AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
Structural Engineering

Risk Assessment for Variation Orders for Residential Projects

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A thesis submitted in partial fulfilment of the requirements of the degree of
Master of Science in Civil Engineering
(Structural Engineering)
Submitted by

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Faculty of Engineering, Ain Shams University, 2012
(Structural Engineering)
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Statement

This thesis is submitted in partial fulfillment of the degree of Master of Science in Civil Engineering (Structural), Faculty of Engineering Ain Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or qualification at any other scientific entity.

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Abstract

This research aims to assess risks caused by variation orders in construction projects in Egypt, through studying the most important causes of the variation orders and their effects on construction projects. Two initial questionnaires were created using brainstorming technology to generate and collect multiple factors related to the causes and effects of variations. Using Delphi technique, a selected team of experts responded to the initial questionnaires and provided comments on the responses from each group of factors that had been gathered until an agreement had been reached and the final questionnaire had been established.

The two structured questionnaires were developed. The first one contained 39 collected causes of change and categorized depending on the origin of the variation; owner related, consultant related, contractor related, project management related or other related variations. The other one contained 12 collected effects of change categorized depending on the impact of each effect; cost related, time-related, productivity related or organization related effects.

The survey was carried out among client representatives, consultants, contractors and project managers involved in delivering projects. A total of 153 and 147 completed questionnaires received for the first and second questionnaires, respectively, out of 250 questionnaires distributed for each questionnaire. The collected

respondents were analyzed with the Statistical Package for the Social Science “SPSS”. In this study we use four different methods to identify the most risk causes of VOs and their effects. The results of the study showed that the most five risky causes of variation orders are “Change in economic conditions”, “Lack of coordination between the parties”, “Bad sub-contractor or supplier by the contractor”, “Impediment to prompt decision-making process by the owner of the project” and “Contractor’s financial difficulties”. Where the most five risky effects of variation orders are “Completion schedule delay”, “Logistic delay”,” Local Procurement delay”, “Delay in payment” and “Productivity degradation”.

A recently completed residential project is selected to be used as a case study to compare the causes and effects of variation orders resulted from this research and a recently completed project. The study showed that the causes of variation orders are “Change in economic conditions” (ranked as the top cause of variation orders in our study), “Change in design by the owner”, “Change in scope by the owner”, “Change in specifications by the consultant”, and “Material replacement by the owner”. Where, the effects of variation orders are “Owner's additional financial requirements”, “Delay in the completion date” and “Disputes & Poor professional relations between parties”

Keywords: Variation orders, Causes, Effects, Risk assessment, Construction projects.

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