POST-ADOPTION MODEL ON CLOUD COMPUTING AND SME PERFORMANCE IN MALAYSIA: RESOURCES-BASED VIEW

BY

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ABSTRACT

The trend of cloud computing has accelerated business model evolution for delivering information technology services. In the transition from traditional IT to cloud-based services, Small Medium Enterprises (SMEs) seems to have experienced substantial difficulties and hurdles in realising cloud benefits, which in turn lead to improving SME performance. In spite of the common belief that SMEs can potentially gain from cloud services, there are numerous evidence which indicate that SMEs have not utilised it at the desired level of adoption. Additionally, past literature also indicates that among those that have adopted, it is unclear as to how cloud services affect SME performance. Generally, it was noted that Malaysia SMEs are not utilising cloud computing for the advancement of their business strategy, and therefore they seem to not able to reap the cloud benefits as expected. Since there is a lack of past studies that examine the effect of cloud computing use on SME performance or the post-adoption stage, this study aims to fill this gap by developing a model for the post-adoption of cloud computing among SMEs in Malaysia. Considering this research purpose, the Resources-Based View (RBV) deems fit as an adoption theory to develop the proposed model since RBV considers organizations can gain competitive advantage and hence improve performance by leveraging on their unique resources. Based on the review of past literature, IT capability is viewed as the essential antecedent that influences how SMEs can gain cloud benefits, which in turn will affect the performance. Specifically, the model examines the effect of technical IT capability, relational IT capability and managerial IT capability on cloud computing benefits, which in turn affects SME performance. This study employed a quantitative approach to test the hypotheses of the developed model by surveying 387 Malaysian SMEs cloud adopters. By using purposive sampling, this number of responses were analysed using Partial Least Squares (PLS) based on Structural Equation Modelling (SEM). The empirical findings indicate that IT capability significantly affects cloud benefits and cloud computing benefits have resulted in a significant effect on SME performance among Malaysia SMEs in the sample. The other important finding is that the model developed has been validated. As this study represents the pioneering investigations on cloud computing post-adoption by SMEs in Malaysia using the RBV lens, the new evidence contributes to knowledge and enhances our understanding of cloud computing post-adoption. The study not only assists SME owners/managers to adopt cloud computing to improve competitiveness but also helps cloud service providers to understand SMEs' requirements, and guides relevant policymakers to formulate policies to promote effective use of cloud services among SMEs in Malaysia.

خلاصة البحث

الاتجاه نحو الحوسبة السحابية متسارع في تطور نموذج الأعمال لتقديم خدمات تكنولوجيا المعلومات. وفي الانتقال من تكنولوجيا المعلومات التقليدية إلى الخدمات المستندة إلى خدمة السحابة، يبدو أن الشركات الصغيرة والمتوسطة (SME) تواجه صعوبات وعقبات كبيرة في تحقيق فوائد السحابة والتي تؤدي بدورها إلى تحسين أداء الشركات الصغيرة والمتوسطة. وعلى الرغم من الاعتقاد السائد بأن الشركات الصغيرة والمتوسطة يمكنها أن تستفيد من الخدمات السحابية، فإن هناك العديد من الأدلة التي تشير إلى أن الشركات الصغيرة والمتوسطة لم تستخدمها على المستوى المطلوب. إضافة إلى ذلك، فإن الدراسات السابقة تشير إلى أنه لم يتضح كيف تؤثر الخدمات السحابية على أداء الشركات الصغيرة والمتوسطة من بين الشركات التي تبنتها. وقد لوحظ بشكل عام، أن الشركات الصغيرة والمتوسطة في ماليزيا لا تستخدم الحوسبة السحابية للنهوض باستراتيجية أعمالها، وبالتالي يبدو أنها غير قادرة على الإفادة من خدمات السحابة كما هو متوقع. ونظرًا لعدم وجود دراسات سابقة تستكشف تأثير استخدام الحوسبة السحابية على أداء الشركات الصغيرة والمتوسطة أو مرحلة ما بعد التبني، فهذه الدراسة تهدف إلى سد هذه الفجوة من خلال تطوير نموذج للتطبيق اللاحق للحوسبة السحابية بين الشركات الصغيرة والمتوسطة في ماليزيا. وباعتبار الغرض من هذا البحث؛ فإن طريقة العرض المستندة إلى الموارد (RBV) كنظرية مناسبة لتبنيها في تطوير النموذج المقترح، لأن (RBV) تعتبر أن المؤسسات يمكنها الحصول على التنافس، وبالتالي تحسين الأداء من خلال الإفادة من مصادرها الفريدة. واستنادًا على الدراسات السابقة، يُنظر إلى قدرة تقنية المعلومات على أنها سابقة تؤثر على كيفية حصول الشركات الصغيرة والمتوسطة الحجم على مزايا سحابية مما سيؤثر بدوره على الأداء. على وجه التحديد، فإن هذا النموذج يفحص تأثير قدرة تقنية تكنولوجيا المعلومات، والقدرة الارتباطية، والقدرة الإدارية لتكنولوجيا المعلومات على فوائد الحوسبة السحابية التي تؤثر بدورها على أداء الشركات الصغيرة والمتوسطة. واستخدمت هذه الدراسة المنهج الكمي لاختبار فرضيات النموذج المقترح من خلال استبانة شملت 387 من الشركات الصغيرة والمتوسطة التي تتبنى السحابة. وهذه العينة تم اختيارها بالطريقة القصدية، وتم تحليل الاستجابات باستخدام المربعات الصغرى الأقل (PLS) بناءً على نمذجة المعادلات الهيكلية (SEM). وتشير النتائج العملية إلى أن قدرة تقنية المعلومات تؤثر بشكل كبير على فوائد السحابة، وأن فوائد الحوسبة السحابية لها تأثير كبير على أداء الشركات الصغيرة والمتوسطة في ماليزيا من الشركات عينة الدراسة. ومن النتائج المهمة أن النموذج المطور قد تم التحقق من مصدقته. ونظرًا لأن هذه الدراسة تمثل التحقيقات الرائدة في مجال الحوسبة السحابية بعد اعتماد الشركات الصغيرة والمتوسطة في ماليزيا باستخدام موارد RBV، فإن الأدلة الجديدة تساهم في المعرفة وتعزز فهمنا للحوسبة السحابية. هذه النتائج لا تساعد الدراسة مالكي/ مديري الشركات الصغيرة والمتوسطة على تبني الحوسبة السحابية لتحسين القدرة التنافسية فحسب، ولكنها تساعد أيضًا مقدمي الخدمات السحابية على فهم متطلبات الشركات الصغيرة والمتوسطة، وتوجه واضعي السياسات المعنيين بصياغة سياسات لتعزيز الاستخدام الفعال للخدمات السحابية بين الشركات الصغيرة والمتوسطة في ماليزيا.

APPROVAL PAGE

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DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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This thesis dedicated

To my dearest mother Hajjah Selimah Binti Abbas

To the memory of my late father, Allahyarham Haji Salleh Bin Kia

May Allah be with your soul

You are never forgotten

And to my wonderful children: Nur Wahida Husna and Ahmad Syahmi Hakim

May this serve as an inspiration to all of you.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
BSC	Balanced Score Card
CB	Covariance-Based
CC	Cloud Computing
CaPex	Capital Expenditure
DOI	Diffusion of Innovation
ICT	Information and Communication Technology
IaaS	Infrastructure as a Service
IS	Information Systems
PLS	Partial Least Squares
PaaS	Platform as a Service
R^2	Coefficient of Determination
RBV	Resources Based-View
SaaS	Software as a Service
SEM	Structural Equation Modelling
SME	Small and Medium-sized Enterprises
SPSS	Statistical Package for the Social Sciences
SP	Service Provider
ß	Path-coefficient
TOE	Technology-Organisation-Environment
VIF	Variance Inflation Factor

CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

The adoption of Information and Communication Technologies (ICTs) may improve business competitiveness and may provide real benefits for Small and Medium Enterprises (SMEs). SMEs are a vital component of the national economy since they are the primary source of employment opportunities and technological development (Marian Carcary, Doherty, & Conway, 2014; Kumar, Samalia, & Verma, 2017). SMEs are the world's fastest-growing sector of most economies globally and account for a more significant percentage of all companies and the gross domestic product (GDP). Nowadays, the newest ICT trend that appeared central for debate on modern business computing is the notion of cloud computing.

Cloud computing is an up-and-coming trend of computing that left the attention and focused on academic research, the software industry, and SMEs. With the advance of computer science and the establishment of the internet, cloud computing evolved scientific technology into the concrete business paradigm. Although the introduction of cloud-based services has turned into a type of utility, it can deliver as different models, namely Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), and Infrastructure-as-a-Service (IaaS) (Mell & Grance, 2011). According to NASSCOM and Deloitte (2012), the worldwide cloud computing market is estimated to surpass 16 billion USD by 2020.

Cloud computing is becoming a broad mainstream set of enterprise applications which is the role of IT in organisations strategically migrating by using suitable cloud services such as SaaS, IaaS, and Platform as a Service (PaaS) (Doherty,

Carcary, & Conway, 2015; Khajeh-Hosseini, Greenwood, & Sommerville, 2010; Khayer et al., 2016). SMEs have begun aware of exploiting the opportunity as cloud-based business services are becoming increasingly prevalent. The cloud-based computing paradigm will reach a level of maturity, which lays the foundation for IS researchers to examine how cloud computing will influence SME performance.

Nowadays, cloud computing is one of the disruptive technologies that enable SMEs to compete with large companies. Cloud computing promises to aid the delivery of cloud-based services, lowering costs, and ultimately boost profitability. To face and confront the intensity of competition from rivals, SMEs strive to formulate new ways to upgrade, improve, and restructure their technology infrastructure. All-encompassing cloud computing is going to empower SMEs to shun capitalism that is at a high cost, which includes setting up ICT infrastructure, reducing the costs of maintenance and services of traditional IT infrastructures. In this case, SMEs adopted cloud computing to lower IT costs and enhance competitiveness, and they may gain value over time.

SMEs would benefit meaningfully from cloud computing due to the benefits of elasticity, flexibility, pay-as-you-go, and diminished computer equipment investment in the SME sector (Chatzithanasis & Michalakelis, 2018). Apart from that, as SMEs would have the highest benefit from the flexibility of faster time to market and better access to highly scalable technologies without upfront capital expenditures, cloud computing subsequently makes more benefits for SMEs. Realisation and adoption of cloud computing by SMEs may facilitate the opportunity to confront large enterprises with adaptive, reactive, and borderless capabilities of the cloud. Cloud computing offers opportunities to SMEs to acquire advanced and flexible IT services at a moderately reasonable cost. By incrementally embracing and using ICT innovations,

which include cloud computing services, SMEs can gain competitive advantages, including increasing access to global markets. SMEs need to enrich their performance by implementing suitable technology to survive due to the recent market turbulence, which is categorised as fast-changing technology, fast-changing customer preferences, and shorter product life cycles or obsolete. From the business perspective of the cloud identified, SMEs act as the primary beneficiaries of this computing paradigm. It offers the opportunity for new entrants amongst SMEs in various business sectors to leapfrog and compete with larger enterprises in the market.

Although deploying the cloud has significant benefits, there are several concerns associated with cloud computing avert organisations from adopting cloud computing. SMEs faced cloud issues such as vendor lock-in, which is explained as the inability or difficulty in switching over to other cloud service providers. Simply, SMEs not secure of getting trapped with only one provider, availability, and reliability of the cloud services. Also, high risk associated with security aspects prevents many firms from using cloud computing and losing control of their data and IT infrastructure (Abolfazli, Sanaei, Tabassi, Rosen, Gani, & Khan, 2015a; Khayer et al., 2016; Raut, Gardas, Jha, & Priyadarshinee, 2017). In cloud computing, customers are provided access to a shared pool of computing resources through the internet, which further gives rise to concerns regarding the availability of cloud services and their subsequent effect on their businesses. The fears of SMEs regarding poor consistency and inadequate accessibility of cloud services may also obstruct the adoption of cloud computing.

Cloud computing is extensively being used in multi-domains including the public sector, education, healthcare, business, tourism, transportation and scientific computing (Abolfazli, Sanaei, Tabassi, Rosen, Gani, Khan, et al., 2015; Yang & Tate,

2012). Thus, this chapter also highlights cloud computing readiness and adoption rate in Malaysia. According to National ICT Roadmap 2012, Malaysia's ICT focus area is divided into wireless intelligence, everywhere connectivity, E-services, Security and platforms, big data and analytic and Cloud Computing. In Malaysia, for instance, cloud computing is not mature yet, but it is growing at a rapid pace. The transformation to acceptance, adoption and deploying of cloud computing has become an important trend and is expected to reach from US$ 43 Million in the year 2012 to US900 million by 2020 (Vidhyalakshmi & Kumar, 2016).

Networked Readiness Index (NRI) is a holistic approach designed to measure ICT access and impacts divided drivers to Readiness, Usage and Environment (NRI, 2014). On this note, Malaysia remains in a stable position ranked 30 from the total of 148 cloud computing countries. The level of penetration the usage of cloud computing by the government value is 5.6 while individual and business value is 4.5, respectively. Value is 1 (worst) and 7 (best). This is because in Malaysia cloud computing technology supportive by government platforms. However, the cloud computing adoption rate is different across the countries around the world. The Software Alliance and Asia Cloud computing Association (ACCA) has been performed analytical studies started in 2012 to identify the cloud readiness rates, challenges and possible solutions to expedite cloud adoption in different countries. The Table 1.1 has shown the adoption rate country- by- country basis.