

Performance Measurement of Cloud Service Suppliers and Cloud Supply Chain

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Certificate of Authorship/Originality

I, Majid Azadi, declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Computer Science / Faculty of Engineering and Information Technology at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise reference or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

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Dedication

*To my beloved parents and siblings for their
encouragement which helped my dreams come true.*

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Abstract

Over the past decade, cloud computing has received much consideration from both practitioners and academics. Nonetheless, the rapid increase in the industrial use-cases of cloud computing and the sharp increase in the number of cloud service providers (CSPs) have resulted in many challenges in performance measurement and the selection of the optimal CSPs according to quality of service (QoS) requirements. To date, there is no reliable approach for the performance assessment of CSPs and quantitative models are rarely used to support such decisions. In addition, the existing approaches to CSP performance measurement suffer from several limitations and drawbacks such as requiring complex calculations, being effort-intensive and being time-consuming. Furthermore, the existing approaches are unable to find slight differences between CSPs in a cloud marketplace owing to the high level of competition. These limitations are major obstacles to applying the existing approaches to assess CSPs. To address these issues in the existing literature, the objective of this study is to develop performance evaluation models based on the Data Envelopment Analysis (DEA) approach that can act as a proxy for many conventional performance assessment problems in cloud computing. The obtained results show that the models proposed in this study are extremely effective in measuring the efficiency of CSPs. Furthermore, the proposed models can deal with different types of data simultaneously in the efficiency measurement of CSPs and cloud supply chains, giving decision makers the ability to estimate the performance of CSPs efficiently.

Keywords: Cloud services, Cloud service providers (CSPs), Cloud supply chain, Data Envelopment Analysis (DEA), Network DEA, Performance measurement and selection.

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