



**Establishing and Developing a Computer Application (Software)  
For Repetitive Detailed Cost Estimation  
Of Construction Projects**

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Date: 13 Aug. 2017

## COMMITTEE DECISION

This Thesis (Establishing and Developing a Computer application “Software” For Repetitive Detailed Cost Estimation of Construction Projects) was successfully defended and approved on August 6<sup>th</sup>, 2017.

### Discussion Committee

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.....

**DEDICATION**

TO THE SOUL OF MY PARENTS  
TO MY WONDERFUL WIFE  
TO MY GREAT FAMILY  
WITH LOVE

**Developing and Establishing Computer Application (Software) for Repetitive Detailed  
Cost Estimation to Construction Projects**

**By**

**Nabil Mustafa Al-Fayyoubi**

**Supervised by**

**Prof. Dr. Rami A. Maher**

**ABSTRACT**

Many main contractors and subcontractors face a lot of problems due to a very limited time given by the owners or the consultants of the construction projects at the bidding competition stage, which usually ranges between 30 – 45 days,. They make several deviations and mistakes related to this limited time to submit their best technical and financial proposals for the construction execution. For many reasons, several cases are recorded for a huge difference between the first bid value and last bid value in most of construction projects which in some cases ranges between (-15%) to (+50%) of the accepted bid value. Therefore, there is a big need to establish a computerized management tool for repetitive process of cost estimation method to the Contracting Sector and to be as a guide and judgment for the Consulting Sector who is directly involved in the analysis and decision making for the awarding process.

In this thesis, the contribution will be based on the creation of templates, forms and tables for the integrated cost estimation methodology and to be as a solid basis for any contracting organization to highlight and build up its own strategy, principles, components, tactics, involved teams, tools, scenarios and calculations to reach and apply an accepted bid value. This study will also be joined by establishing and developing a computer application (software) made specifically for this process for ease reference and use by all contracting companies to ease and facilitate their works in the estimation process which can be used also at a later stage during execution process for progress of works, reporting and forecasting.

The computer software application will mainly contain three major categories; the first part will be especially for the Estimation Process, the second will be for Work Progress and finally the third will be for Project Forecasting.

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## LIST OF SYMBOLS

Symbol	Definition
BOQ	Bill of Quantity
RDC	Repetitive Detailed Cost
JCA	Jordanian Contractors Association
MPWH	Ministry of Public Works and Housing
PPP	Private Public Partnership
BOT	Built Operate Transfer
SQL	Structured Query Language
C#	C-Sharp Language
$V$	Total project value (Selling Price)
$Q$	Quantity of item a
$UR_a$	Unit rate of item a
$a$	Activity or work item
$D$	Total Direct Cost of project activities
$I$	Total Indirect Cost of project
$O$	Total Over-Head Cost
$P$	Total Profit Amount for nominated project
$S$	Total sub-contractors supply & apply cost
$M$	Total material cost of project activities
$L$	Total labor cost of project activities
$E$	Total equipment cost of project activities
$S$	Total sub-contractors supply & apply cost
$i_a$	Category cost of indirect cost
$d_a$	Direct cost of activity (a)
$I_a$	Indirect cost of activity (a)
$O_a$	Overhead Cost of activity (a)
$d_a$	Direct cost of activity (a)
$P_a$	Profit amount of activity (a)
$S_a$	Subcontractor S/A cost of activity (a)
$M_a$	Material cost of activity (a)
$L_a$	Labor cost of activity (a)
$E_a$	Equipment cost of activity (a)
$EV_a$	Earned value for executed work item or activity (a)

$\% C$	Percentage completed
$EV_e$	Value of executed extra works of work item or activity (e)
$EV_i$	Periodical earned value (usually monthly)
$EV_c$	Earned value at completion = Budgeted Cost of Work Performed BCWP
$CV$	Cost variance
$\% CV$	Percentage of cost variance
$AC$	Actual cost = Actual Cost of Work Performed ACWP
$CPI$	Cost performance index
$SC$	Schedule cost = Budgeted Cost of Work Scheduled BCWS
$t$	Percentage of cumulative time
$SV$	Schedule variance
$\% SV$	Percentage of schedule variance
$SPI$	Schedule performance index
$PC$	The percentage of project completion
$EAC$	Estimated at completion
$VAC$	Variance at completion
$TAC$	Time at completion
$T$	Original project time
$SCI$	Schedule cost index
$TCPI$	To complete performance index
$C\alpha$	Cronbach alpha value
$K$	Number of items in each domain
$r$	The average correlation
$\bar{X}$	The item or domain mean
$i$	The scale points
$f$	The frequency of observed scale
$x$	Item scale point
$n$	Sample size
$S$	Standard deviation
$Z_c$	Calculated critical value
$\mu$	Population mean
$\alpha$	Significant level



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