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COMPUTERIZED SYSTEM FOR ASSESSING ENGINEERING-RELATED CLAIMS

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ABSTRACT

Construction projects are usually associated with delays, which raise claims. These claims are essentially time-consuming for both employer and contractor and are considered costly element in construction projects. For employers, delays mean loss of revenues due to lack of production of incomplete facility. While, for contractors, delays cause higher overhead costs due to extending construction period, escalation of material costs, wage increases, and application of a liquidated damage and penalties. This paper presents a computerized system, dedicated to assess construction projects' delay claims (due to engineering-related attributes). The system is capable to identify the party(ies), which has (have) caused that delay. The proposed system is generic and can be used by all project parties. It can be used by the employer or contractor who plans to submit a claim in such a way that it helps in knowing ahead whether s/he is entitled for the claim or not. Also, it can be used by the engineer to support the decision of acceptance/rejection of the submitted claim. The system is considered a great aiding tool for arbitrators who have little or no engineering knowledge.

INTRODUCTION

The progress of construction projects is greatly influenced by disputes. Whenever a dispute arises, projects run behind schedule. This is attributed to disturbance of resources in a way that does not meet original resources' allocation plan. Further, projects suffer cost overrun due to associated legal cost. Publicly advertised disputes might influence the reputation of construction firms, property developers, public agencies, and employers (Fahmy 1995). Delay disputes can be resolved in several techniques such as negotiation, mediation, conciliation, use of dispute resolution boards, arbitration, and litigation. Negotiation is an approach to maintain an open dialogue between all dispute parties in order to arrive at a speedy settlement on terms favorable to all parties (Mercorella 2004). Whereas, mediation technique is considered

an effective resolution technique in dealing with disputes as it uses the capacities of an experienced impartial and knowledgeable person familiar with the construction process. On the other hand, conciliation aims at bringing about mutual consent between the disputing parties by means of a compromise suggested by the conciliator through providing the parties together by exposing any misunderstandings of the facts or law giving rise to the dispute (Pickavance 1997). In dispute resolution boards technique, the disputes can be resolved by appointing an adjudication board which assembled by a particular procedure pre-defined by the dispute parties upon contracting. The decision of that board is not binding on the parties. Arbitration is a formal process for achieving an earlier resolution of the dispute than may be obtained through the courts. The particular procedures of arbitration utilized are usually fashioned by the parties themselves, rather than imposed by outside authority. However it should be noticed that decision of the arbitration is binding on the parties (Whitman et al. 1998).

Litigation is resolution of disputes through the courts which is time consuming and expensive way of solving disagreement (ILO 2004). Despite the fact that all dispute resolution techniques are useful, they do have associated drawbacks. The common drawback, of all techniques, is the lack of a systematic and comprehensive technical evaluation of the entire problem. This paper presents a computerized system to advise on contractual assessment of construction claims related to engineering delays. It aids in assessing construction claims according to their entitlement, origin and compensability. A comprehensive actual case study is presented to illustrate the capability of the developed system in assessing engineering-related claims.

PROPOSED SYSTEM DESIGN

Engineering-related delay claims are considered significant with respect to construction delay claims. The causes of Engineering-related delay claims can be classified into three main categories; i) delays in design development, ii) delays in work shop drawings preparation and/or approval, and iii) delays due to changes requested by one of the contracting parties or even by a third party. Analyzing the attributes of each category aids in defining the responsibility of each contracting party towards the occurred delay and identifying the compensability of that delay. The attributes of engineering-related delay claims have been identified in a research study by: 1) literature review, 2) questionnaire surveys (collected from contractors, consultants, employers' representatives and construction claim experts), and 3) interviews with construction claims experts. The outcomes of the above mentioned study have been used in building the knowledge of the proposed system. Such knowledge accounts for delay claims related to engineering causes in construction projects, designed by the employer (i.e., the design-bid-build projects) or by the contractor (i.e., design-build projects). The system consists of five main components, which interact via a user interface that controls the connectivity among those components (see Figure 1). The components are:

System Input: it acquires project information (e.g., type of contract, particular conditions, schedule, etc) which has great impact on claim analysis.

Claim Procedure Module: it reviews the timing procedure of the claim in order to ensure the abidance of the contractual terms and conditions.

Claim Identifier Module: it is considered the core of the system. It concludes whether the claim is valid in principle or not. In addition, it advises on the origin, compensability and timing of the claim.

Claim Analyzer Module: it provides the final conclusion of the examination and illustrates the reasons that lead to the decision. Also, it provides a recommendation to avoid further claims regarding the examined case.

System Output: it provides the assessment of the claim in a form of summary and detailed reports.

The computerized system utilizes claims' procedures stated in FIDIC 1999-a & b for both design-bid-build and design-build projects. Further, it is flexible in allowing the user to define different procedures. The system provides the user with claim's origin, compensability and timing. It also advises on the validity status according to claim procedure stated in the contract.

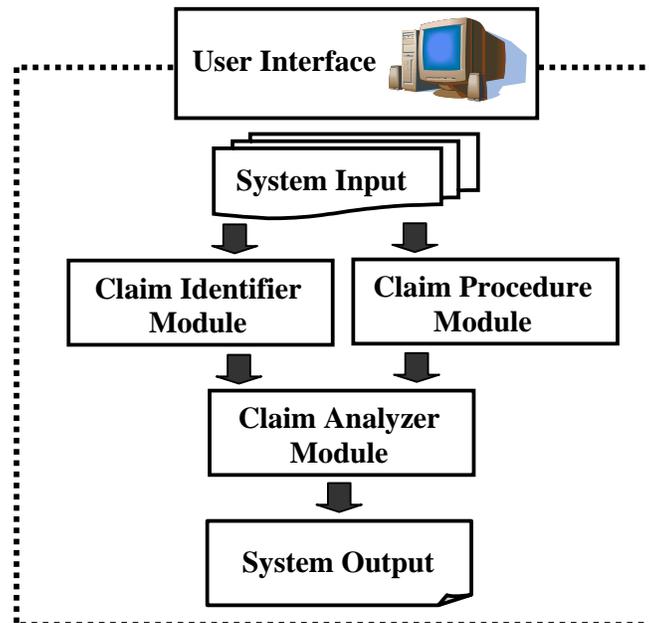


Figure 1: Schematic Diagram for Proposed System

SYSTEM IMPLEMENTATION

The proposed system is implemented utilizing Microsoft Visual Basic 6.0 which allows connectivity with commercially available software such as Primavera and Microsoft Project. System's screens are designed to retrieve information from its users. The inputs of the system are fed utilizing four main screens:

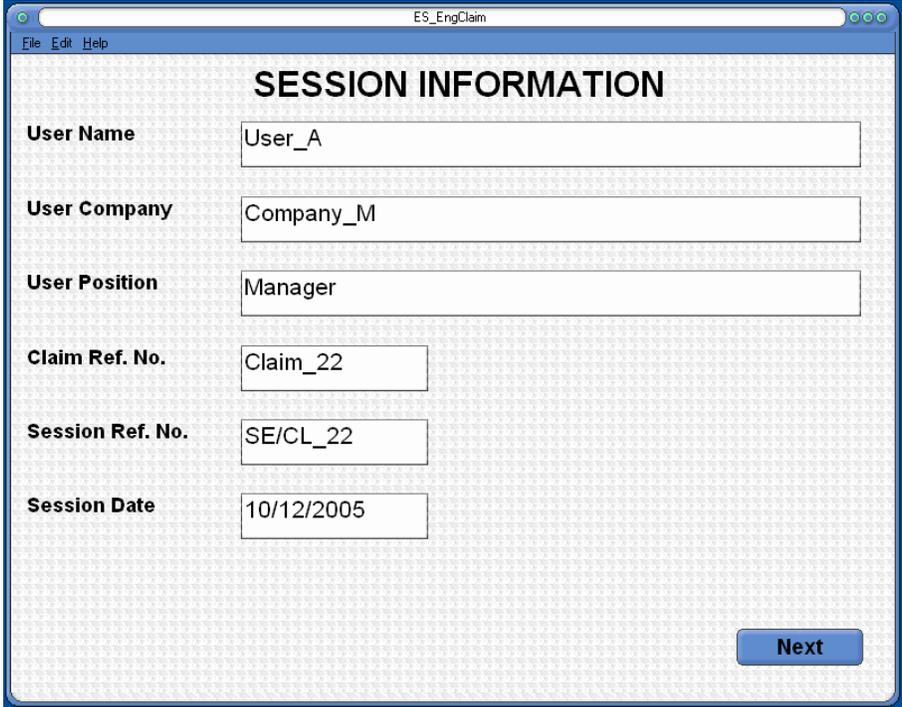
Session Information Screens: are used to enter user's personal information as well as the reference number of that session (see Figure 2).

Project Data Screens: are used to enter project name, description, contract parties' name, project delivery system, time schedule control tool as well as the contract form of the project (see Figure 3)

Claim Data Screens: are used to answer some questions needed to identify the claim events (see Figure 4)

Claim Procedure Data Screens: are used to define the procedure that has been followed by the claimant in handling the claim documents (see Figure 5).

More than 300 IF-THEN rules have been designed in order to address all possible situations of engineering-related claims. The system provides its outputs in two forms: 1) on-screen summary report, and ii) detailed report which can be exported to either text format or Microsoft Word. The detailed report includes information pertaining to claim assessment conclusion as well as a reasoning paragraph explains the reasons lead to that conclusion.



The screenshot shows a window titled "ES_EngClaim" with a menu bar containing "File", "Edit", and "Help". The main content area is titled "SESSION INFORMATION" and contains a form with the following fields:

User Name	User_A
User Company	Company_M
User Position	Manager
Claim Ref. No.	Claim_22
Session Ref. No.	SE/CL_22
Session Date	10/12/2005

A "Next" button is located at the bottom right of the form.

Figure 2: Session Information Screen

ES_EngClaim

File Edit Help

PROJECT DATA

Project Name

Project Description

Employer Name

Engineer Name

Contractor Name

Identify the Claimant

Employer

Contractor

Identify the Time Schedule Control Tool

Manual Software

Figure 3: Project Data Screen

ES_EngClaim

File Edit Help

CLAIM DATA _ DELAY IN WORK SHOP APPROVAL

Work Shop Drawings Approval activity data after the event giving rise to the claim

ES EF

LS LF

Claim Investigation

Contracted date of submitting the work shop drawings to the employer representative for his approval

Actual date of submitting the work shop drawings to the employer representative for his approval

Are there any mistakes or changes by the contractor belongs to the work shop drawings that lead to delay in the approval activity

Yes No

Define the duration needed to rectify these mistakes or changes effect Days

Is there any delay in respond to the employer representative queires that lead to a delay in the approval activity

Yes No

Notes: The Proj. Delivery Sys. is: **Design-Build**

Proj. time schedule control tool is: **Manual**

Figure 4: Claim Data Screen

CLAIM PROCEDURE

Contract Form Is **FIDIC, Condition of Contract for Plant and Design/Build, First Edition 1999**

Date of the event giving rise to the claim 29/04/1999

Did the Claimant issue claim notification to the Engineer?

Yes No **Claim Notification issuing date** 15/09/1999

Did the Claimant submit the claim details to the Engineer?

Yes No **Claim Details Submission date** 15/09/1999

End date of the effects resulting from the event 29/04/1999

Did the Claimant submit the final account of the claim to the Engineer?

Yes No **Final Account Submission date** 15/09/1999

Previous **Next**

Figure 5: Claim Procedure Data Screen

CASE STUDY

This section presents an actual case study to illustrate the practical use of the proposed system and to validate its output. The contract of the project case had been signed on January 28, 1999 between an Employer (referred to as *Employer_X*) and a Contractor (referred to as *Contractor_Y*). The scope of the contract work is fabrication, delivery and erection of 9,860 metric tones of steel structure to construct a facility for *Employer_X*. The project delivery system was design-build and the FIDIC 1999-b "Condition of Contract for Plant and Design/Build" was used as a contract form. *Employer_X* and *Contractor_Y* accepted to modify the claim notification period to be 7 days instead of 28 days as mentioned in clause 20.1 of FIDIC 1999-b. The signed contract came into force on February 1, 1999.

As per contracted time schedule which had been planned using Primavera software, the contractor should submit the package of design and workshop drawings to the employer for his approval on February 28, 1999. Fourteen days were allowed to the employer representative for achieving the review and approval task. The employer had assigned the said task to the project Engineer. The design and workshop drawings approval activity was critical; accordingly, any delay in that activity led to a direct delay in the overall project time schedule. Table 1 lists the dates of claim events in sequence.

Table 1: Dates of Claim Events

Date	Event
March 4, 1999	The contractor submitted the design and workshop drawings package to the Employer for his approval as per contract conditions.
March 11, 1999	The Engineer discovered that the contractor missed to apply one of the specified life loads on the top of the different steel buildings roof. The Engineer reported the said mistake to the contractor requesting him to revise the design and work shop drawings documents to implement the missed loads. The Engineer report included all contract supporting documents which proved the contractor fault.
March 23, 1999	The contractor admitted his mistake after several correspondences and litigations between the contractor and the Engineer. The contractor promised to revise the design and work shop drawings documents as soon as possible.
April 12, 1999	The contractor submitted the revised documents to the Engineer after considering the missed loads. The contractor requested the Engineer approval as soon as possible to start the steel structure fabrication activity in order to minimize the negative impact of the delay in engineering activities on the overall project time schedule.
April 29, 1999	All design documents and work shop drawings were stamped either “ <i>Approved</i> ” or “ <i>Approval with comments</i> ” and submitted to the contractor. Meanwhile the Engineer instructed the contractor to start the fabrication of steel structure activity regardless the stated comments (since these comments would not lead to a major changes that affect the successor activity) and allowed one week to the contractor to rectify these comments.
September 15, 1999	The contractor issued a claim notification to the Engineer announcing that he is entitled to an extension of time of 45 days due to the delay of Engineer in approving the design and workshop drawings documents submitted by the contractor.

Upon entering the above information to the system, it reviews the timing procedure of the claim in order to ensure the abidance of the contractual terms and conditions by triggering claim procedure module. Then it activates both claim identifier and claim analyzer modules in order to reach its final conclusion as depicted in Figure 6. It should be noted that the system output shares the arbitrators their opinion with respect to above described case. The responsibility of the delay relies on both contractor and the employer due to delay on design and work shop drawing approval, respectively. As such, the claim is dropped due to the claimant failure in following the contracted claim procedures.

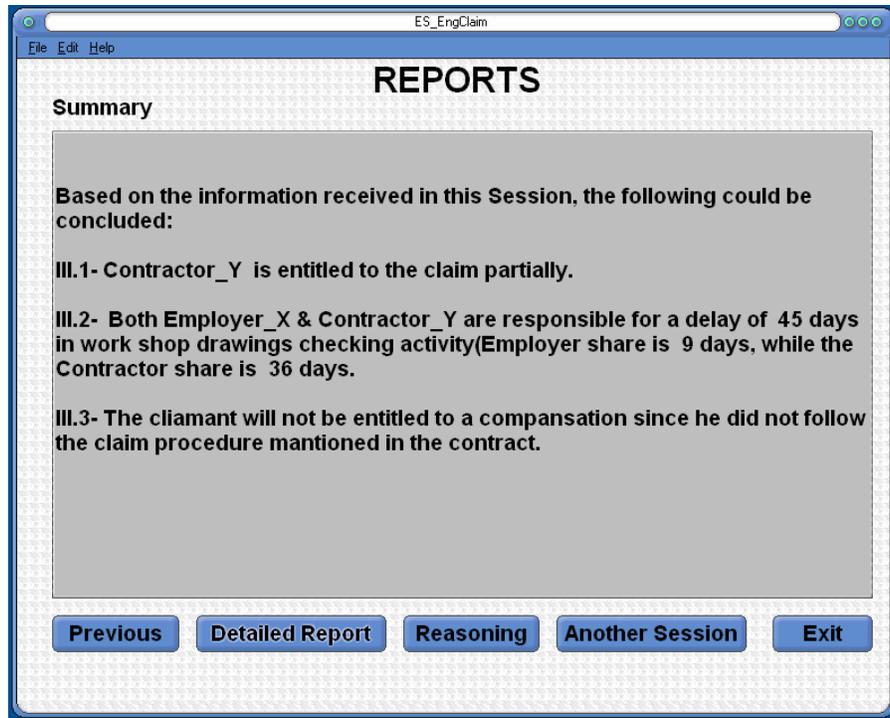


Figure 6: Summary Output Screen

CONCLUSIONS

Delays in construction projects have a remarkable impact on projects' performance. Their influences make projects to run behind schedule and over budget. Therefore, it is important to carefully analyze the delays raise claims. This paper presented a computerized system, dedicated to assess engineering-related claims. The system is generic and can be used by all project parties including employers, contractors, engineers and arbitrators. The system consists of five main components; system input, claim procedure module, claim identifier module, claim analyzer module, and system output. It utilizes claims' procedures stated in FIDIC 1999-a & b for both design-bid-build and design-build projects. Further, it is flexible in allowing the user to define different procedures. A detailed actual case study was presented to illustrate its use and validate its output.

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