International Journal of Engineering & Technology, 7 (3.25) (2018) 614-619

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Key Factors for Mitigating Contractor's Claim on Loss and Expense Due to the Extension of Time in Public Projects: the Causes and Mitigation Measures

Nor Hidayah Yahya[1]*, Mohammad Fadhil Mohammad[2], Marina Musa[3]

[1,2]Centre of Studies for Quantity Surveying, Faculty of Architecture, Planning and Surveying Universiti Teknologi MARA (UiTM) Selangor, Malaysia

[3]Quantity Surveying & Contract Division, Public Works Department, Malaysia

**Corresponding author E-mail: hidayah_sudoku@yahoo.com.my*

Abstract

Claim on loss and expense is quite a common occurrence and tends to pile up during a construction project. Nonetheless, it can be mitigated in several ways. This paper aims to show that the causes of the claims is due to the EOT with reference to (PWD) projects in Malaysia on the critical issues and challenges faced by the clients in mitigating contractor's loss & expense claims. Data were collected through questionnaires distributed among professionals in PWD and private sectors. Recommendations on mitigating contractor's claims on loss and expense due to EOT are made based on the analysed data. The findings show that factors which can mitigate claim on loss and expense can be categorized into three distinctive groups. All the lessons learnt and solutions from this study could be used in the mitigation of contractor's claims in future public projects.

Keywords: *Construction Claims; Extension of Time; Loss & Expense; Mitigation Measures*

1. Introduction

The growth and development in Malaysia is thriving even more in recent years. In 2014, about RM42.2 billion was spent on the construction industry and in 2015 the amount increased by 20% to RM 50.5 billion (CIDB, 2015). The projects involved building new schools, hospitals, complexes and also infrastructures projects such as roads, bridges, road and water tunnels and electrical and telecommunications systems. All these developments are constructed in a specific and in a short period of time.

Public Works Department (PWD) or Jabatan Kerja Raya (JKR) is the implementing agency for federal department under the Ministry of Works Malaysia. PWD is responsible for implementing, monitoring construction and maintenance of infrastructure projects in Malaysia. Therefore, the PWD has to handle the vast responsibility of the on-going large and mega projects in Malaysia. These projects are also susceptible to change with respect of its capacity and complexity. Hence, the completion deadline is often overdue and subjected to delays. For heavy industrial projects, execution phases usually commence while the design phase is still under way. Consequently, this leads to incomplete and inaccurate implementations, causing further delays. Most construction projects experienced completion delay, and is a global phenomenon, whereby the Malaysian construction industry is of no exception (1). The contractor of the project is required to pay the liquidated and ascertained damages (LAD) to PWD for overdue work completion. Nonetheless, contractors more often than not, tried to sidestep this by requesting claims for loss and expenses.

2. Literature Review

According to Oyegoke (2) claim is a complicated and difficult issue that needs professional judgement to scrutinise what constitutes a claim. While (2)) and (3) agreed that claim is a request by the contractor to recompense for some loss or expense that he has suffered or an attempt to avoid the requirement to pay the liquidated and ascertained damages (LAD). Claims occur when the regular progress of the works delayed. Whereas, Hassanein & El Nemr, (4) (5) defined a claim as "a request, demand, application for payment or notification of presumed entitlement to which the contractor, rightly or wrongly at this stage, considers himself entitled to and with respect of which an agreement that has not yet been reached".

The industrial sector in particular is one of the area most susceptible to changes and claims *Amr A.G.Hassanein* . Heavy industrial projects need time for design. Execution phases might commence while the design phase is still under way, therefore leading to incomplete and inaccurate designs (4). The end result is an abundant of claims which lead to the increase cost of projects and time completion not meeting the stipulated dateline.

Completing a project on time , with the specific cost stated in the contract and quality as per in the specification and contract documents while fulfilling the client's needs and satisfaction are the critical indicators in measuring project success. This is explained by (6). Therefore, due to this complex and unique environments, delay has become and also seen as a norm in the construction industry. When project delay happens, the contractor would be penalized by having to pay liquidated and ascertain damages (LAD as stated in the contract). Therefore, in order to avoid this penalty

being imposed upon them, contractors will usually pursue the claim for Extension of Time (EOT). Hamzah et al. (7) defined delay as a slowing down of work without stopping it completely. If delays impacted upon the critical path rather than merely taking up available float, in such a way that the contractor failed to meet the contractual completion date (Critical Delay), the contract will generally give provision to the contractor an extension of time (EOT).

In a nutshell, loss and expense claims can be defined as the rights for contractor's to claim for direct loss or/and expenses that they are entitled for due to some causes or circumstances that the contractor is not eligible to claim from any clauses in the condition of contracts. A claim for loss and expense is often described as the financial side of a 'delay' claim. However, it was not always the case that delay caused by the employer in a project will result in a loss to the contractor. The same goes when simply because the contractor has received an extension of time (EOT), it does not always mean that they will be entitled to additional payment as well. Moreover, the losses actually suffered will not necessarily be down to the delay.

Delays which impacts the critical path of construction affects the major duration of the construction, rather than the availability of float, in such a way that the contractor fails to meet the contractual completion date is referred to as critical delay. In such a case the contract will generally give provision to the contractor an EOT. In the case where works of the contractor is delayed which the client is responsible for, e.g. failure to give access to and from the construction site, the contractor is eligible to claim for direct loss or/and expenses. In the PWD, the clauses for claims loss and expenses is mentioned in clause 44.0 PWD Form 203(Rev 2010) & PWD Form 203A (Rev 2010) and clause 50.0 in PWD Form DB (Rev.1/2010). Therefore, according to the contract, the contractor's obligation is to construct and complete the work regularly and diligently. A contractor must also complete and construct the works before or on the agreed completion date. If there is at any time during the contract period, the government or his party is affecting the work progress therefore contractor cannot deliver their work regularly and diligently, it will be considered as a breach of contract.

Sabitu Oyegoke (2), reiterated that claim is a complicated and difficult issue that Claims may be defined as the seeking of consideration or change by one of the parties involved in the construction process. Once a claim is presented, it may result in a negotiation between the parties, resulting in a change order or a modification.(8). Most construction projects experienced completion delay, and as a global phenomenon, the Malaysian construction industry is of no exception (1). Claims under the contract can be divided into claims due to the Extension of Time such as claims for loss and / expenses at construction site, lost of profit and lost of financial interest. However, the focus of this research is only on claims for loss and/or expenses due to the Extension of Time (EOT) focusing only on PWD projects.

The definition of delay is an activity may not result in the same amount of project delay. While the causes of delay can be from one party or more than one party , (8). While according to Yusuwan & Adnan (1), delays in construction may give rise to a need for an application of extension of time (EOT), to provide sufficient time to complete the project.

3. Methodology/Materials

The execution of a project is a complex process which involves high levels of coordination of activities involving several parties, approvals, scheduling, equipment and materials. Ideally, these activities should synchronize and run smoothly. Evidently, delays are inevitable. A delay is an activity may give rise for an application of EOT to provide sufficient time to complete a project.

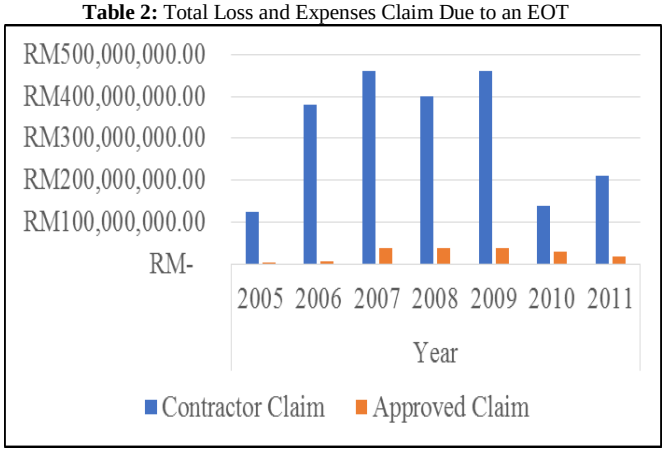
In Conventional projects, the clause regarding EOT is clause 43, and for a Design & Built contract is clause 49 .However, only three (3) clauses that falls (Under PWD COC 203/203A(rev.10/83) for clause 43 (c) , 43 (f) and clause 43 (i) that entitled contractor to claim for loss and expense. While for Design & Built contract PWD DB (Rev 1/2010) there are five (5) clause for contractor to claim for loss and expense. While for Design & Built contract PWD DB (Rev 1/2010) there are five (5) clause

clause ; Clause 49.1 (b), 49.1 (d), 49.1 (e), 49.1 (h) and 49.1 (j).

Table 1: Claims in the PWD for Year 2008-2009

	Total Claims		Total Approved Claims	
	Amount (RM)	**Percentage %**	**Amount (RM)**	**Percentage %**
Claims due to (EOT)	861,886,142.90	96.53%	13,199,965.02	89.07%
Claims due to discrepancies in Document Contract	15,785,020.05	1.77%	1,620,000.00	10.93%
Claims due to project terminated/mutual termination	0	0.00%	0	0.00%
Claims due to materials price increase	6,629,258.46	0.74%	0	0.00%
Other claims	8,545,660.62	0.96%	0	0.00%
TOTAL	892,846,082.03	100.00%	14,819,965.02	100.00%

Table 2: Total Loss and Expenses Claim Due to an EOT



Sources: PWD, Malaysia

Table 1 and Table 2 are the statistical data that shows claims due to the (EOT) is the highest number of claims compared to other types of claims.

It is for this reason that claims due to (EOT) is chosen for this study. Usually, contractors will claim for loss and/expenses as stated in the column of total claims in Table 1 and will be presented and submitted to the committee for approval.

4. Results and Findings

Frequency distribution was obtained for all the personal data and classification variables (9). The personal information of the respondents have very significant role to play in expressing and giving the response about the research. The questionnaires have been analysed using frequency distribution for a set of personal characteristics of the 137 respondents. All of the respondents are from the PWD.

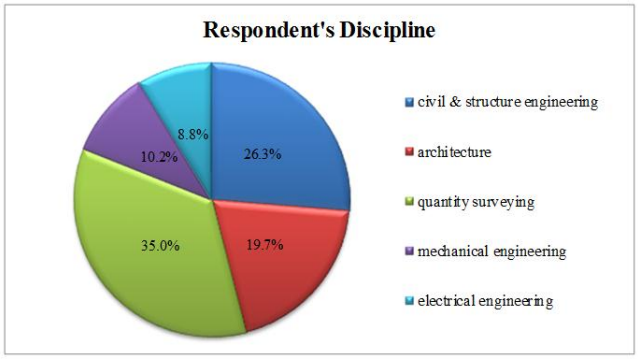


Fig. 1: Respondent's Discipline

In Figure 1, the Pie chart shows the number and percentage of respondent's discipline. It indicates that 35% of the respondents is from Quantity Surveying, 26.3% from Civil & Structure Engineering, 19.7% from Architecture, 10.2% from Mechanical Engineering and followed by 8.8% from Electrical Engineering. The chart indicates that the majority of respondent's came from the Quantity Surveying division of the PWD .

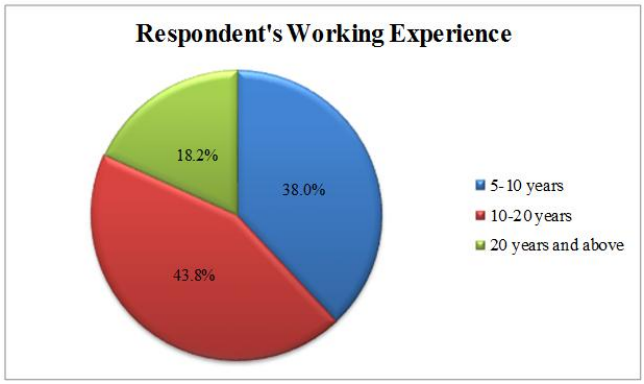


Fig. 2: Respondent's Working Experience

While Figure 2 shows the number and percentage of respondent's working experience. It indicates that 43.8% or the majority of the respondents have between 10-20 years of working experience. 38% of the respondents have between 5-10 years of working experience and lastly 18.2% have between 20 years and above working experience. The pie chart indicates the percentage of respondent's working experience in their organization.

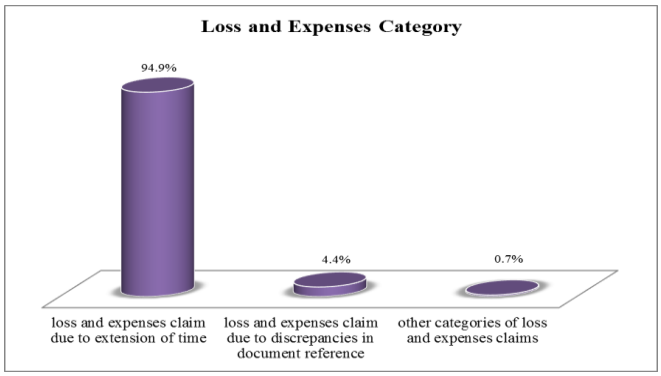


Fig. 3: Loss and Expenses Category

Referring to Figure 3, the highest loss and expenses category that contractors will claim the most is loss and expenses due to extension of time which represents 95% of the respondents followed by 4% of loss and expenses claim due to discrepancies in document reference and only 1% of respondents choose other categories of loss and expenses claims. It shows that loss and expenses due to extension of time category is the top rank among the other types of loss and claims category.

Table 3: Response Rate

Descriptive Statistics					
Item	**N**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
(1)	137	1.00	5.00	3.2117	.66896
Harban (10)	137	1.00	5.00	4.1241	1.02502
Hamzah et al (7) – input factors	137	1.00	5.00	3.4891	0.77760
Hamzah et al (7) – internal environments	137	1.00	5.00	3.7299	1.14084
Hamzah et al (7) – exogenous factors	137	1.00	5.00	3.0073	0.85316

Table 3 shows the Descriptive Statistics such as minimum, maximum, mean and standard deviation when obtained for the interval scaled variables. It mentioned that all the variables were tapped on a 5-point scale. The minimum of 1 indicates that extremely low the mitigation measures for loss and expense according to Literature Review and maximum of 5 valued that extremely high the mitigation measures for loss and expense according to Literature Review.

From the results, it may be seen that the variables mean for (10) is the highest of 4.1241, mean for Hamzah et al (7) – internal environments is 3.7299 and mean for Hamzah et al (7) – input factors is 3.4891. While, Yusuwan & Adnan (1) is 3.2117 and the lowest is mean for Hamzah et al (7) – exogenous factors is 3.0073.

Harbans (10): Understanding the key principles of assessing and dealing with EOT for the clients side; procedure and process of EOT, event that is include in the Conditions of Contract (COC), knowledge on critical path activities, assessing "net effective" delay, assessment in terms of a logical analysis.

Hamzah et al (7) – internal environments :too many changes/ordered by the owners, failure to provide required construction site, slowness important decision, consultants problems in the construction, changes in design and design errors, slow preparation and approval shop drawings, slowness in making decision, slow in giving instruction, inexperience consultants and lack of effective communication and mistake in implementation.

Hamzah et al (7) – input factors: Avoiding loss and expense due to EOT by avoiding delay in terms of input factors – labour, capital, energy, design, material and equipment. Examples : poor workmanship, shortage of labour supply, labour productivity, shortage of materials, problems in delivering materials at site, equipment failure and financial difficulties by contractors**.**

Norazian & Halimah (2013): loss and expense happen when contractors fails to deal with such EOT claims in terms of record keeping, their knowledge of contracts, preservation of rights, quality change orders, planning & scheduling, proactive actions.

Hamzah et al (7) – exogenous factors: factors that originates from the outside. Example; weather, government regulations, code related, interruption from the public, building permit approval, change in law and regulations, subsurface soil condition and changing site condition.

In the study by Harban (10), the mitigation measures for loss and expense answered by the respondents. Therefore, It is important for professionals who deal with Extension of Time (EOT) & Client understand and practise the key principles of assessing and dealing with EOT for the clients side; procedure and process of EOT, event that is include in the Conditions of Contract (COC), knowledge on critical path activities, assessing "net effective" delay, assessment in terms of a logical analysis. While, the second rank is Hamzah et al (7) – internal environments. This internal environments involves too many changes/ordered by the owners, failure to provide required construction site, slowness important decision, consultants problems in the construction, changes in design and design errors, slow preparation and approval shop drawings, slowness in making decision, slow in giving instruction, inexperience consultants and lack of effective communication and

mistake in implementation. In order words, this internal environments is more to delay due to client's and consultants site because it involves delay in giving instructions that lead to change order/ variation order. Besides, delay in giving instruction and slow decision making will also lead to delay and Extension of Time. Besides, delay in producing designs and any related problems with designs such as design change, design errors and slow preparation of tender designs and any approval of shop drawings. Literature Review which agreed by the respondents showing that The third rank is Hamzah et al (7) – input factors Literature Review. For the fourth rank is Yusuwan & Adnan (1). Literature Review and last is Hamzah et al (7) – exogenous factors Literature Review which the least choose by the respondents. Therefore, It shows that the key factors in minimizing the Loss & Expense is goes back to the understanding of Extension of Time (EOT) itself which start from the understanding and mastering in process and its procedure, the assessment of EOT, understand and master in COC and knowledge in Work Programme such as in critical path activities and assessing the net effective delay. Then again , every level of management must define and understand their rules and responsibility to prevent act that lead to delay and Extension of Time (EOT) and surely lead to Loss and Expense claims.

4.1. Causes of Extension of Time (EOT)

Delay can be defined as an extend of the time to complete the works in the contract Hamzah et al (7). It is a time overrun in order to complete the work. According to the Condition of contract, time is an assence of the contract. Therefore, delay is a situation when the actual date completion not meeting the time as per stated in the contract.

According to the PWD (2008), project delay can be defined as having a difference of more than 30% of the actual progress versus scheduled progress or the delay is more than three (3) months or whichever is the earlier and the contractor do not exhibit any effort in recovery plan to overcome the delay. The project will then be classified under sick project. For the PWD any other government related project, should the project's delay is more than 30% of its scheduled process, a warning letter is issued. The matter will be discussed and elaborated in a committee with the intention to terminate and later issue termination notice.

Previous studies on the causes of Extension of Time (EOT) in the Malaysian Construction Industry. Table 2.6 explained on the summarization of causes of Extension of Time (EOT) in Malaysian Construction Industry based on the literature review.

Table 4: Causes of Extension of Time (EOT) in Malaysian Construction Industry

Main Causes of Delay and (EOT)	Authors							
	1	2	3	4	5	6	7	8
(1) Contractor's improper planning	✓	✓	✓	✓	✓		✓	
(2) Contractor's poor site management	✓	✓	✓	✓	✓	✓	✓	✓
(3) Inadequate contractor experience	✓	✓	✓	✓	✓	✓	✓	✓
(4) Client's finance & payments for work completion	✓	✓	✓		✓	✓	✓	✓
(5) Problems with subcontractors	✓	✓	✓			✓	✓	✓
(6) Shortage in material	✓	✓		✓	✓	✓	✓	✓
(7) Owner Interference			✓		✓	✓	✓	✓
(8) Slow Decision Making	✓		✓	✓	✓	✓	✓	✓
(10)Unrealistic contract duration and requirements Imposed		✓		✓			✓	✓
(11)Contract Management						✓		
(12)Preparation and approval of drawings	✓			✓	✓	✓	✓	
(13)Quality assurance/control				✓				✓
(14)Waiting time approval of tests and inspection	✓	✓		✓	✓		✓	✓
(16)Quality of material				✓	✓		✓	
(13)Labor supply		✓		✓	✓		✓	
(14)Equipment availability and failure		✓				✓		
(15) Lack of communication between parties	✓	✓	✓		✓		✓	✓
(16) Change Orders	✓	✓	✓		✓		✓	✓
(17) Discrepancies in Document Contract					✓		✓	✓
(16) Mistakes during the construction stage	✓	✓					✓	
(17) Time overrun		✓						
(18) Cost overrun		✓						
(19) Disputes	✓							
(20) Arbitration								
(21) Litigation								
(22) Total Abandonment								
(23)Weather condition	✓	✓		✓	✓	✓		
(24)Regulatory changes		✓			✓	✓		✓
(25) Problem with neighbors		✓						
(26) Unforeseen site condition		✓		✓	✓	✓		

Table 5: Causes of Claims from Previous Researcher

Researcher	Country	Causes
Zaneldin, (11)	UAE	Change of Variation Orders, Delay caused by owner, oral change order by owner, delay in payments by owner, low price of contract due to high competition, change in material and labor costs, owner personality, variations in quantities, subcontracting problems, Delay caused by contractor, Contractor is not well organized, Contractor financial problems, Bad quality of contractor's work, Estimating errors, Scheduling errors, Bad communication between parties, subsurface problems, poorly written contracts, suspension of work, accidents and planning errors
Chaphalkar et al. (12)	India	Provisions of express condition in the contract for compensation of variation work, variation orders by owners, change orders issues in writing, extra work necessary for completion work, change in specification due to inconsistency in documents, contractor conveyed the change in rate of item of work to owner, execution of variation works supported by documents
Shah et al. (13)	India	Delay in supply of drawings, delay in handing over site, delay in supply of materials, delay in payments, delay in starting works, delay in completing works, work actually done but not measured and paid, refund of maintenance deposit, loss due to extra overhead on account of extension of time limit, loss due to idle machinery and labor, due to design errors, due to inadequate or incomplete specifications, due to inadequate information related to design, due to inadequate bid information, due to inadequate time for bid preparation, due to change in work scope, due to change in plans and specification during construction, due to poor management at site, due to ambiguities in Document Contract, different interpretations of contract provisions, quote low during tender, due to Extension of Time (EOT), due to employers lack of construction knowledge
William Vidogah & Ndekugri,, (14)	UK	Failure of the owner to make site available to the contractor to commence work, late issue of instructions and drawing by architect, restriction on contractor's access to the site, postponement of all parts of the works, owners failure to supply materials or equipment, changes made by owner to the original design during construction
Hadikusumo & Tobgay (15)	Bhutan	Differing /adverse site conditions, delay from project participants, changes in design and specifications, force majeure, ommissions / ambiguous contract provisions.
Hassanein & Afify (16)	Egypt	Change orders, poorly coordinated design, additional scope of works, contracts poorly formulated, change in design and specifications.

1 = N.Hamzah, M.A.Khoiry, I. Arshad, N.M. Tawil and A.I. Che Ani,2 = Murali Sambasivan , Yau Wen Soon ,3 = Mohammad Abedi, Dr Mohammad Fadhil Mohammad, Dr Mohammad Syazli Fathi,4 = Intan Diana Binti Musa,5 = Salman Riazi Mehdi Riazi , Fiona Lamari,6 = Wa'el Alaghbari , Mohd. Razali A. Kadir, Azizah Salim and Ernawati,7 = Mohd Razaki Abdullah, Ismail Abdul Rahman, Ade Asmi Abdul Azis ,8 = Zayyana Shehu , Intan R.Endut

Therefore, as a result, the most main causes of delay upon the literature are (in descending order):

1) Contractor's poor site management ->2)Inadequate contractor experience -> 3) Client's finance and payments for work completion -> 4)Problems with subcontractors -> 5)Shortage in material -> 6) Slow decision making -> 7)Waiting time approval of tests and inspection -> 8)Lack of communication between parties -> 9)Change Orders.

4.2. Causes of Claims Loss & Expense

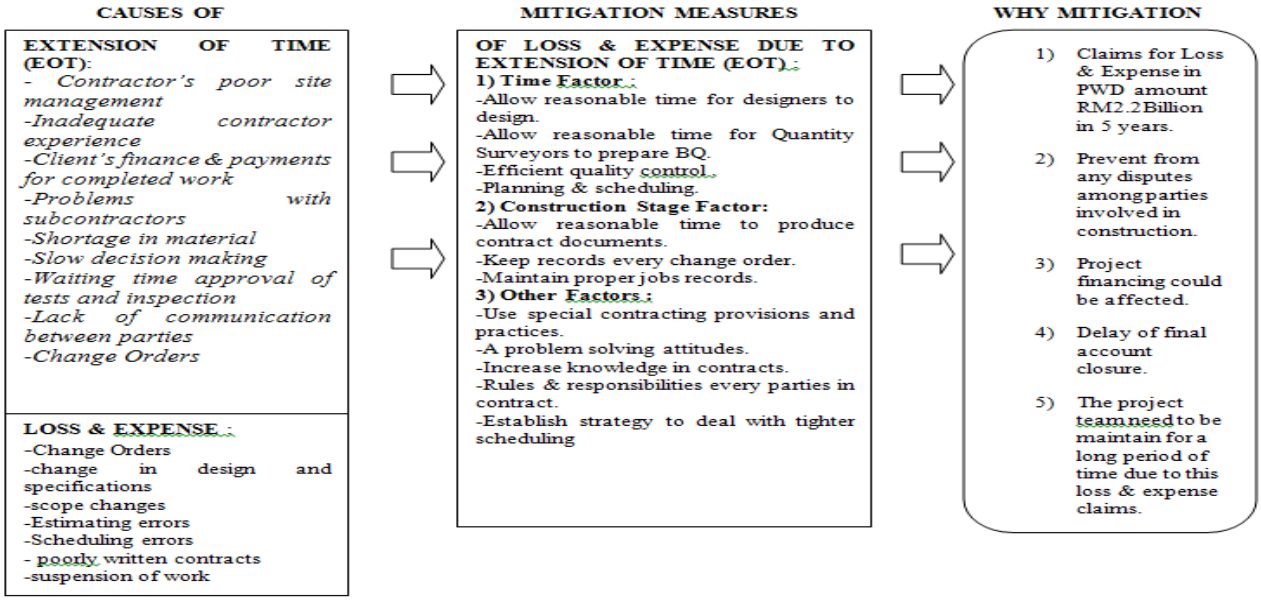


Fig. 1: Causes, Mitigation Measures and Why Mitigation

Therefore, the causes of Extension of Time (EOT) and Claims Loss & Expense can be summarize in the diagram 3 below. This summary diagram can explain the causes, mitigation measures of Loss & Expense of PWD project.

5. Conclusion

The findings of this study provide recommendations that may help in mitigating Loss & Expense claims due to (EOT). The following are the recommendations:

1. Time Factors

Mitigation of loss & expense will start from the beginning of the project itself that is the design stage. The time factors that involves are:

(i) Allow reasonable time for designers to complete the design, drawings and specification. This is important part to allow the designer to understand the requirement of the tender. Changes on the drawings will require variation order which impact the loss and expense.

(ii) Allow reasonable time for Quantity Surveyors (QS) to complete the Bills of Quantities (BQ). Errors in the quantity will require repetition of work which in turn requires variation order and impacts loss and expense.
(iii) Establish efficient quality control techniques and mechanism that can be used during design process to prevent errors. This element need to be emphasize especially at the designers office.
(iv) Ample time for planning and scheduling which includes consideration for resources such as materials, labours and machineries.

2. Construction Stage

(i) Allow reasonable time to produce contract documents. An importants element in the document is the quantities of all substructures and superstructures measured by the QS which requires time determined.
(ii) Provide a mechanism which allow proper management and easy monitoring of the contract.
(iii) Keep proper records for every variation order. This include the variation order instructions, the calculation and built up rate for the change order items. The variation order entitles the contractor to claims EOT and loss & expense. Therefore the records is important.
(iii) Maintain proper jobs records including time sheets, work diary, reports, photographs, records of labors and weathers. This is important for both contractors and clients side as evidence when claims are rejected.

3. Other Factors

a. Use Special Provisions and Practices

This include putting addendum in Conditions of Contract of prevention measures of loss & expense. However, in putting this addendum the approval from committee for Conditions of Contract is vital. Plus for government contract , whatever addendum and amendment must go thru legal advisor first.

b. Develop a Cooperative and Problem Solving Attitudes on Projects

This involves risk sharing on decision made on the project. Besides, fast and right decision from S.O or P.D of the project.

c. Increase Knowledge in Contracts

All parties involved including the Architect, civil engineer, mechanical engineer, electrical engineer and quantity surveyor in the project are recommended to have knowledge of contracts.

d. Rules and Responsibilities of Every Parties in the Contract

Every project teams and all parties in contract must be clear their rules & responsibilities of the project. In this way, when an issue arises it is quick to fix.

e. Establish a Strategy Dealing with Tighter Scheduling Requirements

Contractors, consultants and clients must always at par with the momentum of project. They must always proactive in dealing with whatever issues occurs during the contract period.

Acknowledgement

The authors would like to acknowledge the support of funding from the Research Incentive Grant(GIP) UiTM for this research. Special thanks also to all respondents that were involved in answering the questionnaire. The authors also would like to thank the PWD especially the committee of claims in giving appropriate direction for the research, providing necessary data and also beneficial comments in the survey.

References

[1] Yusuwan NM, Adnan H. Issues associated with extension of time (EoT) claim in Malaysian construction industry. Procedia Technology. 2013;9:740-9.
[2] Sabitu Oyegoke A. Building competence to manage contractual claims in international construction environment: The case of Finnish contractors. Engineering, Construction and Architectural Management. 2006;13(1):96-113.
[3] Seeley IH. Quantity surveying practice: Macmillan; 1984.
[4] Hassanein AA, El Nemr W. Management of change order claims in the Egyptian industrial construction sector. Journal of financial management of property and construction. 2007;12(1):45-60.
[5] Hughes GA, Barber J. Buliding and Civil Engineering Claims in Perspective: Longman scientific & technical; 1992.
[6] Yoke-Lian L, Hassim S, Muniandy R, Mee-Ling T. The assessment of applications for extension of time claims in Malaysian construction industry. International Journal of Engineering and Technology. 2012;4(4):446.
[7] Hamzah N, Khoiry M, Arshad I, Badaruzzaman W, Tawil N, editors. Identification of the causes of construction delay in Malaysia. Proceedings of World Academy of Science, Engineering and Technology; 2012: World Academy of Science, Engineering and Technology (WASET).
[8] Arditi D, Patel BK. Expert system for claim management in construction projects. International Journal of Project Management. 1989;7(3):141-6.
[9] Sekaran U, Bougie R. Research methods for business: A skill building approach: John Wiley & Sons; 2016.
[10] Harbans SK. Engineering and Construction Contracts Management: Post-Commencement Practice: LexisNexis; 2003.
[11] Zaneldin EK. Construction claims in United Arab Emirates: Types, causes, and frequency. International Journal of Project Management. 2006;24(5):453-9.
[12] Chaphalkar N, Iyer K, Patil SK. Prediction of outcome of construction dispute claims using multilayer perceptron neural network model. International Journal of Project Management. 2015;33(8):1827-35.
[13] Shah A, Shah D, Majumder P, editors. Andd7@ NTCIR-11 Temporal Information Access Task. NTCIR; 2014.
[14] Vidogah W, Ndekugri I. Improving the management of claims on construction contracts: consultant's perspective. Construction Management & Economics. 1998;16(3):363-72.
[15] Hadikusumo BH, Tobgay S. Construction claim types and causes for a large-scale hydropower project in Bhutan. Journal of Construction in Developing Countries. 2015;20(1):49.
[16] Hassanein AA, Afify HM. A risk identification procedure for construction contracts—a case study of power station projects in Egypt. Civil Engineering and Environmental Systems. 2007;24(1):3-14.