

EVALUATION PERFORMANCE OF CONSTRUCTORS IN CONCRETE PRODUCING BASED ON COST AND QUALITY PARAMETERS



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MSc Dissertation

2010

EVALUATION PERFORMANCE OF CONSTRUCTORS IN CONCRETE PRODUCING BASED ON COST AND QUALITY PARAMETERS

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A Study Submitted In Partial Fulfillment of the Requirements of the Degree of Master of Science in Project Management

Declaration

I hereby declare that this submission is my own work and that, it contains no materials previously published or written by another person nor material which, to a substantial extent, has been accepted for the award of any other degree or diploma of a University or other institution of higher learning, except where an acknowledgement is made in the text.



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09th February 2010

I hereby acknowledge that Mr./~~Mrs.~~Miss A. L. Pathirana has followed the dissertation process set by the Department of Building Economics.

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Dissertation Supervisor

09/02/2010
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Date



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Dedication

I dedicate this dissertation to my ever loving parents and teachers.



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List of Abbreviations

- C – Cost
- T – Time
- Q – Quality
- CTQO - cost, time, and quality objectives
- TOR – Terms of Reference
- ITB - Instruction to Bidders
- CM - Completely machine based/ producing in a batching plant
- HM - Handling manually while mixing in a rotary machine
- LM - Both handling and mixing manually by labors
- CP - concrete production
- U - Unit production cost
- W_s - Wastage
- R - Rate of production
- S - Concrete strength (Cubic Strength)
- W - consistency/ workability (Slump)
- BS - British Standard
- SRS - simple random sample
- X – Sample Mean
- S^2 - Variance
- S - Standard Deviation
- CI - Confidential Intervals
- CL – Confident Level
- UL – Upper Limit
- LL – Lower Limit
- CTQ - cost, time, and quality
- UOM – University of Moratuwa
- WT – Weighting factors for S, W, U and W_s

ABSTRACT

EVALUATION PERFORMANCE OF CONSTRUCTORS IN CONCRETE PRODUCING BASED ON COST AND QUALITY PARAMETERS

Some extensive researches have been undertaken on raw concrete, structural use of concrete and concrete production although a less concern has been given on the aspects of optimizing cost, quality and time (CTQ) objectives in concrete production. The degree of control over cost, quality and time overruns by client is limited to a certain extent during implementation stage of a project associated with more concrete based works due to various reasons. However, during the initial stage of a project (i.e. in initial procurement stage) the client has a sound control over cost and quality aspects of producing concrete. In this study the main objective was to develop a methodology to evaluate the performance of constructors in producing concrete introducing a scoring system in technical bid evaluation since concrete production is an essential and an expensive item in construction projects.

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First relationships of cost and quality parameters (Unit production cost-U, Wastage- W_s , Concrete strength-S, and Workability-W) were developed against the Rate of concrete production (R - Time parameter) using regression analysis using collected data from few national construction projects. Then a range of R was generated from 5 to 25 (m^3 /Hour) for different 81 constructors, fitting the best curves for above four relationships. The collected data were also analyzed statistically and descriptive statistic results were reviewed including mean, standard deviations, confidential intervals (CI) at different confidence levels.

Then the calculated S, W, U and W_s for above range of R were contrasted separately within their CI at 90%, 95%, 99%, 99.99% confidence levels for 81 constructors. The evaluating constructors for each parameter were done giving scores based on the CI within which the calculated parameter lays on for the range of R from 5 to 25 (m^3 /Hour).

Finally total score obtained by each constructor (bidder) was determined and reviewed by adding individual scores of S, W, U and W_s with different weightings. The final out put was

a flexible case study model consisting with 81 bidders which can be adopted to include a score component for concrete production in bid evaluation. Using this case study model it was found that a constructor should produce concrete with a range of R from 19 to 21 m³/Hour for the best performance based on quality while he should have a range of R from 23.50 to 23.75 m³/Hour for the best cost wise performance. The range of R from 19 to 24m³/Hour shall lead toward the best overall performance over cost, quality and time.

Key Words: *Technical evaluation, Cost, time and quality parameters, Concrete production*



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