Faculty of Information and Communication Technology

CLOUD-BASED ENTERPRISE RESOURCE PLANNING ADOPTION MODEL AMONG SMALL AND MEDIUM SIZED ENTERPRISES IN IRAQ

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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CLOUD-BASED ENTERPRISE RESOURCE PLANNING ADOPTION MODEL AMONG SMALL AND MEDIUM SIZED ENTERPRISES IN IRAQ

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DECLARATION

I declare that this thesis entitled “Cloud-Based Enterprise Resource Planning Adoption Model Among Small and Medium Sized Enterprises in Iraqi” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Doctor of Philosophy.

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DEDICATION

To Allah, my creator and my master. The most gracious and the most merciful, for His support since the very beginning and throughout this venture.

My great teacher and messenger, Mohammed - peace be upon him - who taught us the purpose of life.

Universiti Teknikal Malaysia Melaka, my second magnificent home.

My great parents, in particular my beloved mother, who never stops giving in countless ways.

My beloved brothers and my twin sister, who stand by me when things look bleak.

My beloved partner: Britney, who I will never stop loving.

My friends who encourage and support me.

I dedicate this research.

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ABSTRACT

Cloud-based Enterprise Resource Planning (Cloud-based ERP) is a system of ERP software and tools that are hosted and managed offsite on the internet by cloud vendor. Cloud ERP promise to improve the reliability and scalability of IT systems, enabling enterprises to focus on core business when the movement towards the computerisation of business activities among enterprises has occurred because of the influences of globalisation and competitiveness. Small and medium-sized enterprises (SMEs) considered the main adopter of Cloud-based ERP. However, recent researches recognised a problem of dropping this technology after the adoption within short time period. This is due to SMEs decision makers' lack of knowledge and mainly focused on the implementation technology adoption stage without considering other actions that could occur before the implementation process (e.g., adoption stage). Therefore, the proposed research investigates the critical factors that influence SMEs' decision makers while making the decision to adopt cloud ERP. This study is designed by utilising three theoretical frameworks: Diffusion of Innovation (DOI), Technological Organisational and Environmental (TOE), and Human Organisational Technology (HOT-fit) to identify the critical factors by covering technological, organisational, environmental, and Human perspectives and recruit the developed model in the adoption stage of ERP life-cycle model. A sequential exploratory mixed methodology was employed to achieve the objectives. A sequential exploratory mixed methodology was employed to achieve the objectives. In the qualitative phase, 18 semi-structured interviews were conducted with SME's decision makers. Data were analysed through thematic analysis. In the quantitative phase, data was collected through a self-administered online questionnaire-based survey that generated 136 valid responses from senior-to-owner level decision making practitioners. Statistical Software, SPSS and Partial Least Squares, PLS for Structural Equation Modelling were used to analyse the collected data. The results were triangulated from both qualitative and quantitative phases to reach to final conclusion. In addition, the proposed model in this study was validated and evaluated with six experts to be more effective for the adoption decision in Iraqi SMEs. The findings revealed that the developed model is valuable in explaining the adoption of the cloud ERP at organisational level. The significant findings have crucial implications and valuable contributions in the body of knowledge of technology adoption, smart computing in particular and information communication system in general. Moreover, the findings are valuable for SMEs, cloud providers, and decision makers looking to increase the adoption of cloud-based ERP systems in middle eastern countries, particularly in the Republic of Iraq.

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MODEL PENGGUNAAN PERANCANGAN SUMBER AWAN DI KALANGAN PERUSAHAAN BERSAIZ KECIL DAN SEDERHANA DI IRAQ

ABSTRAK

Perancangan Sumber Perusahaan berasaskan Awan (ERP) ialah sistem perisian dan alatan ERP yang dihoskan dan diuruskan di luar tapak di internet oleh vendor awan. ERP awan menentukan peningkatan kebolehpercayaan dan skalabiliti sistem Teknologi Maklumat, membolehkan perusahaan menumpukan pada perniagaan teras apabila pergerakan ke arah pengkomputeran aktiviti perniagaan di kalangan perusahaan telah berlaku kerana pengaruh globalisasi dan daya saing. Perusahaan kecil dan sederhana (PKS) dianggap sebagai pengguna utama ERP berasaskan Awan. Walau bagaimanapun, penyelidikan terkini mengiktiraf masalah menggugurkan teknologi ini selepas penggunaan dalam tempoh masa yang singkat. Ini disebabkan oleh kekurangan pengetahuan pembuat keputusan PKS dan tertumpu terutamanya pada peringkat penggunaan teknologi pelaksanaan tanpa mengambil kira tindakan lain yang boleh berlaku sebelum proses pelaksanaan, contohnya peringkat penerimaan. Oleh itu, penyelidikan yang dicadangkan menyiasat faktor kritikal yang mempengaruhi pembuat keputusan PKS semasa membuat keputusan untuk menggunakan ERP awan. Kajian ini direka bentuk dengan menggunakan tiga kerangka teori: Penyebaran Inovasi, Organisasi Teknologi dan Alam Sekitar, dan Teknologi Organisasi Manusia untuk mengenal pasti faktor kritikal dengan merangkumi perspektif teknologi, organisasi, alam sekitar dan Manusia. dan merekrut model yang dibangunkan dalam peringkat penggunaan model kitaran hayat ERP. Metodologi campuran penerokaan berurutan telah digunakan untuk mencapai objektif. Metodologi campuran penerokaan berurutan telah digunakan untuk mencapai objektif ini. Dalam fasa kualitatif, 18 temu bual separa berstruktur telah dijalankan dengan pembuat keputusan PKS. Data dianalisis melalui analisis tematik. Dalam fasa kuantitatif, data dikumpul melalui tinjauan berasaskan soal selidik dalam talian yang ditadbir sendiri bagi menjana 136 tindakbalas sah daripada pengamal membuat keputusan peringkat kanan kepada pemilik. Perisian Statistik, SPSS dan Partial Least Squares, PLS untuk Pemodelan Persamaan Struktur digunakan untuk menganalisis data yang dikumpul. Keputusan telah ditriangulasi daripada fasa kualitatif dan kuantitatif untuk mencapai kesimpulan akhir. Tambahan lagi, model yang dicadangkan dalam kajian ini telah disah dan dinilai dengan enam pakar supaya lebih berkesan untuk keputusan penerimaan bagi PKS di Iraq. Penemuan ini mendedahkan bahawa model yang dibangunkan adalah berharga dalam menerangkan penggunaan ERP awan di peringkat organisasi. Penemuan penting ini mempunyai implikasi dan sumbangan berharga dalam badan pengetahuan penggunaan teknologi, pengkomputeran pintar khususnya dan sistem komunikasi maklumat secara amnya. Selain itu, penemuan ini berharga untuk PKS, penyedia awan dan pembuat keputusan yang ingin meningkatkan penggunaan sistem ERP berasaskan awan di negara timur tengah, khususnya di Republik Iraq.

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LIST OF ABBREVIATIONS

ABS	-	Australian Bureau of Statistics
AVE	-	Average Variance Extracted
CAGR	-	Compound Annual Growth Rate
CAPEX	-	Capital Expenditures
CAT	-	Compatibility
CB-SEM	-	Covariance-Based Sem
CEO	-	Chief Executive Officer
CEX	-	Complexity
CP	-	Competitive Pressure
CR	-	Composite Reliability
CRM	-	Customer Relationship Management
CSOI	-	The Central Statistical Organization of Iraq
CT	-	Cost Saving
DMC	-	Decision Makers' Cloud Knowledge
DMI	-	Decision Makers' Innovativeness
DOI	-	Diffusion of Innovation
EaaS	-	ERP as a Server
ECK	-	Employees' Cloud Knowledge/Experience
ERP	-	Enterprise Resource Planning

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ES	-	Supplier Efforts and External Computing Support
EU	-	European Union
FS	-	Firm Size
GDP	-	Gross Domestic Product
HOT-fit	-	Human Organisation Technology
HRM	-	Human Resource Management Systems
HTMT	-	Correlations' Heterotrait-Monotrait Ratio
ICT	-	Information and Communication Technologies
IMST	-	Iraqi Ministry of Science And Technology
IN	-	Industry
INI	-	Information Intensity
IOM	-	International Organization Migration in Iraq
IQD	-	Iraqi Dinar
IS	-	Information Systems
IT	-	Information Technologies
NGOs	-	Non-Governmnetal Organizations
NIST	-	National Institute of Standards and Technology
OECD	-	Organisation for Economic Co-operation and Development
OPEX	-	Operating Expenditures
PLS	-	Partial Least Square
PLS-SEM	-	Partial Least Squares Sem
RA	-	Relative Advantage
SEM	-	Structural Equation Modelling
SLAs	-	Service Level Agreements

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SME	-	Small and Medium-Sized Enterprises
SP	-	Security And Privacy
SPSS	-	Statistical Package for the Social Sciences
TCO	-	Total Cost of Ownership
TOE	-	Technological, Organisational and Environmental
TRA	-	Trialability
URL	-	Uniform Resource Locators
USAID	-	United States Agency for Internationl Development
VIF	-	Variance Of Inflation Factors

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LIST OF SYMBOLS

*	-	Multiplication Sign
f^2	-	Effect Size
Q^2	-	Predictive Relevance
R^2	-	Coefficient Of Determination
β	-	Path Coefficient

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LIST OF PUBLICATIONS

The followings are the list of publications related to the work on this thesis:

1. Mohammed, G.J. and Burhanuddin, M.A., 2018. Cloud-Based ERP Implementation in SME's: A Literature Survey. *International Journal of Engineering & Technology*, 7(3.20), pp. 753-755.

2. Mohammed, G.J. and Burhanuddin, M.A., 2018. Conceptual Model for Adoption Cloud-Based ERP in SMEs: Case Study Iraq. *International Journal of Engineering & Technology*, 7(3.20), pp. 756-758.

3. Mohammed, G.J. and Burhanuddin, M.A., 2018. Factors Affecting the Adoption of Cloud-Based Enterprise Resource Planning (ERP) Systems in Small and Medium Sized Enterprises (SMEs): An Overview. *International Journal of Engineering & Technology,* 7(2.34).

4. Mohammed, G.J. and Burhanuddin, M.A., 2018. Barriers Facing the Adoption of Cloud-Based Enterprise Resource Planning (ERP) Systems in Small and Medium Sized Enterprises (SMEs). *International Journal of Engineering & Technology,* 7(2.34), pp. 1-4.

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5. Mohammed, G.J. and Burhanuddin, M.A., 2018. The Influence of Factors to Adopt Cloud-based ERP for Iraqi SMEs. *Journal of Advanced Research in Dynamical and Control Systems*, 10(09-Special Issue).

6. Mohammed, G.J., Burhanuddin, M.A., Alyousif, S., Alkhayyat, A., Ali, M.H, Malik, R.Q. and Jaber, M.M., 2022. Affecting Factors for the Adoption of Cloud-Based ERP System in Iraqi SMEs: An Empirical Study. *International Journal of Interactive Mobile Technologies*, 16(21), pp. 153-167.

7. Mohammed, G.J., Burhanuddin, M.A., Alyousif, S., Alkhayyat, A., Ali, M.H, Malik, R.Q. and Jaber, M.M., 2022. Cloud-Based ERP System Adoption in Iraqi SMEs: A Qualitative Approach to Identify and Evaluate the Affecting Factors. *Computer Integrated Manufacturing Systems*, 28(11), pp. 1475-1493.

CHAPTER 1

INTRODUCTION

1.1 Overview

The purpose of this chapter is to provide an overview of the research conducted in this study. This chapter begins with an introduction to the background of the research. The problems have been identified and considered in order to propose an introduction of the research to justify the foundation of tracking the study. The research questions and objectives were structured based on the gaps and scope of work. This research's contribution has been explained by emphasizing the value of the study. The remaining sections of this chapter define the structure of this work, including a summary of the five chapters that follow, and the last section contains a summary of this chapter.

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1.2 Research background

The demand for businesses to be competitive has increased due to rapid technological advances (Ocloo et al., 2014). As a result, in order to remain competitive, businesses must carefully manage their resources and try to outsmart their competitors.

It is widely recognized that a lack of innovation can lead to business failure, which means that organizations must either “innovate or die” (Cole, 2019). An organization’s success is likely driven by innovation (Kylliainen, 2019). In today’s environments, innovation has been identified as a critical component for growth and survival. Innovation enables organizations to achieve and maintain process excellence and significant growth and competitiveness (Kylliainen, 2019). Alhajaj (2018) agrees, arguing that the goals of

imaginative organizations, both in developed and developing countries, can only be met through innovation. As a result, an organization cannot successfully improve and sustain its competitiveness in the dynamic global environment unless it can generate new and creative ideas and turn them into profitable products and services (Henderson, 2017). This means that organizations must improve their processes and services through continuous improvements and the implementation of more radical innovations. Therefore, businesses must effectively manage their resources, which can be achieved through Enterprise Resource Planning (ERP) systems.

In the early 1990s, the Gartner Group introduced ERP (Alajbegovic et al., 2013; Zhang, 2019). ERP integrates all facets of a business into a unified system (Zhang, 2019). According to Surendro (2016), ERP provides a real-time infrastructure for a company's back-end systems, including "purchasing, marketing, sales and inventory, procurement, finance, and human resources" (p. 1). The use of ERP systems offers companies numerous tangible benefits. Improve competitive organizational position in the market is considered the most interesting benefit when implementing ERP systems (Ram et al., 2013). However, the ERP system's implementation and adoption are complex and often fail. For example, in Indonesia, more than 80% of companies could not use ERP systems; in China, only 10% of companies successfully implemented ERP systems (Weng and Hung, 2014). One of the main reasons for ERP implementation failure is cost overruns (Hustad and Olsen, 2014).

Small and medium-sized enterprises (SMEs) are an important part of every country's economy because they provide most new jobs and drive technical advancement. SMEs account for a more significant proportion of all businesses and GDP than any other sector (OECD, 2017). SMEs have historically played an essential role in contributing to the economic development of many countries worldwide. Naturally, every business begins as a small business or even grows out of a small firm founded by a single person. SMEs play a

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critical role in the world's economies, providing jobs, adding value, and stimulating innovation. To achieve environmental sustainability and more modest growth, SMEs are essential (OECD, 2017). Chege and Wang (2020) found the use of Information and Communication Technologies (ICTs) by SMEs impacts livelihoods and reduce vulnerabilities. Moreover, applying ICT innovatively in SMEs within most developing countries will increase the opportunity to create jobs. However, these contributions vary greatly by company, country, and industry. Improving access to global businesses and knowledge exchange can increase the contributions of SMEs, but a dearth of ICT infrastructure keeps these businesses from operating efficiently and selling their products on worldwide markets at competitive costs (OECD, 2017); (Chege and Wang, 2020).

In addition, SMEs face various logistical challenges and determinants compared to large corporations. They have less budget allocated and less staff (Usman et al., 2017), making their computing environment less complex than equivalent large enterprises. Moreover, SMEs face similar requirements similar to those experienced by larger companies (Fathey et al., 2016). Therefore, SMEs need to improve their service level to achieve the targeted goals of the company. According to Khamis and Mohd (2016), SMEs will be expected to modify various logistics to suit the needs of their information technology (IT) departments. Thus, SMEs need to use information technology system (for example, ERP) to achieve a higher level of competence and efficiency; However, utilizing standard ERP has several disadvantages for businesses, for instance on-premise ERP require excessive expenses in terms of initial investments (Pareek, 2014). Venkatraman and Fahd (2016) believed that one of the criteria for SMEs to select ERP systems is to check the affordability. Therefore, there was a need for cloud ERP systems that were less in cost and time consuming than traditional ERP systems, and that where ICT come across.

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