

**UNIVERSITI TEKNOLOGI MARA**

**Efficiency and Productivity Analysis of  
Construction Companies in Libya**

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for the degree of  
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## CANDIDATE'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

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## ABSTRACT

The purpose of this study is to measure and investigate efficiency and productivity by using Data Envelopment Analysis technique (DEA) and Malmquist Total Factor Productivity (TFP) index for cross-section time series data involving 26 firms of Libyan construction firms over the period 1995-2005. A multiple input-output non-parametric model was used to measure technical, cost, revenue and profit efficiencies. Source of productivity growth was also investigated to identify for efficiency change or technology change of the firms under study. The input variables comprise assets, equity and numbers of employees, while the output variables are revenue and profit.

This study also examines the impact of three moderating variables - size, age and change of government policy (or deregulation) on the efficiency and productivity measures of the firms concerned. Change of government policy refers to Libya opening its doors to foreign companies to operate in its country beginning 2003. This study also conducts statistical test of significance for the overall results, in particular the Mann-Whitney's Test was used to test hypothesis for the moderating variables. The relationship between technical, cost, revenue and profit efficiency scores are also tested for their statistical significance before interpretation in the light of hypothesis of interest.

The findings show that the average technical efficiency (TE) score was 0.807 and 69 percent of the firms were operating above the average, and 31 percent below it. Only 2 firms scored full efficiency (TE = 1.00) while 24 others were inefficient. Larger firms are more efficient than smaller firms. Technical efficiency is not a consequence of age of the firm, and change of government policy (i.e., from socialist to open market policy) has strong effect on technical efficiency. That is, after the government implemented the open door policy, technical efficiency scores gradually increase. Cost efficiency average score was 0.616; 42 percent of the sample was operating above the average while 58 percent below it. Only 2 firms scored full efficiency (CE = 1.00) while 24 others were inefficient. Average revenue efficiency score was 0.780; the number of firms which have efficiency scores greater than the average was 15 representing 58 percent, while 11 others scored less than the average representing 42 percent.

Average profit efficiency score was 0.778; the lowest mean efficiency was 0.370 indicating that most firms were operating inefficiently over the period of study. On the other hand, there were 12 firms operating more than 0.778 or 46 percent and 54 percent were operating less than the average. Only 2 firms scored full efficiency scores representing 8 percent while 24 were inefficient representing 92 percent.

Meanwhile, the productivity results using DEA-based Malmquist productivity index representing a Total Factor Productivity (TFP) positive growth over the period of study 1995-2005 of +10 percent, overall the efficiency change growth of +2 percent

and technical change growth of +13 percent. The average total factor productivity (TFP) for all firms over the period of study shows that more than 88 percent of firms achieve productivity improvement. 23 out of 26 firms or 88 percent of the firms show an increase in productivity, while 3 others show a regress representing 12 percent. The source of total productivity growth for all firms over the study period is contributed from technical change (TC) rather than efficiency change (TEC), this is because all of firms 100 percent experienced TC where as only 77 percent experienced TEC.

This study indicates that even though all firms' experienced increased productivity not all of them are efficient and that productivity growth has been contributed more by technical change rather than efficiency change. The study also suggests that the change in government policy towards open market has resulted in increased firm efficiency. Therefore, several useful policy implications involving the government and the construction industry are discussed in particular the policies that can improve the efficiency of the firms. Future research is also suggested for more robust results in efficiency and productivity as well as to track further impact of market liberalization toward the construction industry in Libya.

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