



## CIVIL ENGINEERING

# An expert system to manage dispute resolutions in construction projects in Egypt



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**Abstract** This study attempts to shed a great deal of light on the problem of construction disputes in the Egyptian projects. This paper presents a comprehensive review of the available literature on analysis of disputes. The objective of this paper was to provide an expert system can evaluate the overall dispute settlement procedures at company's projects. A questionnaire has been used to study dispute sources and resolution methods. Four case study applications have been provided to check the validity of the proposed system. Results confirmed that the most important source of disputes was contract management 74.04%, the second was contract documents 71.49%, the third was financial issues 67.80%, the fourth was project related issues 63.92%, and the lowest one was other sources (such as force majeure) 61.58%. Finally, the expert program facilitates dispute resolution by using alternative dispute resolution methods instead of going direct to arbitration or litigation. © 2015 Faculty of Engineering, Ain Shams University. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

*Abbreviations:* ADR, alternative dispute resolution; UK, United Kingdom; EFCC, Egyptian Federation for Construction and Companies; IP.I, importance index; DRExM, disputes resolution expert manager; FIDIC, Federation International Des Ingenieurs Conseils; DRB, dispute review board; DAB, disputes adjudication board; AI, artificial intelligence

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## 1. Introduction

Construction industry in Egypt suffers from the misunderstanding of dispute resolution management; many factors affect the development of dispute resolution. Over the last years, there has been a breakdown in the relations between parties involved in the construction processes. Several studies have been reviewed which present the disputes' definitions, nature, parties, classification, causes and resolution in construction projects. Richard [1], defined a dispute as "a specific disagreement concerning a matter of fact, law or policy in which a claim or assertion of one party is met with refusal, counter – claim or denial by another", Diekmann and Girard [2], described dispute as "any contract question or controversy that must be settled beyond the jobsite management

staff”, Corby [3], defined dispute as “a difference between the parties after the internal procedure has been exhausted”, and Cheung and Yiu [4], stated that dispute is “a regular feature in construction and consumes resources that would otherwise be used in a more productive manner”. It can be said that a dispute only appears after a claim has been made and been rejected, Ndekugri and Russell [5].

Bunni [6], specified that one of the main reasons that can affect the completion of projects is disputes. It is normal to have disputes in construction projects related to contract nature. Thomas [7], stated that the nature of disputes arising from engineering contracts may range from trivial disputes to disputes that threaten the viability of the underlying transaction. Steen [8], stated that the construction industry has become known as one of the most adversarial and problem-prone, with claims and disputes on construction projects frequently the rule rather than the exception. The large risk that can be resulted from disputes existing, requires fair resolution methods.

Roxene [9], stated that in a typical construction project, the owners, donor agencies, project managers, field engineers, general contractors, subcontractors, and suppliers are the primary stakeholders. So when disputes arise in a construction project, some or all of the stakeholders are the dispute parties. Without exception, disputes involve, misunderstandings, conflicting solutions on the issues, and communication dynamics between the parties. Bunni [6], said that disputes are a reality in any construction project, as the construction contracts always have many parties. Construction contracts are different from other contracts in many points such as; the large number of contract parties, numerous tasks to be implemented, and the large period of execution. UNITAR [10], suggested that in case of dissimilarity the parties have a choice to select the laws and jurisdiction of courts of the country to which either of the parties belong to or of a neutral or third country. Such a choice is made at the time of entering into the contract.

Shin and Molenaar [11], made classification for disputes based on definition of disputes and analyses of disputes for his related research, and the proposed three major types of disputes are contractual, organizational and technical disputes. Contractual disputes include definitions, interpretation, and clarification of the contract. Contractual issues cause a significant portion of disputes in many projects. Organizational disputes are related to human behavior in project operations and include human interactions, personality, cultures, and professional background among project stakeholders. Technical disputes are considered as the most common issues in project operation and include engineering clarification, which is a part of engineering decision making processes.

Fenn, Hall, and Carmicheal [12–14], have identified the causes of construction disputes that are caused by client, designer and contractor. Fenn and Speek [12], identified the following factors for the client as failure to respond in timely manner, poor communication among members of the team, inadequate tracing mechanism for request of information, deficient management, supervision and coordination efforts on the part of the project, lowest price mentality in engagement of contractors and designers, the absence of team spirit among the participants, reluctance to check for constructability, clarity and completeness, failure to appoint a project manager and ambiguities in contract documents. Hall [13], identified causes of construction disputes caused by the consultant such as

failure to understand the responsibilities under the design team contract, over design and underestimating the costs involved, late information delivery and cumbersome approach to request for information, design and specification oversights and errors or omissions resulting from uncoordinated civil, structural, architectural, mechanical and electrical designs and incompleteness of drawings and specifications. Carmicheal [14], identified causes of construction disputes caused by the contractor as follows: inadequate contractors’ management, supervision and coordination, delay/suspension of works, failure to understand and correctly bid or price the works, Inadequate CPM scheduling and update requirements.

Zakzok [15], mentioned peaceful resolution of the dispute which passes before reaching the judiciary or international arbitration that those responsible for the project have to be aware of the causes of conflict and work to avoid them in the beginning of the project and the speed of handling and decision-making with their claims. Nosair [16], provided a sound solution to the construction disputes problem. This will be through the development of an expert system that can materially help to reduce the likelihood of construction disputes. The output of the proposed system is a reliable prediction for the expected causes of disputes for any future project. Nicholas Gould [17], searched for how disputes arise and then taking proactive steps to avoid them communicating well and looking for objective solutions and avoiding conflict can also help once the project is under way. A commercially based settlement, either in negotiation or by mediation, is now frequently used in the construction industry. Use of a mediator or some other ADR process can resolve disputes more quickly, saving time and money. If all of this fails, there are of course the procedures of arbitration and litigation. While they are applicable occasionally, they are best avoided if possible. Howard Klein [18], looked at all procedures currently being used by UK employers, professional advisors, project managers and contractors to resolve their disputes. All of them normally at lower cost and reduced time than would be incurred in Arbitration or Litigation, to ensure that contractors benefit from prompt ensuing cash flow necessary for their survival and well being, and thereby the UK’s construction. Verster [19], showed the professional how by communicating effectively and continuously, disputes can be minimized. It also proposes some procedures to enable all functionaries and parties to the contract to focus on achieving the project objectives. It is advised that the building blocks for resolving differences should be communication, conciliation, adjudication and mediation, with arbitration or litigation as a last resort. El-Adaway and Ezeldin [20], investigated how arbitration is used as a dispute resolution mechanism in Egyptian large scale

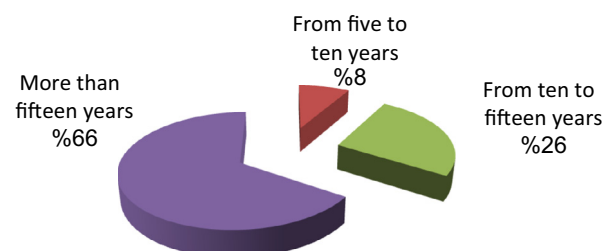


Figure 1 Ranges of respondent companies’ experiences.

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