國立高雄科技大學

企業管理系碩士班

碩士論文

# 應用 DEA 衡量新冠疫情期間台灣工具機廠商之營運效率

# Using DEA to Measure the Operating Efficiency of Taiwanese Machine Tool Manufacturers during the COVID-19 Pandemic

研 究 生：曹博軒

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# 應用 DEA 衡量新冠疫情期間台灣工具機廠商之營運效率

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## 摘要

工具機產業在 2018~2020 年間除了受到中美貿易及新冠疫情的衝擊下，造成整體工具機業的在外銷方面受到了影響外。也受到各國因新冠疫情影響下導致原物料短缺，這些都會使公司在營運及生產等方面受到影響。本研究應用資料包絡分析法來分析企業的營運效率及應用 Tobin's Q 分析企業的績效。

本次研究對象為 2017~2020 年台灣 12 間上市櫃工具機之企業，在資料蒐集方面,主要是透過台灣經濟新報資料庫(TEJ)及從各公司財務報表中蒐集研究所需的資料，應用資料包絡分析法來衡量營運效率，並且以員工人數、固定資產、研發費用為投入項、以內外銷值、每股盈餘為產出項，來衡量 2017~2020 台灣上市櫃工具機 12 間企業之營運效率及生產力之變化，並且利用 Tobin's Q 來衡量台灣 12 間上市櫃工具機企業之企業績效。

研究結果發現2017~2020年間四年皆為相對有效率公司分別為喬福、程泰、百德、恩德。生產力變化結果顯示，台灣在 2017~2020 這段期間的平均麥氏生產力指數(MPI)為 0.962，技術效率變動為 0.920 及技術變革指數為 1.047，表示台灣在 2017 至 2020 年這段期間的生產力及技術效率雖呈現退步但在技術是呈現進步的。而在 Tobin's Q 的結果中發現，台灣工具機企業在 2017 至 2020 年這期間的 Q 值皆為小於 1，表示台灣工具機之企業績效在這 4 年間表現得較差，其中在這四年中唯一每年 Q 值皆大於 1 的公司只有力山公司。

關鍵詞：工具機產業、資料包絡分析法、麥氏生產力指數、Tobin's Q

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## ABSTRACT

From 2018 to 2020, in addition to the impact of China-US trade and the COVID-19, the overall tool machine industry was affected in terms of export sales. It is also affected by the shortage of raw materials caused by the COVID-19 in various countries, which will affect the operation and production of the company. Therefore, this study will use data envelopment analysis to analyze the operation efficiency of enterprises and Tobin's Q to analyze the performance of enterprises.

The object of this research is 12 listed machine tool companies in Taiwan from 2017 to 2020. In terms of data collection, the data required for the research is mainly collected through the Taiwan Economic Journal (TEJ) database and from the financial statements of various companies. The data envelopment analysis method is used to measure the operational efficiency, and the number of employees, fixed assets, and R&D expenses are used as input items, and domestic and foreign sales value and earnings per share are used as output items to measure the operation of 12 Taiwan-listed machine tool companies from 2017 to 2020. Changes in efficiency and productivity, and use Tobin's Q to measure the corporate performance of 12 listed cabinet machine tool companies in Taiwan.

The results of the study found that the four years from 2017 to 2020 were relatively efficient companies, namely Qiao-fu, Cheng-tai, Bai-de, and En-de. The results of productivity changes show that Taiwan's average productivity index during the period from 2017 to 2020 was 0.962, the technical efficiency change was 0.920, and the technological change index was 1.047, which were all greater than 1, indicating that Taiwan's productivity and technology during the period from 2017 to

2020. is showing progress. Finally, in the results of Tobin's Q value, it is found that the Q value of Taiwan machine tool companies during the period from 2017 to 2020 is less than 1, which means that the performance of Taiwan machine tool companies has been poor in these four years. The only company with a Q-value greater than 1 every year is Li-shan company.

Keywords: Machine Tool Industry, Data Envelopment Analysis, Malmquist Productivity Index, Tobin's Q