



CLAIM MANAGEMENT FRAMEWORK UNDER FIDIC 2017: CONTRACTOR CLAIM SUBMISSION

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Abstract

Purpose of the study: The objective of this research is to develop a framework for managing the claim document. The contractual and management issues will be considered in this framework to enhance the Claims Management System (CMS). The framework includes the mechanism of claim submission based on Fédération Internationale Des Ingénieurs Conseils (FIDIC) 2017 clauses and procedures.

Methodology: Qualitative methodology has been selected for this paper as the topic requires a collection of sensitive information from an experienced professional. The proposed CM framework developed based on, a study conducted to rank the feature required for CMS. This study has been conducted among 43 experts in Claims Management (CM) field working on contractor firm's category A. Then, the framework verified by 7 experts who participate in the first study.

Main Findings: Eleven features were required for CMS that can enhance contractor claim submission. These factors have a different level of importance. The top three factors are Tracking Claim Status (99.5%), Supporting all types of document (96.3%), Centralized Database (93.0%). Based on these features, the proposed framework developed to improve contractor claim submission.

Applications of this study: Applying the proposed framework will reduce human effort in getting document related to claims by its systematic recording, transparency, a reminder feature, contractual guide, friendly user and other features of the system. Moreover, it will provide the contractual support pursuant to FIDIC 2017 clauses.

Novelty/Originality of this study: The framework will improve contractor claim submission and the contractor will be satisfied by claim resolution and engineer determination. Side by side the framework will save about 50% of time consumed (d is missing) by the claims analysts that usually spent in collecting information, screening and identifying related claim event document in the project's documentation.

Keywords: Claim Management, Contractor, Construction, Document Control, Framework, FIDIC 2017.

INTRODUCTION

Claims have been found to be the most cited fact in most of the construction projects (Ho, 2016). It becomes more common overall in the world and has a significant effect on projects cost and time (Bakhary et al, 2018). The claim preparation usually is not a straightforward task, as the claim submittal shall contain evidence, supported documents, impacted programs to substantiate the claim. The red book FIDIC 2017 release edition contains twenty-eight (28) sub-clauses defining the situation which should they occurred (FIDIC, 2017). These sub-clauses will enable the contractor to submit his claim for the addition of time or/and cost (Kycia, 2018). Accordingly, claim shall be submitted within a certain time frame (Ali, 2015). In the absence of effective document control for claims, this task may be made much more difficult and take too much time to prepare.

The claim analysts spending from 70% to 80% of their professional time searching in project documentation (Hammad, 2001). This issue ended up greater and greater when project documentation is kept in an unstructured database. It became more significant if the preparation of the claim is carried out after the project completion date. On the other hand, unavailability of the key person in the project especially the one who has the history of the claim by this time may lead the contractor to miss the history of the claim event as it will become fade or fuzzy. Accordingly, it will be so difficult for new staff to understand fully what really happened during the project period (Tan and Anumba, 2013). Therefore, in absence of a productive system for managing and controlling claims during the claims life cycle, disputing parties may wind up at the losing end, as challenging the claims by an opposing party who will face troubles to prove his right (Tan and Anumba, 2013).

To solve the issue of related documents omissions in the preparation and submission of a claim, some researchers adopted the strategy that it is essential for all project groups to be part of the same document exchange framework, and to enlist or register all their documents within a central database (Hammad and Alkass 2000). CMS shall contain some requirements and features which are essential for the program to facilitate. The concept implemented for the development of the framework is to create an overview of the history of a claim from its initiation to the claim finalization, which are claim notice and particulars supported with a relevant contemporary substantiating document. To achieve this, the framework comprises an IT system called CMS to administer the workflow for claims and the claim's documentation. In addition, the following basis is required for the end-user to facilitate the program in an easy way which is not limited to friendly use, accessibility, consistency, security, and well-structured templet for various kinds of claims (Tan and Anumba, 2013).

LITERATURE REVIEW

Claim Procedure Under FIDIC 2017

There are processes and procedures the contractor shall be followed under FIDIC 2017. These processes can be described as follow:

Notices of Claims

Notices of claim are notices which the contractor can estimate the time delay and cost by reporting the event to the engineer and employer upon occurrence (Ali, 2015). Under Clause 20.2.1, the contractor is under obligation to give written notice of any to Engineer claim describing the event giving rise to the cost, loss, or delay if he considers himself entitled to claim, regardless of whether for cost and/or time, not later than 28 days after the contractor became aware, or should have become aware, of the circumstances giving rise to the claim. This notice may present the initial estimates of likely impact of time and costs. If the contractor does not come with this notification, the contractor neither gets an extension of time, nor extra cost, and the employer released from all liability regarding the claim. Exceptionally, in respect of Sub - Clause 4.12 'Unforeseeable Physical Conditions', notice has to be given as soon as practicable. The notice can be very brief giving only the essential facts of the event or circumstance but should contain the correct contractual references. If the contractor fails to give notice of a claim within this period of 28 days, the contractor shall not be entitled to any additional payment (FIDIC, 2017).

If the engineer received the notice of claim after 28 days from the contractor and he considered that the contractor failed to submit his notice of claim, the engineer shall reply to the contractor that his notice is not valid within 14 days after receiving the notice otherwise contractor notice of claim will be considered as a valid notice (FIDIC, 2017).

Fully Detailed Claim

The contractor shall submit a fully detailed claim during 84 days starting from event occurred date or contractor became aware or should be aware pursuant to sub-clause 20.2.4. A Full detailed claim shall contain the detailed description of the event, statement of contractual and/or other legal bases of the claim, all supported document and contemporary document, and full supporting detailed report of the claim showing event cause and effect, and impacted program (FIDIC, 2017).

There are a variety of approaches to prepare a detailed claim. No format will be best in each case. However, the format will be described can be considered as the most format utilized. It is designed to introduce the claim event in a way similar to how it would be shown in court and give chance to several people to work together n same time to save time. The fully detailed claim shall be presented in a logical method using a "Top-Down" approach. (Contract to Impact) as per the following points (FIDIC, 2017):

i. Contract Particulars

The following items to be present as a detail of contract particular such as project title, project description, project stakeholders, type of contract, contract dates, Contract Values, etc.

ii. Claim events chronology

When a claim is submitted, a history of the event shall be submitted along with a general proof of entitlement and how contractor suffered from the event that out of contractor control (Shadid, 2015).

iii. Causes and Effects

The contractor has to establish a strong link between causes of his claim event and their impacts and effects of the damages suffered from the other party's actions. The contractor needs to recognize these causes carefully showing the contractual bases for his claim based on related FIDIC clauses and providing all related contemporary document to substantiate his claim in the right way. If these causes are not evoked by the contractor, then they do not fall under his liability (Ali, 2015). The outcome of the contractor claims will be the new project completion date, assuming the contractor can prove his entitlements to additional time or/and cost (Hwang and Low, 2012).

Claims Management System

One of the most important deliverables of the system envisaged are the features that allow useful knowledge about claims generated to be captured for reuse in existing or future projects. Leveraging knowledge through IT alone is often hard to achieve as there are human, cultural and organizational issues such as reluctance to share knowledge which is not readily resolved by IT. Conversely, a purely non-IT approach is not going to benefit from the faster, cheaper and broader source of data and means of communication to enable people to share knowledge offered by IT (Tan et al., 2011). Hence, many have advocated for a more balanced approach which comprises a combination of IT system and non-IT knowledge management technique in order to tap from the best of both worlds.

The concept adopted for the development of the system is to create an "as complete as possible" history of a claim from its initiation to the settlement, which is supplemented by the relevant substantiating document from the parties involved and accompanied by a post-mortem review of the outcome. To achieve this, the framework comprises an IT system called

Claims Transaction System to administer the workflow for claims and the claims documentation, and also a post mortem (a non-IT knowledge management technique) to capture the knowledge generated from the claim. The details of the components are described in subsequent sections.

Claims Management System Features

CMS shall contain some features which are essential for the program to facilitate. The concept adopted for the development of the system is to create an overview of the history of a claim from its initiation to the claim finalization, which are claim notice, particulars supported with a relevant contemporary substantiating document. To achieve this, the framework comprises an IT system called CMS to administer the workflow for claims and the claim's documentation. In addition, the following basis is required for the end-user to facilitate the program in an easy way which is not limited to friendly use, accessibility, consistency, security, and well-designed forms for different types of claims (Tan and Anumba, 2013). These are basic since the program is to be made accessible as an administration through the Web.

METHODOLOGY

A qualitative study was conducted in UAE for 43 expertise in construction claim field working on contractor firm's category A. Semi-structured interviews were designed in the instrument for the quantitative survey of this study. Respondents were asked to rate the CMS features and requirements on a 5-point Likert scale (1 for "not important" and 5 for "very important") regarding the importance CMS to enhance contractor claim submission.

Table 1: Relative importance of CMS features

CMS Feature	Freq. Index	Rank	CMS Feature	Freq. Index	Rank
Tracking Claim Status	99.5%	1	Combining a Number of Claims into One	34.4%	11
Raising Reminder	83.7%	6	Customization based on company profile	58.6%	10
Centralized Database	93.0%	3	Friendly Use	88.8%	5
Online Claims Transmittal	63.7%	8	Supporting all types of document	96.3%	2
Provide Templates for letters and reports	64.7%	7	No software needs to be installed	60.9%	9
Categorize Claim Documentation	89.8%	4			
Test Statistics: Kendall's W=0.692 $\chi^2_{sample} = 248.689$; with $df = 18$; $\chi^2_{critical}(\alpha = 0.001) = 29.239$					

The results, shown in Table 1, indicate that there was strong agreement between respondents in their rankings ($W = 0.69$) and this was statistically significant at 95% confidence level. It demonstrates that the "Tracking Claim Status" ranked first followed by "Supporting all types of document" and "Centralized Database", while "Combining a Number of Claims into One" comes at the lowest impact followed by "Customization based on company profile" and "No software needs to be installed".

Strategy of the claim management framework

To develop a claim submission framework there are two steps to follow. The first step is to classify input data then reorganize it in order to enhance claim submission. Here we assume that the required document and analysis are already in hand. The strategy of how-to reorganize the claim submission is the concern discussed here. Input data can be classified into three main categories as shown in Figure 1:

- Data related to the project: Which called Contract Particulars
- Data related to the anticipated claim event: Which contains Event overview, Event Chronology, Cause and Effect, Analysis of time and cost impact.

- Data related to contract: Which contains FIDIC 2017 clauses that related to contractor claim in addition to contract specifications and conditions.

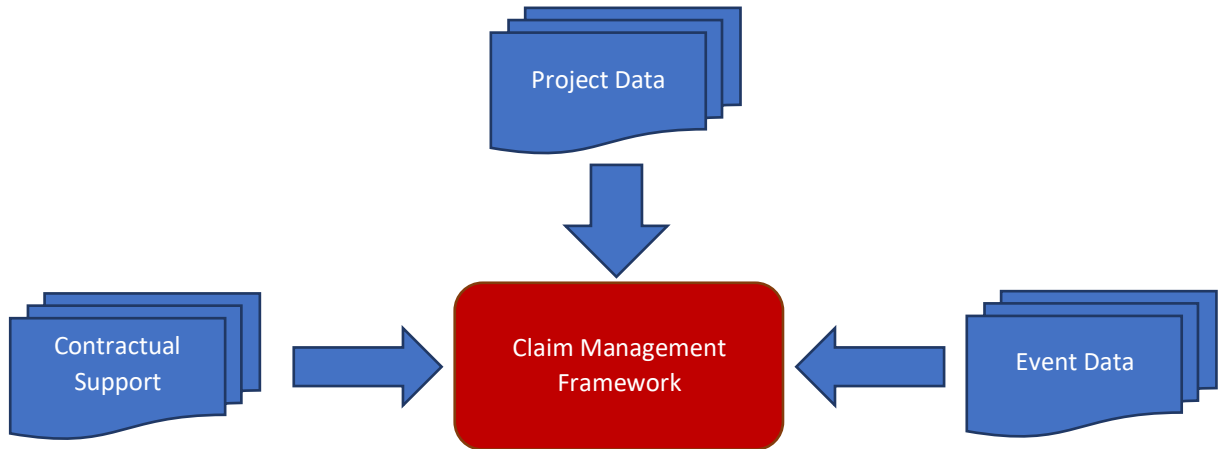


Figure 1: Classification of claim management framework input data

Project Data

Claim submission shall contain some basic information about the project. This information called as contract particulars which can be divided into six main parts as presented in Figure 2:

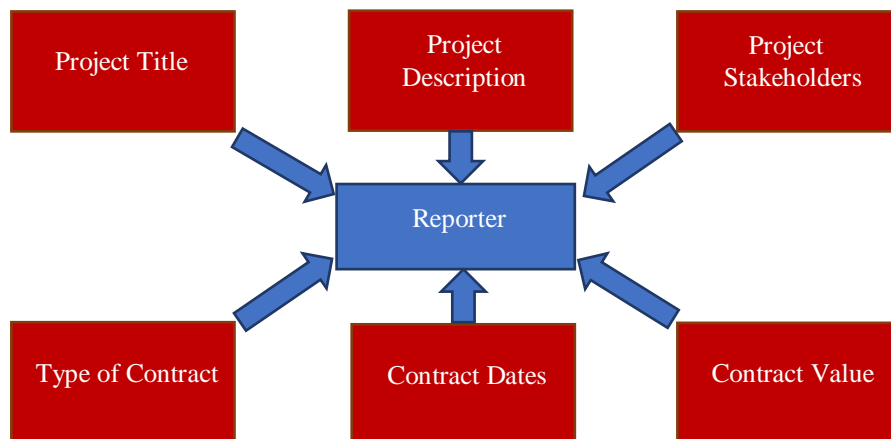


Figure 2: Project Database

- Project Title

In this, part project name and contract number shall be presented as mentioned in the signed contract/agreement. This part will be introduced in the narrative text.

- Project Description

Brief introduction about project location and components such as the number of building, number of floors, main items quantity, etc. this part will be presented in the narrative text.

- Project stakeholders

The related parties to the project and claim in addition to basic data related “Location, State, PO Box, etc.” shall be introduced such as: Employer, Engineer, Designer, Contractor, Sub-contractor, etc. it shall be introduced as text.

- Type of contract

In this part there are two types of the contract shall be chosen, either lump-sum contract or cost-plus contract.

- Contract Dates

The contractual dates will be introduced in dates form. This will be for the following dates: project commencement date, project completion date, revised completion date, contractual completion milestone date.

- Contract Values

This part will show the original contract value and revised one based on approved variation order/s. the value will be formalized in figure data.

Event Data

Due to the numerous natures of claim document production work during the construction project life cycle, the process of the proposed framework could be divided into two steps.

The First step: supported by the proposed framework mapping the required claim event data, the primary step of the framework attempts to simulate the workflow of the standard claim event document management process, especially including classifying claim document and filing them in line with individual claim event respectively. The concept of this step would be as shown in **Figure 3**.

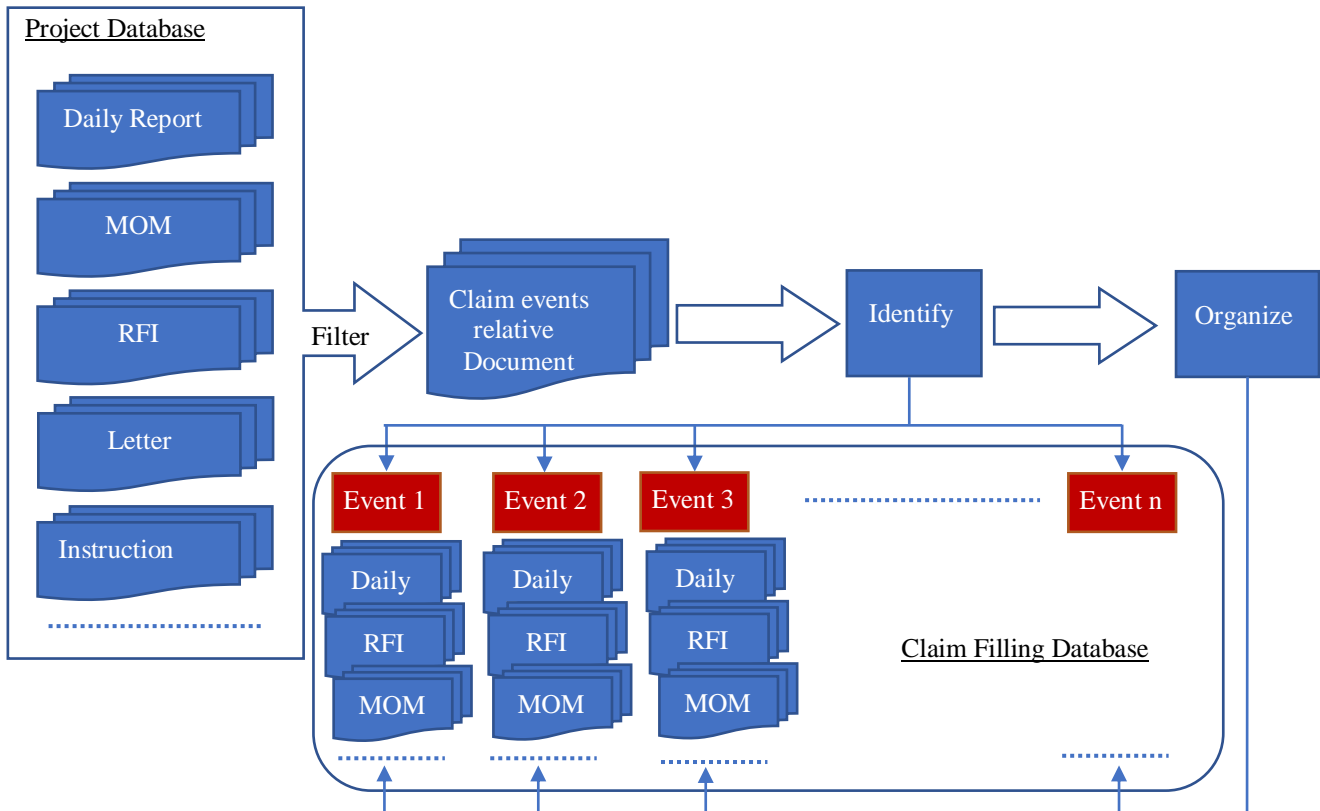


Figure 3: Concept of the Claim Document Identifying and Filing Framework

This step of the framework begins with the commencement date of a project to its completion date. It should cover the duration in which the claim probability appears. The incoming and outgoing document for the project should be filtered, which considered as a smart agent in the framework, then segregate the document into two categories claim irrelevant files which will be eliminated and claim relevant files which will be reserved in the framework. After that, the relevant files will be forward to “Identify” to analyse the claim relevant document into two categories. The first category shall contain the document that might be experiencing an anticipated claim event whereas the second category contains the documents that are present a part of the claim event history of an existing claim event. Next, the “Organizer” can make the matching filing work for each category in a certain database: a new claim event will be generated depending on the first-category document and the document will be kept as the first record of that newly generated event; while the files belong to the second category will be placed under the existing event to which the document is related. With this daily-based workflow, the project claim record-keeping work will be automatically updated while the project is developing.

The Second Step: The second step of the framework should be adopted when the claim event is going to end and meanwhile all the claim event history is basically finalized. The framework’s mechanism of this step can be shown in Figure 3: Concept of the Claim Document Identifying and Filing Framework

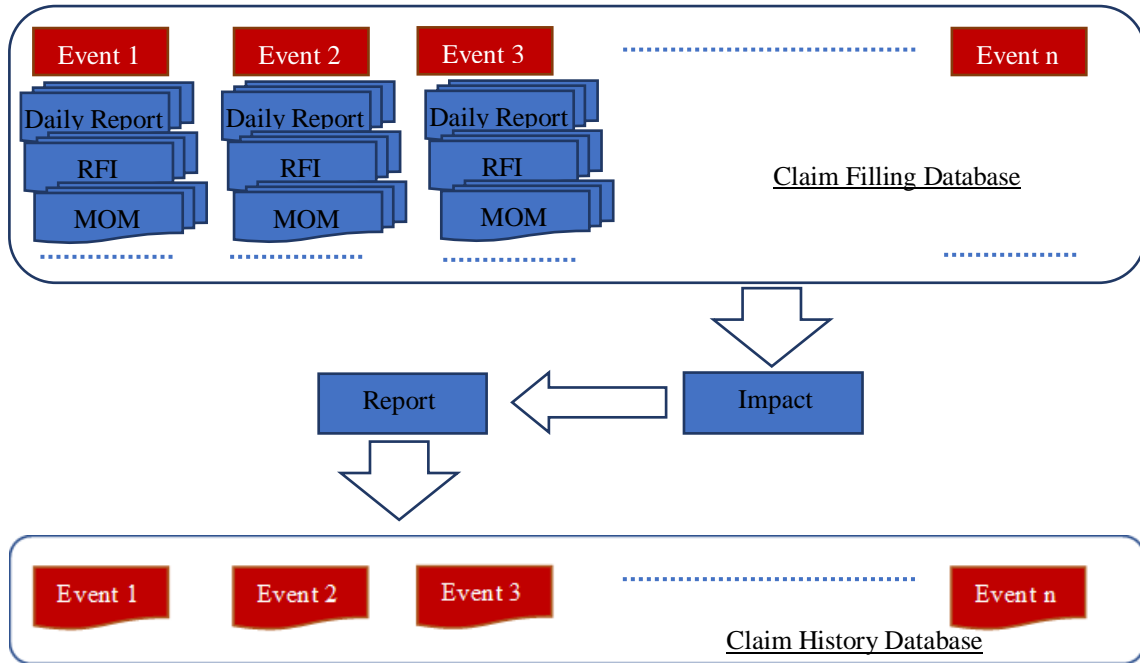


Figure 4: Framework of claim events history database generation

In this step, in the claim document database, all of the claim relevant document has been organized by the claim events. To each one of those events, the “Impact” will do the evaluation of the cost and/or time impact claimed for showing the case and effect study in addition to mitigation action that contractor did to reduce the event impact. The impact part cannot be done without professional/expert QS and planner to be feed to the system manually. Afterward, the “Report” will generate the event chronology along with all supporting document. Finally, the history for each claim event is finished, and it is ready to submit the claim history to the engineer for review and issue his determination.

Contractual Support

In this section, the related FIDIC 2017 clauses to the contractor’s claim will be introduced and listed to the framework. These clauses are 28 clauses in number. The contractor shall tick the clauses that related to his event and support his claim. After that, the “Report” engine shall report the clause number and name with it is description.

The “Impact” engine will notify the contractor team about the contractor’s right to claim as per FIDIC 2017 whatever time, cost and/or profit based on selected clauses. The “Reporter” process will not be completed unless the contractor calculates the impact of the claim event. Figure 5 presenting the FIDIC 2017 clauses that related to contractor claim and process related to contractual support.

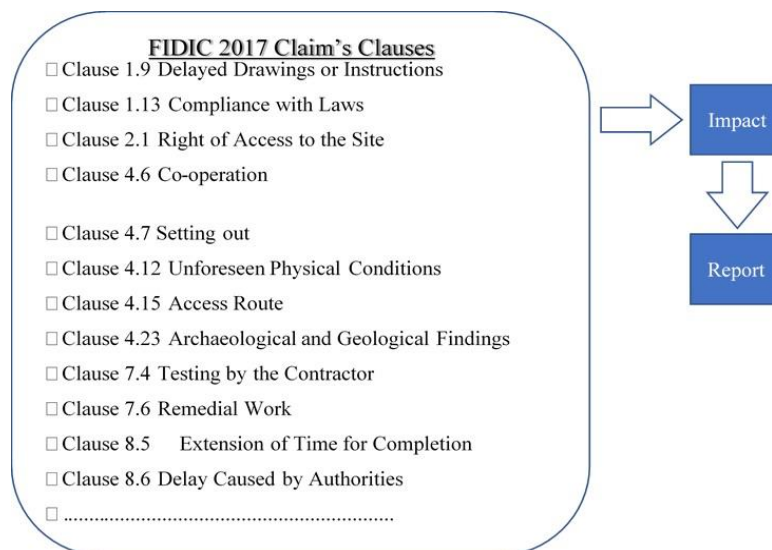


Figure 5: Contractual support process



Smart Engines

Eight types of smart engines have introduced in this framework. The mechanism of each engine can be described as follow:

Notification Engine

Notification engine will notify contractor team during first 28 days from event occurred date or the time that contractor became aware of the circumstances giving rise to the claim to give written notice of claim percent to sub-clause 20.2.1 to the engineer. This notice shall describe the event and shall present the initial estimates of likely impact of time and costs.

After contractor give written notice of claim to engineer, the contractor shall submit a fully detailed claim during 84 days starting from event occurred date or contractor became aware or should be aware inline to sub-clause 20.2.4. A full detailed claim shall be generated by Report engine.

Filter Engine

Filter Engine is the most important engine in this framework. The philosophy of this engine is to filter the project document to the document related to the claim event and to exclude the document irrelevant to claim event.

Identify Engine

Identify Engine is the engine responsible to categorize document relative to the claim event into two categories based on claim status. The first category for anticipated claim event which may be acquired, so the contractor can build his claim and the second one for existing claim event, so the (add “the”) contractor can develop a history of the currently running event. This engine will identify the document not only by document name or subject but it also by the contents of these documents.

Organize Engine

Organize engine is the engine which responsible to organize and file contemporary document based on a type of document such as “letters, daily report, weekly report, monthly report, engineer instruction, shop drawing submittal, etc.” and store it in claim file database. Once a new claim’s event will be generated, the related document will take place in the claim file database under the new claim event. The first type of document will be reserved until the claim event became existing. Once the claim event became existing, the first type of document will be stored along with the second type of document on the document file database under the newly created event.

Impact Engine

Impact engine is the engine which collects the impact calculation whatever time or cost. Professional planner and QS shall determine the actual impact of claim event upon project progress and shall assess the longest or critical path of the project.

Report Engine

The report engine is the engine responsible for genet a fully detailed claim report. Detailed claim report shall be organized and generated in order as shown in Figure 6.

Administration Engine

Administration engine is the engine responsible to give privilege for the user to add new records, view the present document, edit the present document, delete the present document, and approve the change. Users with system administrative privilege can customize the system to reflect the organizational hierarchy of the contractor organization chart in addition to engineer preventative. For example, engineer preventative can review the final report only. Also, project manager he/she is the one can approve the change however it can be, add a new document, delete, or edit an existing document.

Security Engine

Security engine is the engine responsible for authentication access for the users. Authentication is any process by which the system verifies that someone is the one who claims to be. This usually involves a username and a password. Furthermore, it is important to ensure that claim data and document is not disclosed to any unauthorized parties.

DISCUSSION / ANALYSIS

To validate the proposed framework, 7 experts participated in an interview survey. All of the experts are actively involved in claim management specializing in claim preparation and submission. They possess relevant qualifications and their average number of years’ experience in the construction industry is 19 years.

The experts were requested among a structured, semi-closed questionnaire according to evaluate the framework. Furthermore, providing tick-box responses, some of the experts furnished their personal observations concerning the framework. Most of the answers received were, largely, positive. A brief of the responses can be summarized as follows:

- 1- Project Particular.
 - Project Title.
 - Project Description.
 - Project stakeholders.
 - Type of contract.
 - Project Dates.
 - Project Value.
- 2- Claim event chronology.
- 3- Contractual support.
- 4- Causes and Effects.
- 5- Mitigation action.
- 6- Impact calculation.
- 7- Contemporary Records “Attachments”.

Figure 6: Detailed Claim report structure

As seen in Table 2, the majority of the experts agreed that the framework presents an essential issue in the claim management area. Regarding the capability in performing the intended function accurately “Table 3”, the results confirmed it is capable. This recommends that experts would concern the framework as a very beneficial tool for claim management

Table 2: Respondent’s answer to question no. 1

Q1: Is the framework address an important problem in the field of claim management?			
Exp1: Yes, quite important	Exp2: Yes, quite important	Exp3: Yes, quite important	Exp4: Yes, but not important
Exp5: Yes, quite important	Exp6: Yes, quite important	Exp7: Yes, quite important	

Table 3: Respondent’s answer to question no. 2

Q2: Is the framework can track claim status?			
Exp1: Yes, highly can track	Exp2: Yes, can track	Exp3: Yes, can track	Exp4: May be can track
Exp5: Yes, highly can track	Exp6: Yes, can track	Exp7: Yes, highly capable	

Most experts expected that the framework will be required for a minimum level of recourse to be implemented “Table 4”. One expert commented that “its operation will not expend much effort and time and subsequently its advantage will overshadow the expenses”. All experts felt that the framework is covering all claim process starting from claim event start or may start till claim submission “Table 5”. One expert commented, “it has covered a very completed part of claim preparation and submission in a straightforward and consistent way, which I think would be easy to apply in practice”.

Table 4: Respondent’s answer to question no. 3

Q3: Is the framework need to resource to be applied?			
Exp1: Yes, but it will not be too costly to operate.	Exp2: Yes, but it will not be too costly to operate.	Exp3: No need for additional resource.	Exp4: Benefits of using it justifies any resource requirements.
Exp5: minimum resource is required.	Exp6: No need for additional resource.	Exp7: No need for additional resource.	

Table 5: Respondent’s answer to question no. 4

Q4: Is the framework covering the claim management process?			
Exp1: Yes, it is	Exp2: Yes, it is	Exp3: Yes, it is	Exp4: Yes, it is
Exp5: Yes, it is	Exp6: Yes, it is	Exp7: Yes, it is	

According to Table 6, Table 7 and Table 8 **Error! Reference source not found.**, most of the experts agreed that the framework is providing contractual support for the claim. While one expert stated that “it’s not enough and we have to refer also to contract specification”. All experts have a different opinion about the time that can be saved in digging in the project document by using the framework. It is between 40% to 70%, on average we can say it is can save about 53% of the analyst time. Finally, all experts agreed that the framework will enhance contractor claim submission.

Table 6: Respondent’s answer to question no. 5

Q5: Do you think that the framework will provide the contractual support for the claim?			
Exp1: Yes, it is	Exp2: Yes, but not enough	Exp3: Yes, it is	Exp4: Yes, it is
Exp5: Yes, it is	Exp6: Yes, it is	Exp7: Yes, it is	

Table 7: Respondent’s answer to question no. 6

Q6: How much do you think that framework will save claims analyst’s time digging in the documentation in percentage-wise?			
Exp1: 40%	Exp2: 70%	Exp3: 50%	Exp4: 40%
Exp5: 60%	Exp6: 50%	Exp7: 60%	

Table 8: Respondent’s answer to question no. 7

Q7: Do you think that the framework will enhance contractor claim submission?			
Exp1: Yes, it is	Exp2: Yes, it is	Exp3: Yes, it is	Exp4: Yes, it is
Exp5: Yes, it is	Exp6: Yes, it is	Exp7: Yes, it is	

CONCLUSION

This paper presents the proposed framework showing the concept, methodology and the mechanism of it. The validation of the proposed framework is introduced by the interview survey for seven experts. By and large, the views of the experts were in favour of the framework recommending that the framework would be viewed as an important tool for claim management. This represents a positive contribution to the body of knowledge and practice of claim preparation and submission within contractor organizations as it will save more than 50% of analyst time and it will combine between the contractual and document control support.

LIMITATION AND SUGGESTION FOR THE STUDY FORWARD

The proposed CMS framework still has some limitations such as it examines only contractor construction companies in the United Arab Emirates without taken the view of the engineer and the owner into account. What's more, the methodology followed should to be more diverse and more in-depth, which would be difficult as the information required is very sensitive and confidential.

Therefore, more investigations for its usage and implementation are subsequently needed. The following points are still needed for further research and investigation:

- This study was restricted to the claims that are introduced by contractors. Notwithstanding, the client and subcontractors are also included in such claims which need more investigation for this particular area.
- CMS framework shall be improved and to be introduced to real-life by developing IT software built on the concept of this framework.

- Contractor's entitlements are calculated manually. Therefore, more investigation for this particular area is required to develop mechanize to calculate it automatically by link it with other software's that calculate Contractor's entitlements.

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REFERENCES

- Ali, A. M. E. F. (2015). A study on Causes and Management of Claims in the Sudanese Construction Industry, M.Sc. Thesis, Construction Management, Sudan University of Science and Technology, Sudan.
- Bakhary, N. A., Adnan, H. and Ibrahim, A. (2018). 'Construction claim problems in Malaysia: from the contractor's perspective', in MATEC Web of Conferences 192, 02004, pp. 4–7. <https://doi.org/10.1051/mateconf/201819202004>
- FIDIC (2017) *Conditions of Contract for Construction*. 2nd edition. FIDIC.
- Hammad, M. M. (2001). CPDICENTER: Web-Based Virtual Construction Project Document Information Center in Support of Claims Preparation. Ph.D. Thesis, Faculty of Engineering and Computer Science, Concordia University, Montreal, Quebec, Canada. [https://doi.org/10.1061/40513\(279\)110](https://doi.org/10.1061/40513(279)110)
- Hammad, M. M., and Alkass, S. T. (2000). "A Web-Based Construction Project Document Information Center in Support of Claims Preparation." Proc., *Eighth International Conference on Computing in Civil and Building Engineering*, ASCE, 279, 110. [https://doi.org/10.1061/40513\(279\)110](https://doi.org/10.1061/40513(279)110)
- Ho, S. P., Asce, A. M., Liu, L. Y. and Asce, M. (2016). 'Analytical Model for Analyzing Construction Claims and Opportunistic Bidding Analytical Model for Analyzing Construction Claims and Opportunistic Bidding', 9364(February 2004). [https://doi.org/10.1061/\(ASCE\)0733-9364\(2004\)130:1\(94\)](https://doi.org/10.1061/(ASCE)0733-9364(2004)130:1(94))
- Hwang, B. G., and Low, L. K. (2012) 'Construction project change management in Singapore: Status, importance and impact', *International Journal of Project Management*. Elsevier Ltd. APM and IPMA, 30(7), pp. 817–826. <https://doi.org/10.1016/j.ijproman.2011.11.001>
- Kycia, K. (2018) *The new FIDIC conditions of contract (2017) from the Polish perspective*. Dla Piper
- Shadid, M. S. R. (2015) *Construction Claims Management in United Arab Emirates Construction Industry*. M.Sc. Thesis, Faculty of Engineering, Eastern Mediterranean University, Gazimağusa, North Cyprus.
- Tan, H. C., Anumba, C. and Yap, E. H. (2011) 'The Development of a Web-based Construction Claims Management System: End Users' Requirements', in 2011 International Conference on Construction and Real Estate Management, At Guangzhou, China, Volume: 1.
- Tan, H. Chen and Anumba, C. J. (2013). 'Web-Based Construction Claims Management System: Operation of the Prototype', *30th CIB W78 International Conference. Beijing, China*, pp. 594–604.