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Devising a Conflict Forecast Model (CFM)

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ABSTRACT. The construction industry is a complex high risk business, in which the probability of conflicts is very high in comparison to other industries. The variables and unknowns are numerous, having a direct impact on the number and intensity of conflicts arising during the life span of a project. The investment in construction is too big to be left to the unknowns. Conflicts, which could sometimes be predicted, but mostly unpredictable, are a major threat to the investment of money, time, technology and reputation. Finding a simple method of analyzing the possibility and intensity of conflicts in a construction project could help decision makers on judging the feasibility of proceeding with a project. This paper describes a Conflict Forecast Model (CFM). The model presents a tabulated guideline that evaluates and studies the possibility of developing conflict in any construction project. The variables of the construction environment and the major elements of a construction project were considered throughout the defined five phases of the project life cycle.

1. Introduction

Construction is a high risk industry. Each party of the construction team tries to minimize the risk on his side. The owner's goal is to get his project within the budget, time allocated, and with the quality set forth in the contract. He tries to minimize the risk on his side throughout the contract conditions and language. The Architect/Engineer and Contractor both try to accomplish their tasks with the minimum effort and maximum profits, they also try to minimize their risk by carefully reviewing and approving the contract wording.

Today, more than ever before, conflicts and disputes in the construction industry are increasing[1]. Some conflicts, and hence claims, are of course inevitable. There are always "an act of God", unforeseen conditions and *force majeure,* which cause conflict that need to be resolved by the project parties. Hence, a big portion of the conflicts area today comes from reasons that could be avoided with better risk management by the project parties[2,3].

This paper presents a model that can be used by all parties of the construction team to minimize the risk of conflicts. The model is based on the different phases of the project life cycle. The project life cycle is divided into five phases. These phases are: project initiation and feasibility study, design and specifications, bid and award, construction, and operation and maintenance. The major conflict areas in the construction industry are listed vertically in a chronological order against the project life cycle. The Conflict Forecast Model (CFM) presents a mechanism, by which the most likely areas of conflict at a particular geographical location are defined throughout the project life cycle. The CFM sets a degree of risk in each conflict area, against a certain project phase. This scale will be determined after a study of legal cases, that will be surveyed in the geographical location under study.

2. Historical Review

Conflicts and claims are subjects that have been extensively published. Many books define, analyze and present procedures, that can be used to avoid conflicts and claims[4-8] . Materials that define causes of claims in construction projects can be found[9] along with guidelines and methods that can be used to avoid claims[10-14].

Computer simulation programs are also used in the area of conflicts and claims in construction. Abo Rizk and Dozzi[15], developed a simulation program to resolve construction disputes. A hypertext model used to provide the user with the information for conflict and claim analysis is also developed[6]. Expert systems are used as tools for analysis, evaluation and learning in construction conflicts, disputes and claims[17-20].

3. Description of the Conflict Forecast Model (CFM)

Conflicts and disputes may happen at any point of time during the project life cycle. The proposed model (CFM) in this paper divides the project life cycle into five phases. Major conflict areas in the construction industry are then assigned to each phase and the possibility of a conflict existence in that particular phase of the project life cycle is considered.

The model is shown in Table 1. The five phases of the project life cycle are shown in the horizontal axis of the table. These five phases are:

Phase 1: Project initiation and feasibility study. The following are the major tasks to be accomplished during this phase:

– The project concept and budget are established.
– Major project parties (owner, consultant, financier and may be contractor) discuss and agree on communication procedures, fees, responsibilities, and contractual relations.
– Site investigation and coordination with government agencies.
– Conceptual estimate, plan and schedule.

Phase 2: Preliminary and detailed design and specifications. The following are the major tasks to be accomplished during this phase:

Table 1. Conflict forecast model based on project life cycle.

No.	Causes of conflict	*Phase 1 :* Project initiation and feasibility study	*Phase 2 :* Design and specifications	*Phase 3 :* Bid and award	*Phase 4 :* Construction	*Phase 5 :* Operation and maintenance
1	Government rules and regulations					
	– Financial	X	X	X	X	X
	– Legal procedures		X	X	X	X
	– Industrial and trade regulations	X		X	X	X
2	Standard and reputation of					
	– Owner	X	X	X	X	
	– Contractor			X	X	
	– Architect / engineer		X	X	X	
3	Project site					
	– Subsurface conditions	X			X	
	– Access				X	X
	– Geographical location	X	X		X	X
4	Construction team authority					
	– Undefined or unclear	X	X	X	X	X
	– Misuse	X	X	X	X	X
5	Design					
	– Duration		X		X	X
	– Defective or incomplete		X	X	X	X
	– Unclear / contradicting		X	X	X	X
	– Change of work scope		X			
6	Specifications					
	– Unclear		X	X	X	X
	– Contradict with design		X	X	X	X
7	Procurement method		X	X	X	X
8	In accurate estimate and quantity takeoff		X	X	X	X

Table 1. (Contd.)

No.	Causes of conflict	*Phase 1 :* Project initiation and feasibility study	*Phase 2 :* Design and specifications	*Phase 3 :* Bid and award	*Phase 4 :* Construction	*Phase 5 :* Operation and maintenance
9	Pre-qualification of bidders			X		X
10	Construction contract – Compensation methods (fixed price, unit price, ... etc.) – Bases of tender award (lower price, second to lower, ... etc) – Governing law – Clarity and balance		 X 	 X X X X	 X X X X	 X X X
11	Change orders – Timing – Quantity				 X X	
12	Safety measures				X	X
13	Approvals – Payment – Drawings – Samples – Change orders		 X X 		 X X X X	 X X X X
14	Complexity of the project – Duration – Value – Level of technical requirements – Financing – Number of parties involved	 X X X X X	 X X 	 X X	 X X X X X	 X X
15	Force majeure	X	X	X	X	X
16	Acts of God				X	X

– The preliminary design and the specifications outline are prepared.
– Detailed design is prepared after owners' approval of preliminary design.
– Detailed specifications are prepared.
– Labor and trade contractors market is studied.
– Project estimates and plans are prepared along with the bid package.

Phase 3: Bid and award. The following are the major tasks to be accomplished during this phase:

– An advertisement or an invitation for bidders.
– Tenders are received and evaluated.
– Contract is then awarded, notice to proceed is issued, and a detailed construction schedule is defined.

Phase 4: Construction. The following are the major tasks to be accomplished during this phase:

– Contractor performs the work according to schedule.
– Consultant monitors and controls the progress of the project activities and establishes cost control, time control and quality control programs.
– A defined mechanism for job meetings, change orders, work inspection and approvals, progress payments, schedule update, owner occupancy and operation are set and applied (with approval of all project team members) along with the appropriate reports.

Phase 5: Operation and maintenance. The following are the major tasks to be accomplished during this phase:

– The project is handed over to the owner according to the contract provisions with all warranties, manuals, and maintenance procedures.
– House maintenance or a maintenance contract is adopted.

The vertical axis in Table 1 represents the major causes of conflicts expected in any construction project arranged in a chronological order against the horizontal project phases. Those causes of conflicts, from 1 to 16, were derived by thorough research and review of the written literature and published work.

One of the major criteria of the model is that it is a regional based model. Different causes of conflicts could exist in different regional areas due to different cultural, economic, political systems, ... etc. Those conflict areas should be added to the model, and others that do not apply to the region under study should be removed. The scale or the intensity of each conflict cause is then established out of a survey of legal cases in the area as will be explained in the next section.

To give a clear example on the effect of geographical location on the model, consider the first cause of conflict in Table 1 which is shown as "Government rules and regulations". The government rules and regulations in Saudi Arabia (home of the authors) could be of low to moderate risk to local project parties due to their familiarity with the system and its local acceptance. The same rules and regulations could be of a high risk to international contractors seeking work in the country, due to the different jurisdiction

and philosophy behind them (i.e. Shariah law) in contrast to what an international contractor is familiar with.

4. Using the Model

As mentioned earlier, the model is based on the geographical location. For each region, the following two steps need to be taken before using the model:

Step 1: The major causes of conflict in each region should be identified. Conflict causes that do not apply to the region should be deleted from the model. The applicability of each cause of conflict to the particular phase is then tested and marked with "X" as shown in Table 1. Take for example the cause of conflict number 3 "Project site". The item "Subsurface condition' is marked in Phases 1 and Phases 4. Thus project conflicts in the region would exist only during these two phases. How strong are the possibilities of conflicts in any project in the region due to cause? The answer to this question is the intensity or scale of the conflict cause and it should be found in Step 2.

Step 2: The legal cases on the construction conflicts and disputes in the region are then examined. An ample number of cases should be considered (number is variable according to the country's size, population, construction activities, ... etc.). The cause of the conflict in each legal case is identified and points are assigned to the conflict cause in the vertical axis and the particular construction phase where it occurs in the horizontal axis. More points in the intersection represents a higher risk of this conflict cause occurring in this particular construction phase.

Step 3: The model then can be applied to construction projects in the region. The construction parties could use the model as a guideline before a project starts and can conduct more analysis and evaluation of the tasks involved in the high risk areas.

The information is then used as an input to study the consequences (effects) of these conflicts, and as a basis for early corrective measures. The decision to take action to minimize the effect of a conflict must be followed with a list of detailed corrective procedures, in order to minimize or delete the inherent risk(s).

It is better to make use of this model as early as possible in the project life cycle, that is in Phase 1, which will give ample time for the necessary measures. Some information will not be available at this stage, thus a return is required at later stages as information becomes handy. It is advised that use is to be made of this model in all five stages of the project life cycle for optimum results.

The model could be used by both the client (owner) and consultant (Architect/ Engineer) in the early phases of a construction project. The contractor who is usually not involved in the project until later stages, still could use the model for some risk analysis in Phases 4 and 5.

This model is suggested for use for all procurement methods (design-build, turnkey, single prime contractor, multiple prime contractors ... etc.) and for all compensation methods (fixed price, lump-sum, cost plus, ... etc.).

5. Conclusion and Further Work

In this research work, only step 1 mentioned in the previous section is addressed. Steps 2 and 3 are under progress. After performing Steps 2 and 3, the model will be applied to several projects to verify the validity of the concept.

The authors believe that using this proposed model will be of benefit to the construction party using it, and to the project itself. Minimization of risk of conflicts will lead to savings in time and money, and will have a positive effect on productivity, profits, and future relations of the parties. The model is a management decision-making tool, that is easy to use and could be expanded upon in further work.

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استنبـاط نمـوذج للتنبـؤ بالمنــازعـات (سي . إف . إم .)

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المملكة العربية السعودية

المستخلص . تعتبر صناعة الإنشاءات واحدة من النشاطات المركبة ذات المخاطر العالية ، وتنطوي على احتمالات كبيرة لحدوث منازعات بالمقارنة إلى غيرها من الصناعات . فما أكثر المتغيرات والمجهولات في هذه الصناعة مما يظهر أثره المباشر في عدد وشدة المنازعات التي تنشأ خلال الفترة الزمنية التي يستغرقها المشروع . إن الأموال التي توظف في أعمال الإنشاءات ضخمة جداً بحيث لاينبغي أن تترك تحت تأثير هذه المجهولات . وهذه المنازعات ، التي يمكن التنبؤ بها أحياناً – وليس دائمًا – تشكل خطراً كبيراً يتهدد استثمار الأموال والوقت والتقنية والسمعة الحسنة . وإذا أمكن التوصل إلى طريقة بسيطة لتحليل امكانية حدوث المنازعات ومدى شدتها في مشروع للإنشاءات ، فإن ذلك يمكن أن يساعد من بيدهم اتخاذ القرار في تقدير جدوى المضى قدماً في تنفيذ مشروع ما .

يقدم هذا البحث نموذجاً للتنبؤ بالمنازعات ، ويتضمن النموذج مؤشرات مرتبة على هيئة جدول لدراسة وتقييم احتمال حدوث نزاع في أي مشروع إنشائي . وقد تم دراسة متغيرات المحيط العام لمشروع الإنشاءات والعناصر الرئيسة للمشروع خلال المراحل الخمسة التي تم تعريفها لدورة حياة المشروع .