



UNIVERSITI PUTRA MALAYSIA

***DECISION-MAKING MODEL FOR OUTSOURCING SOFTWARE
DEVELOPMENT PROVIDERS SELECTION***

ORLU GLORY UREKWERE

FSKTM 2020 24



**DECISION-MAKING MODEL FOR OUTSOURCING SOFTWARE
DEVELOPMENT PROVIDERS SELECTION**

By

ORLU GLORY UREKWERE

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfillment of the Requirements for the Degree of Master of Science**

June 2020

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

DECISION-MAKING MODEL FOR OUTSOURCING SOFTWARE DEVELOPMENT PROVIDERS SELECTION

By

ORLU GLORY UREKWERE

June 2020

Chairman : Associate Professor Noraini bt Che Pa, PhD
Faculty : Computer Science and Information Technology

The implementation of outsourcing software provider selection models in public sector has been rapidly increasing in the last few years. This is because of the necessity for organizations to establish IT alignment in their projects to deliver services and enhance sustainability. However, the outsourcing software provider selection processes face several challenges related to human perceptions such as the decision makers' intuition, knowledge and experience, impreciseness, and vagueness in public sector. Also, outsourcing selection process, still have gaps in research despite the various researches being executed due to lack of empirical evidence regarding inappropriate selection of IT provider. Therefore, there is need to conduct more studies on how significant factors influence outsourcing selection process in public sector. Considering the significance of a clear standard for decision making in the selection of outsourced software providers in IT services, this research proposed a model by which this problem can be improved through the efficacy of the selection processes. Specifically, this research objectives are: to identify and prioritize influential factors for the decision making in outsourcing provider selection process, to propose a model for decision making in outsourcing provider selection in public sector, to validate the model against human perceptions and uncertainty through a prototype. The research scope is based on Malaysian outsourcing organizations that deal with outsourcing software selection processes. Quantitative research was adopted in this research thus, a pilot study was carried out from 33 respondents in Malaysian outsourcing organizations and another 133 respondents from a conducted empirical study. The developed decision outsourcing software selection model for public sector considers six criteria which are: development capability, product quality, delivery time, cost, client's satisfaction, and service quality. The fuzzy logic technique supports the decision making procedure by assigning weightage, then evaluating and ranking the software providers. Afterward, three experts validated the model by verifying it in their outsourcing software provider selection processes; the model was shown to

improve the chances of IT practitioners for selecting the most suitable software providers in Malaysian organizations.



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Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

**MODEL PEMBUATAN KEPUTUSAN UNTUK PEMILIHAN PEMBEKAL
PEMBANGUNAN PERISIAN PENYUMBERAN LUAR**

Oleh

ORLU GLORY UREKWERE

Jun 2020

Pengerusi : Profesor Madya Noraini bt Che Pa, PhD
Fakulti : Sains Komputer dan Teknologi Maklumat

Pelaksanaan model pemilihan pembekal perisian penyumberan luar dalam sektor awam telah meningkat pesat dalam beberapa tahun kebelakangan ini. Hal ini kerana keperluan organisasi untuk mewujudkan penjajaran IT dalam projek mereka untuk menyampaikan perkhidmatan dan mempertingkatkan kelestarian. Walau bagaimanapun, proses pemilihan pembekal perisian penyumberan luar menghadapi beberapa cabaran yang berkaitan dengan persepsi manusia seperti gerak hati, pengetahuan dan pengalaman pembuat keputusan, penilaian linguistik, ketidaktepatan dan ketidakjelasan pembuat keputusan dalam sektor awam. Di samping itu, proses pemilihan penyumberan luar masih mempunyai jurang dalam penyelidikan walaupun pelbagai kajian dilakukan berikutan kurangnya bukti empirikal mengenai pemilihan pembekal perisian IT yang sesuai. Oleh itu, terdapat keperluan untuk menjalankan lebih banyak kajian tentang bagaimana faktor-faktor penting mempengaruhi proses pemilihan penyumberan luar di dalam sektor awam. Mengambil kira kepentingan standard yang jelas untuk membuat keputusan dalam pemilihan pembekal perisian penyumberan luar dalam perkhidmatan IT, penyelidikan ini mencadangkan model di mana masalah ini dapat diatasi melalui keberkesanan proses pemilihan. Secara khusus, objektif penyelidikan ini adalah: untuk mengenal pasti dan mengutamakan faktor-faktor yang mempengaruhi pembuatan keputusan dalam proses pemilihan pembekal penyumberan luar, untuk mencadangkan model untuk membuat keputusan dalam pemilihan pembekal penyumberan luar di dalam sektor awam, untuk mengesahkan model terhadap persepsi dan ketidakpastian manusia melalui prototaip. Skop kajian adalah berdasarkan organisasi penyumberan luar di Malaysia yang mengendalikan proses pemilihan perisian penyumberan luar. Penyelidikan kuantitatif digunakan dalam penyelidikan ini justeru, kajian rintis telah dilakukan melibatkan 33 orang responden dalam organisasi penyumberan luar di Malaysia dan 133 orang responden lagi dari kajian empirikal yang dijalankan. Model pembuatan keputusan untuk pemilihan pembekal perisian penyumberan luar yang dibangunkan untuk sektor awam dengan mengambil kira enam kriteria iaitu: kemampuan pembangunan, kualiti produk,

masa penyerahan, kos, kepuasan pelanggan, dan kualiti perkhidmatan. Teknik logik kabur menyokong prosedur membuat keputusan dengan memberikan pemberat, kemudian menilai dan mengelaskan pembekal perisian. Setelah itu, tiga orang pakar mengesahkan model tersebut dengan menentusahkan proses pemilihan pembekal perisian penyumberan luar mereka; model tersebut ditunjukkan untuk meningkatkan peluang pengamal IT bagi memilih pembekal perisian yang paling sesuai dalam organisasi di Malaysia.



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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the Degree of Master of Science. The Members of the Supervisory Committee were as follows:

Noraini bt Che Pa, PhD

Associate Professor

Faculty of Computer Science and Information Technology

Universiti Putra Malaysia

(Chairman)

Rodziah binti Atan, PhD

Associate Professor

Faculty of Computer Science and Information Technology

Universiti Putra Malaysia

(Member)

Hazlina Hamdan

Senior Lecturer

Faculty of Computer Science and Information Technology

Universiti Putra Malaysia

(Member)

ZALILAH MOHD SHARIFF, PhD

Professor and Dean

School of Graduate Studies

Universiti Putra Malaysia

Date: 08 October 2020

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Signature: _____
Name of Chairman
of Supervisory Associate Professor
Committee: Dr. Noraini bt Che Pa

Signature: _____
Name of Member
of Supervisory Associate Professor
Committee: Dr. Rodziah binti Atan

Signature: _____
Name of Member
of Supervisory
Committee: Dr. Hazlina Hamdan

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LIST OF ABBREVIATIONS

| | |
|--------|--|
| IT | Information Technology |
| NCC | National Computing Centre |
| ITP | IT Provider |
| RITP | Right IT Provider |
| AHP | Analytic Hierarchy Process |
| DOSS | Decision Outsourcing Selection System |
| QIW | Questions Importance Weight |
| FRW | Fuzzy Rule Weight |
| IS | Information System |
| FIS | Fuzzy Inference System |
| ANP | Analytic Network Process |
| MCDM | Multi Criteria Decision Making |
| FLT | Fuzzy Logic Technique |
| MAGDM | Multi-Attribute Group Decision Making |
| PP | Planning Provider |
| EP | Evaluating Provider |
| RP | Ranking Provider |
| TOPSIS | Technique for Order Preference by Similarity to Ideal Solution |
| DM | Decision Making |
| DOSP | Decision Outsourcing Selection Process |
| PSPP | Planning Selection Provider Process |
| EPP | Evaluating Provider Process |
| RPP | Ranking Provider Process |
| OSP | Outsourcing Selection Process |

CHAPTER 1

INTRODUCTION

1.1 Background

Information technology (IT) governance is a set of enabling mechanisms used to request, prioritize, fund, monitor, enforce, and realign IT investment decisions (Heier, 2009; Wautelet, 2019). The main objective of IT outsourcing governance is to align business and IT strategies (Al-Surmi *et al.*, 2020; Ilmudeen *et al.*, 2019). According to the National Computing Centre (NCC), the rapid technological developments necessitate that organizations incorporate IT outsourcing governance in their executed projects for optimum output. Thus, IT has to be systematically aligned with strategic objectives to enhance sustainability and improved IT services (Manning *et al.*, 2017).

To comfortably achieve this in a cost-effective manner, outsourcing comes into play. Outsourcing is the act of transferring work from one entity to another (Bajec *et al.*, 2010; Samgam *et al.*, 2017). IT outsourcing governance can be described as a strategic process for aligning technology initiatives and set goals for IT activities. Outsourcing activities in public sector is highly beneficial for decision makers, IT practitioners and heads of departments as it allows them to fully concentrate on their assigned professional activities rather than wasting time on activities that are unrelated to their expertise which may invariably affect their stipulated strategic objectives (Wibisono, 2016; Oeser, 2020; Taponen *et al.*, 2020).

Outsourcing projects to IT Providers is a trending practice among IT practitioners, especially in the field of IT outsourcing governance in public sector. This is done to achieve high service productivity. This structure had been in existence for decades in various organizations (Liou *et al.*, 2011; En-lin, 2013).

From prior studies (such as Senthil *et al.*, 2014; Heier, 2009; Crue, 2007; Impact, 2005; Cengiz, 2009; Bajec *et al.*, 2010), it can be gathered that there is a need for organizations and IT providers to put the IT project plan into proper consideration before IT services are outsourced. This is essential because IT Providers play important roles in successful outsourcing process (Haes, 2009). Proper consideration of the important facets associated with outsourcing activities by both parties will also facilitate a smooth outsourcing experience. For IT outsourcing activities to efficiently achieve the set organizational goals, Bin-Abbas and Bakry (2014) suggest that the outsourcing must be executed with well-established principles.

One of the key aspects that pose a serious challenge during the outsourcing selection process in public sector is decision making. This challenge has been in existence decades ago due to impreciseness and uncertainty in decision making. It has thus affected outsourcing to the Right IT Provider. Over the years, outsourcing in public

sector experiences a daily increase while decision makers are still faced with the issue of inaccurate selection of IT providers. However, a such decision making issue can be successful addressed if IT practitioners streamline the number of opinions and associated criteria for making decisions (Senthil *et al.*, 2014; Zakeri *et al.*, 2015).

1.2 Problem Statement

The outsourcing selection process of IT providers is a very challenging task according to the studies carried out by Galal *et al.* (2018) amongst IT practitioners. Outsourcing IT practitioners need a model that can effectively solve the problems associated with outsourcing selection in public sector. This is because the process requires more than human perception or the decision maker's intuition, knowledge, and experience. According to the study carried out by Shahrasbi *et al.* (2017) emphasized that in the context of outsourcing provider selection, it is quite difficult for IT practitioners to ascertain the exact performance value of the IT providers in relation to each factor. Based on this concept, it is no doubt that human perception or the decision maker's intuition, knowledge, and experience is always vague and difficult to measure. However, fuzzy technique is the best systematic approach to support decision makers to deal with the stated aforementioned difficulties in outsourcing provider selection process.

Decisions may have to be made with prior experience in public sector. These issues have been identified in previous research works and the following have been revealed.

- It is a challenge to implement a successful IT Provider evaluation and outsourcing selection criteria due to diverse human perceptions. Hence, IT practitioners decisions are imprecise and uncertain (Senthil *et al.*, 2014; Zakeri *et al.*, 2015; Haldar *et al.*, 2017). Based on the uncertainty in human perceptions or assessment, IT practitioners faced challenges such as lack of identification of influential factors for provider selection, lack of prioritizing the selection factors (Galal *et al.*, 2018).
- The research on the criteria influencing the outsourcing provider selection practices is still unexploited and there is need for outsourcing to be well executed (Abbas *et al.*, 2014; Song, 2019).

To solve the aforementioned problems, there is a need to investigate existing practices in outsourcing selection and decision making. This will give insights into how to design a suitable model to solve these problems. In addition, the factors that influence decision making in outsourcing selection processes in public sector will as well be investigated.

1.3 Research Questions

1. What are the influential factors for decision making in outsourcing provider selection in public sector?
2. How can the factors support in evaluating IT providers with outsourcing selection processes in public sector?

1.4 Objectives

The research objectives of this study are as follows:

1. To identify and prioritize influential factors for the decision making in outsourcing provider selection process.
2. To propose a model for decision making in outsourcing provider selection in public sector.
3. To validate the model against human perceptions and uncertainty through a prototype.

1.5 Scope

This research investigated specifically on the challenge faced by the IT practitioners such as lack of identification of influential factors for provider selection, lack of prioritizing the selection factors during the outsourcing provider selection process in IT outsourcing organization in public sector.

This study data was only collected amongst IT practitioners such as (project manager, project sponsor, project board, project team leader, project administration, system developer, and system administrator) which works in the department such as (IT division, IT management, system administration, human resources and finance) in IT outsourcing organizations in Malaysia.

1.6 Significance

This study signifies outsourcing selection practice of public sector during decision making by IT practitioners to improve their performance. Based on this, the significance of this study can be described as follows: firstly, in terms of practices, this study identifies the process and factors required to make decisions during the outsourcing selection process in public sector. Secondly, this study develops a decision outsourcing selection model for public sector in IT outsourcing organization in public sector.

1.7 Thesis Structure

This thesis consists of six chapters. Chapter 1 gives the background knowledge of this study and identifies the research questions, objectives, scope and significance. Chapter 2 presents the literature review which includes an overview of the outsourcing selection process, associated decision factors for outsourcing selection, techniques, decision making in public sector and other pertinent information related to this research in terms of easy usability of the developed model. Chapter 3 presents the research methodology which includes a pilot study and empirical study. Chapter 4 gives a detailed exposition on the model development and results. Chapter 5 explains the processes involved in the prototype development and prototype evaluation. Chapter 6 concludes this thesis and discusses promising area for future research.



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BIODATA OF STUDENT

This thesis is prepared by Orlu Glory Urekwere (GS43208), in fulfillment of the requirement for degree of Master of Science in Computer Science; Research in Information Systems at Universiti Putra Malaysia. She completed her Bsc. in Business Information System in 2014 and graduated with first class honours. She started her post graduate studies at Universiti Putra Malaysia in 2015. In 2015 she joined the Applied Informatic Research Group, Department of Software Engineering and Information System, Faculty of Computer Science and Information Technology, Universiti Putra Malaysia (UPM) to continue her master degree by research. Her research interest includes Outsourcing Practices, and IT Governance.



LIST OF PUBLICATIONS

Conference Paper

Glory, U.O., Noraini, C. P., Rodziah, B. A., & Hazlina, B. H. (2017). A Conceptual Model for Outsourcing IT Practices in IT Governance Services. *Applied Informatics Post Graduate Research Symposium*.

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