of the identified constraints. It is expected that this paper provides effective measures to avoid or at least reduce the problems in final account closing to the optimum level. It is also anticipated that the finding or outcome reported in this paper could address the unsuccessful contributors in final account closing and define tools for their mitigation for the better development of construction project.

***Keywords*—**Fundamental variables, closing of final account, construction project, Malaysia.

I. Introduction

THE construction industry is one of the industries listed as a major contributor to the economic development of a country. The importance of the construction industry can be seen clearly through the construction of involvement in a variety of industries and diverse fields. Pheng (1994) argues that the construction industry has a direct bearing on the national economy and consequently, hence can be used as an indicator of economic well-being for a country [23]. Thus, the effect of construction on the economy through the production process and through the effects of credit constraint can be as important as the effect of the economy on the construction sector [29]. This is because the construction sector comprises various fields including architecture, civil engineering, mechanical engineering, electrical engineering, quantity surveying, land surveying, building contracting and landscaping, among others [7]. The consultant and contractor are drawn together by a common purpose to build a building project for a person or an organization, called the client [26]. Normally, construction player considers the project as successful when it is completed on time, within budget and met the standard specifications [6]. However, the importance of the final account closing resolved in the stipulated time understand the situation and come up with suitable solutions frame and agreed contract cost is always being neglected [32], [34].

Therefore, it is undoubted that construction industry plays an important role in generating wealth and improving the quality of life through the translation of government's social-economic policies into social and economic infrastructures and buildings. For this reason, a sum of RM230 billion has been allocated for development under the 10th Malaysia Plan from Malaysia governments [32]. Furthermore, the construction industry creates a multiplier effect to other industries, including manufacturing, financial services and professional services. However, at the same time, there are a lot of problems faced by Malaysia construction industry, which will effect to the productivity of construction industry in terms of manpower, quality of productivity, time and payment issue especially during the closing of final accounts in construction projects. Nevertheless, as various efforts have been taken by the government in sustaining Malaysia construction industry to ensure its supports to other industries, Malaysian economy grew by 4.7 percents (FY2010: 5.4 percents) on growth in private consumption and sustained robust expansion in gross fixed capital formation amid the consolidation in government outlays and moderate external trade growth [19].

When unforeseen situations occur on construction project, it is important to firstly and forecast the problematic consequences. The timing of payments is said to be a key element of a contractor's profitability performance [28]. It will bring inconveniences to all the parties involved in the construction industry, mainly the client, consultants and the most important, the contractors. On the other hand, it also brings inconvenience to the end user because the final accounts remained unresolved after the building is occupied. This is supported by Odeyinka and Kaka (2005) through their surveys on the impact of the payment terms of cash flow, which found that contractors were dissatisfied with the time lag to receiving payment [22].

Zarabizan Zakaria is with the UTM Razak School of Engineering and Advanced Technology, University of Technology Malaysia Kuala Lumpur, Jalan Semarak, 54100 Kuala Lumpur, Malaysia (phone: +6013-343 4949; fax: +603-2180 5380; e-mail: zarabizan2@live.utm.my).

Syuhaida Ismail is was with UTM Razak School of Engineering and Advanced Technology, University of Technology Malaysia Kuala Lumpur, Jalan Semarak, 54100 Kuala Lumpur, Malaysia (e-mail: syuhaida@ic.utm.my).

Aminah Md. Yusof is with the Faculty of Civil Engineering, University of Technology Malaysia, 81310 Johor Bahru, Johor, Malaysis (e-mail: aminahyusof@utm.my).

Over the years, the issues of unsuccessful project which failed to follow the clauses stipulated in the contract will be blamed on an ineffective management [20] and dominance of traditional construction practices. Love et al., (2002) claim that these practices create unnecessary waste, errors and misapprehension amongst the project managing. Current construction practice in Malaysia has also resulted in duplication of work, lengthy approval and work time, lack of transparency and surging costs that contribute to the failure of final account closing [9]. Calls for improvement have been made through the Malaysian Construction Industry Master Plan 2006-2015 [9] with similar efforts being previously made in other nations, such as Australia, Sweden, Finland, Hong Kong, Norway, Singapore and the United Kingdom [18]. This suggests the need to identify the fundamental variables of final account closing in the way projects are successfully managed.

Based on this, some strategies are needed to anticipate any problems that may occur from the planning stage, so that the on-site issue can be determined and minimized during the closing of final account. The logical questions at this point are: why is it necessary to link the causes and effects of unsuccessful final account closing and how can the link help the practitioners to prevent or remedy future dispute and unsuccessful final account closing? Therefore, a study to identify the fundamental characteristics of final account closing in ensuring the success of final account closing is crucial to be conducted. This is in accordance with Shen et al., (2007) who claim that the objectives of a construction project are to ensure the financial affordability to the stakeholders and clients, create employment opportunities and competitiveness as well as maintain the needs of future generations, which could be indirectly achieved if the final account can be successfully closed [27]. Therefore, client or paymasters should practise an efficient system to make sure that the contractor receives the payment accordingly.

II. Overview of Malaysia Construction Industry

Construction industry is an important cog in the wheel propelling the Malaysian economy, where the nation has witnessed a great change in this industry since the last two decades. According to Lewis (1956), more than half of capital formation consists of work in construction [17]. Construction industry via the delivery of construction project provides work for many professionals ranging from architects, engineers, surveyors to main contractors, sub contractors, suppliers and ultimately manual labourers employed by these contractors [14]. Chua et al., (1999) define construction project participants as the key players, namely the project manager, client, contractor, consultants, subcontractors as well as suppliers and manufacturers [8]. Construction project will only sustain when these people are paid for the work and services that have been properly rendered [35]. Malaysia construction industry is aimed to be World Class Standard by 2015 by Malaysia Construction Industry Master Plan (CIMP) (2005 – 2015), which outlines the vision, mission, critical success factors, seven strategic thrusts and 21 strategic recommendations in channelizing the development of the Malaysian construction industry through the following decades. Therefore, from economic perspectives, the works in construction industry are very important because they are linked and supporting the growth of other industries [10].

This positive expansion of Malaysia construction industry is affected by the most profound recent developments in construction, which include the increasing size of many of its projects and organizations, technological complexity of projects, volume of contractual claims and disputes, complex interdependencies and variations in the relationships among its organizations and institutions, as well as proliferating regulations and demands from government [4]. In terms of the increased volume in contractual claims and disputes, which can negatively affect the current positive expansion of Malaysia constructions industry, there are many reasons for these disputes to be occurred within Malaysia constructions industry, ranging from under capitalisation of the respondent to the in competency of the claimant. Generally, there is no standard approach or guidelines in evaluating construction project performance [14]. In the early 1990s, at project level, success was measured by the project duration, monetary cost and project performance [14]. The criteria of project success are constantly being improved by the studies in various aspects, mainly in construction industry. Therefore, it is essential to investigate the solution method of final account closing problems in Malaysia construction industry through identifying the fundamental variables of final account closing success in construction projects.

III. The Need of Transformation in Managing Construction Project Effectively

Construction industry, not only in Malaysia but also throughout the world, has been heavily criticized for decades for conflict relationships, fragmented nature, the need for customer/end-user focus, limited investment in improvement and innovation, cost performance, poor time as well as low quality, productivity and satisfaction levels [5], [11], [16]. There is now an urgent need for revolutionizing construction practice, technology, mentality, work practice and processes and maintaining continuous improvement through effective benchmarking and performance measurements. These changes will ensure advantages over conventional practices [13], as the sustainability of the industry depends on its improved capability and aptitude [2]. Calls for greater project success have been made in recent times [15]. Thus, in order to adapt in the new era, considerable improvement needs to take place to improve the country‘s construction performance, such as success of the final account closing.

By examining the improvement needed for Malaysian construction practice, the industry could possibly benefit from the best practices from other industries such as manufacturing and production. The UK’s Egen (1998) also stresses the need for industry to modernize itself to become more competitive and efficient. The increasing, unique, complexity and dynamic nature of today’s construction industry [12] suggest that conventional practice should be “a story of the past” [21]. A step towards a longer-term relationship that nurtures

enhancement of integration, knowledge sharing, investment in relations and greater flexibility is vital [25]. Improvement in the management of construction players is therefore necessary for increased construction productivity [30]. In the case of Malaysia, effective construction management integration practice needs to be related to the current trend in order to enhance its competitiveness and innovativeness toward success in construction project [1].

IV. Final Account in Construction Project

The process payment to contractors begins from the start of construction until the project is completed. Among payments involved are advances payment, progress payment and final payment, which is the final figure of a contract project [33]. Final accounts for the construction project have been prepared to show the final cost of a project that has been completed by the contractor [31]. Final accounts include the cost of defect liability period, all additions, alternations, deductions resulting from project changes and other related payment as stated in the contract [34]. Final accounts should be prepared immediately after the projects are completed based on the type condition of contract [24]. Sometimes, it also refers to the calculation and agreement of the final construction cost between the employer, contractor and incorporates a fair valuation of the works carried out [3].

Forms of contract to be used should be understood by all parties involved in the construction projects to prevent any disputes or problems in the future, especially in the closing of final accounts. Most of the standard forms of contract in Malaysia contain provisions upon which the contract administrator is obliged to close the final account and issue a final payment certificate to the contractor within a stipulated time period after the receipt of the contractor's final account statement [32], [24].

On the other hand, impacts of problems in the closing of final account also represent an additional cost to the contractor, where in majority of cases, the employer is anxious to know his ultimate financial commitment [32]. The contract administrator has a contractual responsibility under the contract to ensure that the date stipulated in the contract for completion of the final account is achieved, whilst the contractor should assist in giving prompt provision for subcontractor's and supplier's accounts by taking into considered the method of measurement and prices based on agreement as well as providing necessary supporting data. Thus, this paper proposes a list of key constraints in the final account closing.

V. Research Methodology

The first step in the research is to obtain existing relevant information on the causes of final account closing problems in construction project in identifying the fundamental variables of final account closing success in construction projects in Malaysia. This involves literature reviews and preliminary structured questionnaire surveys conducted with Malaysian construction industry experts, which aimed at identifying Malaysia's current issues by taking into account the locality factors that may apply. The survey forms are prepared, tested and sent to industry practitioners in order to identify the main causes of the unsuccessful final account closing in Malaysian construction projects, which will then be grouped into distinctive pathogens. To increase the validity of the survey outcomes, the paper ensures that the questionnaires are purposively scattered throughout the industry's supply chain, with the proposed sample size of 300 responses and at least at 35 percent response rate. The data obtained from surveys is then translated into a framework which improves each pathogen of key constraints in the final account closing. Finally, the framework is validated through two sessions of structured interviews with the experts and decision makers of Malaysian construction industry to ensure that it is workable and suitable for Malaysian construction industry application.

VI. Data Collection

This section presents the results of the questionnaire survey based on the construction projects completed in the past five years in Malaysia. The results of this study are generated from all the responses received. Data collected are then analyzed statistically. The structured data are summarized by calculating frequencies, percentage, relative index, standard deviation and ranks. Relative index is used to determine the ranking of factors, impacts and action taken by contractors to overcome the final account closing problems. As to evaluate the level of agreement between each of the categories of respondent involved, Spearman's correlation coefficients are used. High value of rank correlation coefficients indicates strong agreement.

A. Respondent Particular

The distribution of respondent varies from the types of business of the company, gender and age. The data obtained are shown in Tables I-III.

TABLE I
Summary of the Data Collection and Response Rates

Questionnaire	Data Collection
Number of questionnaire sent out	300
Total questionnaire received	156
Total questionnaire selected	156
Response rate (received questionnaire)	52 %
Response rate (selected questionnaire)	52%

TABLE II
Experience Level of the Project's Respondent (N=156)

Year of construction experience	Frequency (per selected project)	Percentage (%)
Below 5 years	9	5.8
6 to 10 years	15	9.6
11 to 15 years	31	19.9
16 to 20 years	32	20.5
Above 20 years	69	44.2
Total	**156**	**100**

TABLE III
THE DISTRIBUTION OF RESPONDENT BASED ON COMPANY NATURE OF WORKS

	Clients	Consultant	Contractors
Respondent	61	40	55

B. Fundamental Variables in Final Account Closing Success

This section discusses the factors that caused problems in final account closing among construction players in Malaysian construction industries which eventually form the fundamental variables in final account closing success. The factors are divided into three groups, which are contractor-related factors, client-related factors and contractual matters-related factors. Relative index is used to measure the most likely factors of problems in unsuccessful on final account closing. These indexes are then ranked, and the results are shown in their table respectively. Relative index with the same value in the same category was then calculated using standard deviation formula to determine the ranking. Finally, the identification of these factors will help to identify the fundamental variables that influence the success of final account closing in construction project.

1. Contractors Related Factors

Contractors related factors are factors contributed mainly by contractors. These factors include both by main contractors and consultants, such as contractors' delay in submitting claims and failure to follow the procedure as stipulated in the contract agreement. Relative index for contractor related factors as chosen by main contractors, consultants and clients, respectively, are shown in Table IV.

TABLE IV
RELATIVE IMPORTANCE INDEX AND RANKING FOR CONTRACTOR RELATED FACTORS

No.	Contractor Related Factors	Clients		Consultant		Contractor	
		In	R	In	R	In	R
1	Contractors failure to agree to the valuation of work	2.80	6	1.75	4	1.67	7
2	Contractors failure to understand the contract agreement	4.33	3	2.05	3	1.84	4
3	Contractors failure to follow the certain procedure/guidelines in claims	1.67	7	1.42	7	1.72	5
4	Contractors failure to do work based on bill of quantities (BQ)	1.33	8	1.60	5	1.70	6
5	Contractors delay in submitting claims	3.72	5	3.17	1	3.15	1
6	Contractors' submit claims with mistakes	4.33	2	2.82	2	2.38	2
7	Contractors submit uncompleted claims – without necessary attachments	4.07	4	1.52	6	1.86	3
8	Contractors failure in submitting a new (corrected) claim	4.33	1	1.32	8	1.52	8

* Remarks; **In**: Relative Index and **R**: Ranking

2. Clients Related Factors

Clients related factors are factors contributed mainly by clients. This includes clients' poor financial management and clients' poor financial sources. The act of clients' employee wrongfully withholding the payment also falls into this category. Relative index for clients' related factors as chosen by main contractors, consultants and clients, respectively, are shown in Table V. Ranking for index with the same value was later done using standard deviation.

TABLE V
RELATIVE IMPORTANCE INDEX AND RANKING FOR CLIENT RELATED FACTORS

No.	Client Related Factors	Clients		Consultant		Contractor	
		In	R	In	R	In	R
1	Clients' failure to understand the contract clauses	2.60	2	2.01	5	1.98	6
2	Clients' failure to follow the certain procedure/guidelines in claims	1.33	7	1.77	7	1.70	7
3	Clients' delay in certification	2.53	3	4.13	4	3.75	4
4	Clients' failure to agree to the valuation of work	2.40	4	2.00	6	2.01	5
5	Clients' failure to implement good attitude among its employee by wrongfully withholding the payment	3.40	1	4.50	3	4.49	3
6	Clients' poor financial sources/condition	1.87	5	4.63	1	4.69	2
7	Clients' poor financial management	1.47	6	4.63	2	4.81	1

* Remarks; **In**: Relative Index and **R**: Ranking

3. Contractual Related Factors

Contractual related factors are factors contributed mainly by contractual matters. This may happen if the contracts clauses in the agreement used are too complicated to be understood by the technical personnel. There are also cases where delay payment occurs because the contracts used are not comprehensive enough especially in terms of payments. Relative index for contractual matters related factors as chosen by clients, consultant and contractors respectively are shown in Table VI.

TABLE VI
RELATIVE IMPORTANCE INDEX AND RANKING FOR CONTRACTUAL RELATED FACTORS

No.	Contractual Related Factors	Clients		Consultant		Contractor	
		In	R	In	R	In	R
1	Contract bias to one party	1.73	3	2.10	4	2.26	4
2	Contract used is not comprehensive of payment aspect	2.00	2	3.45	2	3.22	2
3	Contract used is too complicated to be understood by both parties	1.60	4	2.30	3	2.30	3
4	The use of "pay when paid" clauses	2.40	1	3.65	1	3.41	1

* Remarks; **In**: Relative Index and **R**: Ranking

4. Influencing Factors in Final Account Closing Success

In the analysis, factors of final account closing problems are grouped into three main categories. Each of these categories was then analyzed and the results are shown in Tables IV-VI. From there, a new table was developed to reflect the factors that were rated highly by each of the group of the respondent. The results are as shown below in Table VII.

TABLE VII
IMPORTANCE INDEX AND RANKING OF UNSUCCESSFUL FINAL ACCOUNT CLOSING FACTOR CATEGORIES

No.	Final Account Closing Factor Categories	Clients		Consultant		Contractor	
		In	R	In	R	In	R
1	Client Related Factors	2.23	2	3.38	1	3.35	1
2	Contractual Related Factors	1.93	3	2.88	2	2.80	2
3	Contractors Related Factors	3.33	1	1.95	3	1.98	3

* Remarks; **In**: Relative Index and **R**: Ranking

As reflected in Table VII, contractors related factors were the highest ranking group to clients. This is mainly due to the failure to submit corrected claims, submission of incorrect claims and failure to understand the contract agreement. These three factors were ranked among the top three in this group by the clients. It was interesting to find out that contractors' delay in submitting claims and contractors submitting incorrect claims are the two most important factors in this category chosen by both main contractors and consultants.

Both main contractors and consultant have high level of agreement in choosing this category as the top factors of unsuccessful final account closing. The Spearman's correlation coefficients value on these factors between these two categories of respondent is 1. This is mainly due to clients' poor financial management and poor financial condition, which are ranked as the top two most chosen factors. Clients on the other hand ranked the failure to implement good "payment" attitude among their employee as contributed most to the unsuccessful final account closing. It is also worth noticing that clients' failure to understand the contract clause and failure to agree to the valuation of works are of more important factors to clients than contractors. The least chosen factor in this category is the clients' failure to follow certain procedures in claims. Contractual matters related factor was considered important and ranked second by both main contractors and consultant. Main contractors and consultant level of agreement on this category was high. They ranked each of the factors equally. The use of 'pay when paid' clauses in most of the contract in Malaysia was chosen as the top factor that caused final account closing problems in Malaysia. This is clearly revealed in the results of the paper by both main contractors and consultants. The use of 'pay when paid' clauses often occurred in contract involving sub-contractors and housing developers.

VII. CONCLUSIONS

Based on the literature review and data analysis result, three important categories, namely client, contractor and consultant are influencing the final account closing success in construction projects. As a result, it can be summarized that the action should be undertaken to achieve final account closing success is to ensure that the construction players have a clear employer's briefing, understanding contract procedure, clear specifications and statement of needs, good quality of workmanship, implementing code of practice, key elements regarding effective management, efficient communication with all components of the project team and decisive action in the event of deviation from plans.

As an important contribution, this paper has successfully demonstrated the fundamental variables of final account closing success in construction projects as specified in Fig. 1. It is believed that the information of this paper can help the construction players (clients, contractors and consultants) and academicians. The construction players can better understand and make efforts to reduce the incidences of dispute. In the future, through comparative studies in other aspects, the reason why each characteristic of a contract form, as well as roles and responsibilities of contract administrator have been formed must be proven from the viewpoints of history, culture and business practices.

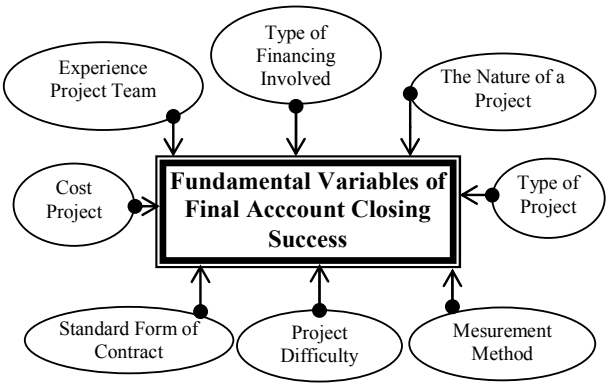

Fig. 1 Fundamental variables of final account closing success in construction project

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