OPTIMIZED BALANCED SCORECARD INTEGRATED MODEL FOR EVALUATION OF ORGANIZATIONS PERFORMANCE

by

Hagag Maher Abdelhameed Abouelhasan

B.Sc. Industrial Engineering

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE
in
MECHANICAL DESIGN AND PRODUCTION

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ABSTRACT

Performance measurement is an important function for monitoring organizations strategic plan. Balanced scorecard (BSC) system developed by Kaplan and Norton is a performance measurement tool using financial and nonfinancial measures to provide an organization with ways to develop and evaluate strategic objectives and goals. BSC captures both leading and lagging performance measures, thereby providing a more balanced view of organizations performance. It has been revealed in the review of relevant literature that despite the satisfying levels achieved by balanced scorecard application, the method has some deficiencies in terms of implementation on a quantitative basis and that there remain some problems to be resolved. BSC weights are an important issue, because these weights reflect the importance of indicators to each other.

First objective of this study covers the measurement and evaluation of organizations performance using BSC. In this study BSC model is integrated with analytic hierarchy process (AHP) technique. The integrated model used to determine the organizations performance based on its vision and strategies. AHP used to estimate BSC indicators weights. One of the main problems in the AHP procedure is inconsistency of judgments and accuracy. Second objective of this study is to propose a new model for prioritization of BSC weights. This is achieved through a proposed prioritization model which combines AHP and Genetic Algorithm (GA) called AHPGA model. The new prioritization model is modeled and analyzed using MATLAB. Verification of the proposed AHPGA model is performed in numerous cases.

The proposed BSC model applied to an industrial company as a real case study. The results show that BSC model is a successful and acceptable tool to measure and improve organizations performance. Performance indicators with different structures included in BSC can be consolidated with the help of AHP. Results of proposed AHPGA prioritization model are compared with other BSC prioritization methods reported in the literature. Comparisons show that the proposed AHPGA prioritization model yields better and accurate results than the others models used. The proposed AHPGA model gives realistic and more accurate results (within tested limits in this search) in case of consistent ($0.003 < \text{Consistency Ratio (CR)} < 0.1$) and inconsistent matrices ($0.229 > CR > 0.1$). Thesis results show also that the developed BSC model is a good tool for monitoring organizations strategic plan. Finally, modification in GA parameter setting may be needed for the proposed prioritization AHPGA model in case of high consistent ($CR < 0.003$) and high inconsistent ($CR > 0.229$) matrices.