

## Research Article

### Factors Contribute to Delay Project Construction in Higher Learning Education Case Study UKM

<sup>1</sup>N.M. Tawil, <sup>2</sup>M.A. Khoiry, <sup>2</sup>I. Arshad, <sup>2</sup>N. Hamzah, <sup>2</sup>M.F. Jasri and <sup>2</sup>W.H.W. Badaruzzaman

<sup>1</sup>Fundamental Studies of Engineering Unit, The National University of Malaysia, Malaysia

<sup>2</sup>Department of Civil and Structural Engineering, The National University of Malaysia, Malaysia

**Abstract:** The delay in construction project completion is a common phenomenon that occurs in the construction industry, especially where the government projects are concerned. This survey will center on the Ninth Malaysia Plan project delay as evidenced in the Universiti Kebangsaan Malaysia campus. It will generally examine delay-related issues, which include the definition, type and category of delay, as well as the contributing factors (theoretically or practically) that lead to delay in the project implementation. Data was compiled from literature review, interview and survey. Data obtained from the survey was analysed using the 'relative Important Index (RII)' whereby the source with the highest RII is one that mostly influences the delay. The critical source of delay is due to the fact that the project contractor does not have enough working capital, the late advance payment, the delay in the client or consultant endorsing the study, issues involving contractor management, the scarcity of construction materials and new instructions for additional construction work.

**Keywords:** Construction project, causes of construction delay, ninth Malaysian plan projects, Relative Important Index (RII)

## INTRODUCTION

Higher learning institutions are function to develop human resources that are able to adapt and compete in such a society. The idea of the knowledge society is increasingly becoming widespread in the move towards globalisation and internationalization (Symaco, 2012). In Malaysian there are currently 20 public universities; The National University of Malaysia or UKM is one of them.

Future more, towards achieving the status of developed countries, the important role of the construction industry in realizing such aspiration is undeniable. The construction industry has been around in Malaysia since the colonial era, evident in the construction of buildings or residential homes like the huts, forts even the palaces. Even transportation such as the boats where both small and big one had been created during those times. The study of the carpenters and carvers of the time had inspired the current construction projects.

Such as cheap labors, easy access to professional workers the construction industry in this country has gradually been progressing even before the country gained its independence. From the study and analysis done, the onset of the industry was noted after the World War II. To date, the infrastructure and facilities for transportation, residential areas and communication have advanced from being normal basic needs to more comfortable and convenient ones.

In construction industry, the person who responsible to arrange the construction site is project manager. Thus, incorrect decision or operating made by project manager who lack of enough experience (Kumar and Navaneethakrishan, 2012). The good manger learns from their working experiences that when their follow correct procedures, it will to project success (Ko, 2010). Managers of construction projects must develop the means to evaluate and estimate the consequential impact of change (Jawad *et al.*, 2009). However the bad manager will lead the project to delay.

The delay in construction project completion is a common phenomenon that occurs in the construction industry, especially where the government projects are concerned. Suspension means stoppage of work directed to the contractor by a form from the client, while delay is a slowing down of work without stopping it completely. Increase to disturbance of work and loss of productivity, late completion of project increased time related costs and third party claims and abandonment or termination of contract is the impact of delay. It is important that general management keep track of project progress to reduce the possibility of delay occurrence or identify it at early stages (Tumi *et al.*, 2009).

**Objective:** The aim of this study is to identify the main reason that explains project delay. Apart from that, this study will closely examine the critical factors that

influence project completion and suggest construction methods that can provide a more accurate prediction of the construction deadline during the project execution phase.

### LITERATURE REVIEW

**Previous study:** In Saudi Arabia, Assaf and Al-Hejji (2006) have conducted a research about different types of project delays in the state. It is concluded that 70% of projects experience time overrun. The survey was conducted with 23 contractors, 19 consultants and 15 owners. Seventy-three causes of delay have been recognized and the causes grouped into nine classes. The outcome of the survey that is agreed by all three parties is changing order. The overall results point to the fact that the factors related to labour, contractors, projects, owners and consultants are in the highest rank.

Using Drewin's open conversion system, Sweis *et al.* (2008) have identified the cause of delay in Jordan. The construction industry is the most important player in the economy to generate wealth and employment; however a lot of projects experience extensive delays and go beyond initial time and cost judgment. The results of the study as agreed by all contractors, clients and consultants are that the financial difficulties faced by the contractors and too many changes of orders by the owner are the leading causes of construction delay.

In Florida, Syed *et al.* (2003) identify the major causes of delay in building construction industries. The primary aim of this study is to identify the perception of the different parties regarding causes of delay, the allocation of responsibilities and the different types of delay. It is found that the consultants play a very important role in design-related delays because they are in charge of the design process in conjunction with the owners of the projects. Furthermore, delay in payment categories does not have the same negative impact on project completion times as other factors considered in this study such as code, design and construction-related issues.

The factor analysis technique is applied by Le-Hoai *et al.* (2008) to categorise the causes, which yields 7 factors: Slowness and Lack of constraint; Incompetence; Design; Market and Estimate; Financial capability; Government; and Worker. From these results, again, it is noted that most causes of delay and cost overrun of the construction projects relate to the human and management problems. These findings might encourage practitioners to focus on delay and cost overrun problems that might have existed in their present or future projects.

Murali and Yau (2007) have made the study about the cause of delay in Malaysia. In a survey in which 150 respondents had participated, this study identified 10 most important causes of delay from a list of 28

different causes and 6 different effects of delay. Ten most important causes were: contractor's improper planning, contractor's poor site management, inadequate contractor experience, inadequate client's finance and payments for completed work, problems with subcontractors, shortage in material, labour supply, equipment availability and failure, lack of communication between parties and mistakes during the construction stage.

**Types of delay:** There are two types of delay (Tumi *et al.*, 2009), namely non-excusable delays and excusable delays. A non-excusable delay is delay caused by the contractors or its suppliers, through no fault by the owners. The contractors are generally not entitled to relief and must either make up for lost time through project acceleration or paying compensation to the owner. Therefore, non-excusable delays usually result in no additional money and no additional time being granted to the contractors.

Excusable delays are divided into two: compensable and non-compensable delays. Compensable delays are caused by the owners or the owner's agents. Meanwhile, non-compensable delays are caused by third parties or incidents beyond the control of both the owners and the contractors. These delays are commonly called "acts of God" because they are not the responsibility or fault of any particular party (Wa'el Alaghbari *et al.*, 2007; Tumi *et al.*, 2009).

Wa'el Alaghbari *et al.* (2007) suggests that in his future study, another type of delay is added, which is the concurrent delay. If there is only one factor that is delaying the construction project; it is usually quite easy to determine as both time and money can well be affected from that single issue. Concurrent delay is a more complicated occurrence and this is very typical in construction projects. This situation happens when there is more than one factor delaying the project at the same time, or in overlapping periods of moment.

### METHODOLOGY

Survey questions were given to parties in the construction projects those were on progress at the University Kebangsaan Malaysia followed by brief interviews. The three construction projects involved were the moot court building of the Law Faculty, a kindergarten and nursery building and the PALAPES and SUKSIS building that were undergoing construction. Six respondents comprised of contractors and consultants, have participated in this study. The analysis for this study employs the relative important index or RII formula:

$$RII = \frac{1n_1 + 2n_2 + 3n_3 + 4n_4 + 5n_5}{5(n_1 + n_2 + n_3 + n_4 + n_5)} = \left( \sum_{i=1}^5 w_i \times f_{xi} \right) \quad (1)$$

where,

$n_1$  = The number of respondents who answered “strongly disagree”

$n_2$  = The number of respondents who answered “disagree”

$n_3$  = The number of respondents who answered “slightly disagree”

$n_4$  = The number of respondents who answered “agree”

$n_5$  = The number of respondents who answered “strongly agree”.

$$RII = \left( \sum_{i=1}^5 w_i \times f_{xi} \right) \times \frac{100}{N} \quad (2)$$

where,

$w$  = The weight age of the respondents

$i$  = 1, 2, 3, 4, 5

$f_{xi}$  = The frequency of every respondent

$f_{x1}$  = Strongly disagree up to  $f_{x5}$  = strongly agree

$N$  = Total number of respondents

Formula (1) and (2) are derived from (Hamzah *et al.*, 2011; Tawil *et al.*, 2011). According to a number of researchers, the mean and standard deviations are not reliable statistics for assessing overall ranking of the attributes (Doloi, 2008). This approach has given a direct descriptive interpretation for the critical factor based on the RII (Doloi and Young, 2009). Therefore, this approach is regarded to be very suitable to be exploited as the method of analysis of this study.

### ANALYSIS

The RII obtained from the above formula was used to determine the priority of every factor category that has been enlisted. The priority for each factor has been decided from the views held by the respondents, whether or not every factor fits to be given level 1 to 5 based on the level category, as stated in paragraph 4.7. The overall RII that has been obtained as shown in results in Table 1 will reflect on the factor that gives more effect on a project. The total number of respondents is 6 and every one of them has offered a different evaluation on every factor that has been discussed. A large RII value is very important in an analysis and the small value would be on the contrary. The highest RII value in this study is 100, whereas the lowest is 20. The results are shown in Table 1.

From the analysis, six out of 22 factors of delay namely insufficient capital, progress fee behind time, delay work approval/endorsement, contractor management issue, scarce construction materials and new instructions for additional work, have been found to be among the critical factors of delay in this study based on the highest RII value. The factors are also contributing to delayed projects at the University

Table 1: RII results

	Factors of delay	RII value
1	Insufficient capital	100
2	Delay in getting progress payment	97
3	Delay in getting work approval	97
4	Contractor management problems	97
5	Scarce Insufficient construction materials	93
6	New instructions for additional works	93
7	Weather and surroundings	87
8	Professional management	87
9	Structure re-checking	80
10	Increase in price of materials	77
11	Site problems	50
12	Difficulty in getting the machinery	47
13	Labour shortage	43
14	Changes in the original design	37
15	Skilled labour shortage	37
16	Replacement of contractors	30
17	Replacement of consultants	30
18	Delay in entering the site	23
19	Machinery's frequent breakdown	23
20	Contractor prioritizing other projects	20
21	Natural catastrophe	20
22	Inexperienced contractor	20

Kebangsaan Malaysia. Every one of the six factors shall be explored in detail in the following paragraphs.

It is aforementioned that one of the most prominent critical factors with the highest RII is one that has everything to do with financial resources. What is implied here is the working capital that is deemed insufficient, also the delay in receiving the advance payment. We have probably known already that every work that is to be executed fully depends on the contractor's financial resources. Most contractors however, do not have strong financial background to keep the work in progress. They would normally rely on the advance money and progress payment to ensure that their study on-site will continue. If a problem arises, in the sense that the client does not pay the advance money or progress payment as scheduled, then the contractor's work will certainly fall behind time.

Financial allocations are substantial in the world of construction. It is a much-needed aspect of the industry, since the money will be used for all resources and materials, labour and machineries. Other resources will all come into place if an organization has a solid financial platform. Therefore, the financial factor, that is seen to regulate all other aspects should be properly managed to ensure that the construction time is not affected. Various problems will surface out of poor financial management, which in turn will lead to money constraints.

The second critical factor is the late in getting advance payment and progress payment. If payment that does not follow the schedule after the study has been completed, it will cause problems to the contractor due to lack of working capital to continue the project. Most working capital will have been used to complete the previous project or work and when the payment is not made, understandably, the issue of finding the

starting capital for the new project will emerge. Other than that, if the contractor has already used a bank loan, then the contractor is in for loss as he will have to pay interest imposed by the loan institution as long as the payment is not made. The weakness in the financial resource management is imminent if a lot of important aspects in financial management are neglected. As an example, if the contractor does not come up with a proper planning and does not manage their cash flow well, of course they will have to face cash flow problem. If this problem is not addressed, then financial resource issues will be sure to appear.

Delay in getting work approval is the next factor and this involves an external party. The norm for this kind of issue persists when the local authority delay in giving project approval, so the contractor start the project. Beside that in other projects the contractor appointed is not allowed to enter the site due to some probable obstacles there, for instance handling squatter residents who will not easily vacate the project site. This is the responsibility of the local authority, at the same time serving as an unavoidable factor at the expense of the contractor and the project owner. However, this particular factor is not really prominent in all three UKM-based projects.

The fourth factor is the contractor management problems. Respondents were all in unison to state that this issue is extremely critical in causing project delay. Contractor management issue problems involve management conflicts in many ways. We are aware of the significant role of the contractors. Yet, in reality many of them are unable to manage the projects the way they should due to their lack of experience, further cause more problems at the construction site. In some projects they have problems in their financial management where workers and suppliers not being paid on time. This will further contribute to project delay. Beside that contractors often complain of not having enough technical staff, experienced supervisors and skilled workers on-site to manage the project and all these are all linked with project delays.

The fifth factor lies in the scarcity of the construction materials. The materials used for a project would normally cost half of the total cost of construction. The management aspect for these resources will be given more emphasis in order to avoid cost increase. Other than that, the contractor is held responsible to ensure that the materials are sufficient throughout the construction period to avoid delay and affect future activities. Various measures have been carried out to control this from happening, but the scarcity of materials prevails. The materials that are often found to be insufficient are sand, cement, bricks and steel reinforcements. Nonetheless, there are also some factors that have been seen to influence construction resource material management in such a way that it is problematic for contractors to manage on-

site work. These include materials being left to waste on-site, shortage of construction materials and construction materials cannot be delivered on time.

The final critical factor is evidenced in the new instructions for additional work. Instructions on variation of construction work are defined as any amendment made on the design or work quality determined in the drawing or contract specification. Variation arises when an item of works is redesign as a result of error on the part of design (Bala and Ibrahim, 2007). This includes any addition or reduction or replacement of materials specified in the original contract. Variation Order is stated in all Contract Forms including JKR 203A Form (2007 amendment) and it allocates an authorized officer to issue the Variation Order. Any amendment can be done on the contract drawings, specifications or items in Bill of Quantities by way of adding, reducing, replacing or changing the construction materials, size, work or scope of contract.

## CONSLUSION

Conclusively, the study has been able to meet its intended objectives. From the survey carried out, the main reasons for delay namely insufficient capital, delay in receiving progress payments, delay in getting work approval/endorsement, problems in contractor management, scarce construction materials and new instructions for additional work, have had such a great impact on the deadline on which a project is due to complete. The key players in the construction industry need to plan and to perform more careful construction process before and during the project execution, as well as working hand-in-hand towards completing the project under their responsibility.

## REFERENCES

- Assaf, S.A. and S. Al-Hejji, 2006. Causes of delay in large construction projects. *Int. J. Project Manage.*, 24: 349-357.
- Bala, K. and Y. Ibrahim, 2007. Effect of inadequate design by specialist consultants in construction project. *J. Eng. Appl. Sci.*, 2(9): 1414-1420.
- Doloi, H., 2008. Analysing the novated design and construct contract from the client's, design team's and contractor's perspectives. *Constr. Manage. Econ.*, 26(11): 1181-1196.
- Doloi, H. and B. Young, 2009. Achieving Cost Performance from the Client's, Consultant's and Contractor's Perspectives. Being a Paper Presented at the Construction and Building Research Conference of Royal Institution of Chartered Surveyors held at the Anjuran University of Cape Town, on the 10-11th September.

- Hamzah, N., M.A. Khoiry, M.A.M. Ali, N.S. Zaini and I. Arshad, 2011. Faktor luaran dan dalaman yang mempengaruhi harga rumah teres di bandar baru bangi. *J. Design Built*, 4: 1-8.
- Jawad, R.S.M., M.R. Abdulkader and A.A.A. Ali, 2009. Variaton orders in construction projects. *J. Eng. Appl. Sci.*, 4(3): 170-176.
- Ko, C.H., 2010. Application of lean production system in the construction industry: An empirical study. *J. Eng. Appl. Sci.*, 5(2): 71-77.
- Kumar, V.R. and T. Navaneethakrishan, 2012. 4D model through GIS planning and scheduling of residential construction project. *Res. J. Appl. Sci.*, 7(4): 222-228.
- Le-Hoai, L., Y.D. Lee and J.Y. Lee, 2008. Delay and cost overruns in vietnam large construction projects: A comparison with other selected countries. *KSCE J. Civ. Eng.*, 12(6): 367-377.
- Murali, S. and W.S. Yau, 2007. Causes and effects of delays in Malaysian construction industry. *Int. J. Project Manage.*, 25: 517-526.
- Sweis, G.R.S., A. Abu Hammad and A. Shboul, 2008. Delays in construction projects: The case of Jordan. *Int. J. Project Manage.*, 26: 665-674.
- Syed, M.A., A. Salman, K. Pragnya and G. Dharam, 2003. Delays in construction: A brief study of the florida construction industry. *ASC Proceedings of the 39th Annual Confrence*. Clemson University-Clemson, South Carolina.
- Symaco, L., 2012. Higher education in the Philippines and Malaysia: The learning region in the age of knowledge-based society. *J. Int. Comp. Educ.*, 1(1).
- Tawil, N.M., N. Hamzah, M.A. Khoiry, A.I.C. Ani and H. Basri, 2011. Capitalist factor that affecting the prices of double storey terrace houses in university town case study: Bandar Baru Bangi. *Seminar Pendidikan Kejuruteraan and Alam Bina (PeKA'11)*, Kongres Pengajaran and Pembelajaran UKM 2011, hlm.
- Tumi, S.A.H., H. Omran and A.H.K. Pakir, 2009. Cause of Delay in Construction Industry in Libya. *Anjuran University of Bucharest, Romania*.
- Wa'el Alaghbari, R.A.K. Mohd, S. Azizah and Ernawat, 2007. The significant factors causing delay of building construction projects in Malaysia. *Eng. Constr. Archit. Manage.*, 14( 2): 192-206.