AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

Department of Structural Engineering

Develop a Decision Support System for Determining the Optimal Mark-up bid percent in Construction Projects

A Thesis Submitted for the Fulfillment of the Requirement of PHD Degree

In Civil Engineering by

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STATEMENT

This dissertation is submitted to Ain Shams University, Faculty of Engineering for the degree of PHD in Civil Engineering.

The work included in this thesis was carried out by the author in the department of Civil Engineering, Faculty of Engineering, Ain Shams University, from April 2013 to December 2018.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others

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DEDICATION

I Dedicate my thesis to my beloved Father (God bless his soul).

To my beloved, great Mother.

To my beloved brethren and darling sons who supported me to achieve my study. I will never forget the secret of my success and happiness in my life after God Almighty, my husband**:** Aerospace Engineer / Ahmed Abu Bakr.

God give everyone Goodness, forgiveness and Radwan.

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ABSTRACT

The Construction contracting is the ability to bid successfully. Winning project tenders and making profit is the main contactor's target to survive in the construction sector. While there are methods to calculate direct and indirect costs, there are fewer tools for estimating mark-ups. Therefore, Optimum bid mark-up decision is an important issue, to maximize possible profits, cover contingency and keeping bids at a competitive level.

The bid markup decision in construction projects is a complex adaptive process performed by contractor in the pre-tender stage. Therefore, it requires significant experience and market knowledge. Due to the economic reform initiatives lately undertaken by the Egyptian government coupled with the ambitious development programs of infrastructure and the development of several new cities, there are new variables that add to the complexity of this process. These variables include high inflation, currency exchange changes, economic instability, removal of subsidies (utilities, fuel, etc.) & compressed construction deadlines.

Cost Engineering makes it possible to increase profits by revealing qualitative and quantitative factors, so that special attention may be given to strengthening decision analysis, thereby evaluate existent unforeseen risk that absorb part or all of the normal profits. Hence, increase the importance of project management science.

The objective of this research is to develop a Decision Support System (DSS) to generate the optimum bid markup for residential building projects. In forming this decision, there are various qualitative and quantitative factors. Thus, factors influencing the decision process identified and evaluated using Delphi technique, two round questionnaire survey to reflect a real decision. Then analyze the retrieved factors with stepwise regression statistical technique to generate highly impact factors. The decision support system consists of three modules; first, the Analytic Network Process (ANP)-Relative Module; second, Rating Module and the third is the financial forecast module. Finally, generate the optimum bid markup.

The main findings in this research are:

- Priorities of bid markup's significant factors, which include need to work, Inflation, the risk involving owing contract, economic and competition market environment.
- Bid markup alternative relation with each markup factor's categories.
- Project item cost fluctuation in cost of finance calculation.
- Contingency's inflation with respect to new Egyptian tendering laws.

The result of this study improves and assesses contractor's ability to enhance their documentation system and estimating process to deal with various bidding evaluation conditions in Egyptian construction firm.

Keywords: Bid Markup, Decision Support System, Inflation, Competitive tender, ANP.

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