

RESEARCH COLLABORATION PARTICIPATION MODEL IN MALAYSIA
RESEARCH UNIVERSITY

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DEDICATION

This thesis is dedicated to my lovely family, especially to both my parents and my husband for endless love, support and encouragement.

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ABSTRACT

E-collaboration tool assist research team in conducting research collaboration in an online environment and produce better research outcomes, in which it can increase communication among non-located researchers, escalate quality of access to information and help to coordinate work more efficiently. However, previous researches indicate that not all researchers are keen to participate in e-collaboration and disinclined to migrate from traditional research practices and facilities to the current e-collaboration research environments. The resistances on the part of the user to participate in e-collaboration are dependent on the user's behavior in making decision to participate as well as to the functions of technology provided. Various reasons for the occurrence of this barriers have been identified: the gap between the needs of the community practice and the actual service provided by e-collaboration tools, trust issues, lack of peer support, lack of motivation and technology reliability. To address the problem, this study investigated the factors that influence the research collaboration participation from the perspectives of e-collaboration and knowledge sharing behavior, in which the proposed participation model integrates the e-collaboration and knowledge sharing behavior factors with the input factors from Collaborative Work Model. Based from the study, several factors that influence research collaboration participation have been identified: self-motivation for research, collaboration technology experience, identification trust, peer support, superior influence, communication, social presence, awareness and cooperation. In addition, the result also illustrates that participation in e-collaboration is found to have significant effect on research performance and satisfaction on research output. To validate the model, a quantitative approach is used by conducting a survey among researchers (208 respondents) from research universities in Malaysia. The survey data was then analyzed using a partial least square structural equation modeling technique. The result of the research illustrates that the proposed research collaboration participation model can be utilized to enhance the e-collaboration tools whereby it can assist in conducting research in online environments.

ABSTRAK

Aplikasi e-kolaborasi membantu penyelidik dalam menjalankan penyelidikan dalam persekitaran secara atas talian dan menghasilkan hasil penyelidikan yang lebih bermutu. E-kolaborasi boleh meningkatkan komunikasi di kalangan penyelidik di lokasi yang berlainan, meningkatkan kualiti akses kepada maklumat dan membantu menyelaraskan kerja dengan lebih cekap. Walau bagaimanapun, kajian terdahulu menunjukkan bahawa tidak semua penyelidik sanggup mengambil bahagian dalam e-kolaborasi dan enggan berpindah dari amalan dan kemudahan penyelidikan tradisional kepada persekitaran penyelidikan e-kolaborasi semasa. Rintangan pengguna untuk mengambil bahagian dalam e-kolaborasi bergantung kepada tingkah laku pengguna di dalam membuat keputusan untuk mengambil bahagian dan juga fungsi teknologi yang disediakan. Antara punca-punca halangan ini adalah kerana jurang antara keperluan amalan komuniti dan perkhidmatan yang disediakan oleh aplikasi e-kolaborasi, kekurangan motivasi, isu kepercayaan, kekurangan sokongan rakan sebaya, dan kebolehppercayaan teknologi. Untuk menangani masalah ini, kajian ini mengenal pasti faktor-faktor yang mempengaruhi penyertaan penyelidik dalam e-kolaborasi dari perspektif e-kolaborasi dan tingkah laku perkongsian pengetahuan. Model penyertaan untuk e-kolaborasi dicadangkan dengan menggabungkan faktor-faktor tingkah laku e-kolaborasi dan faktor-faktor tingkah laku perkongsian pengetahuan dengan faktor input dari Model Kerja Kerjasama. Faktor dikenalpasti adalah motivasi diri, pengalaman mengguna teknologi kolaborasi, identifikasi kepercayaan, sokongan rakan, pengaruh orang atasan, komunikasi, kehadiran sosial, kesedaran dan kerjasama. Untuk mengesahkan model, pendekatan kuantitatif digunakan dengan menjalankan tinjauan di kalangan penyelidik dari universiti penyelidikan di Malaysia di mana data tinjauan 208 responden dianalisis dengan menggunakan teknik pemodelan persamaan struktur kuasa dua terkecil separa. Dapatan kajian mendapati model penyertaan yang dicadangkan dapat digunakan untuk membaikpulih aplikasi e-kolaborasi, yang juga dapat membantu para penyelidik dalam menjalankan penyelidikan mereka dalam persekitaran secara atas talian.

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LIST OF ABBREVIATIONS

ACP	-	Average Congruency Percentage
AVE	-	Average Variance Extracted
HTMT	-	Heterotrait-monotrait Ratio of Correlations
IPMA	-	Importance-performance Matrix Analysis
IS	-	Information Systems
IT	-	Information Technology
KSB	-	Knowledge Sharing Behavior
PLS	-	Partial Least Square
SCT	-	Social Cognitive Theory
SDT	-	Social Determination Theory
SEM	-	Structural Equation Modeling
SET	-	Social Exchange Theory
SPT	-	Social Presence Theory
TCM	-	Three Component Model
TPB	-	Theory of Planned Behavior
TRA	-	Theory of Reasoned Action
TTF	-	Task Technology Fit
UKM	-	Universiti Kebangsaan Malaysia
UM	-	Universiti Malaya
UPM	-	Universiti Putra Malaysia
USM	-	Universiti Sains Malaysia
UTAUT	-	Unified Theory of Acceptance and Use of Technology
UTM	-	Universiti Teknologi Malaysia

LIST OF SYMBOLS

R^2	-	Coefficient of Determination
f^2	-	Effect Size
β	-	Structural Model Path Coefficients
Q^2	-	Predictive Relevance
q^2	-	Effect size

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Within the context of the emergent complexity of research, collaboration has been regarded as fundamental in academic research. It embraces different structure, extending from the sharing of ideas among research team member to a corporate collaboration. The increasing complexity of the research problem creates demand for multidisciplinary research. Research disciplines gradually factionalize into a specific area of specialization, in turn leads to a situation which the research team member, requires the services and knowledge from other researcher, to complete a research project. Research team member need to work with others to deal with complicated and multidisciplinary research problems that cannot be solved within an individual domain. Along with the expansion of collaboration, e-collaboration tools have been developed to support the research collaboration with the features of web 2.0, which allows for rapid sharing and processing of data.

E-collaboration could be defined as the technology infrastructure and process developed to support research collaboration activities (Anandarajan, 2010; Deepwell and King, 2009). These research collaboration activities can include information gathering, problem formulation, research design, theory formulation, hypothesizing, research equipment construction, data interpretation and writing up results. E-collaboration represent a virtual community of practice whose aim would normally be to set, investigate and attempt to answer particular research questions through cooperative knowledge sharing. E-collaboration can increase productivity of the research and produce better research outcomes. While e-collaboration tools could be defined as software support for collaborative work, which consists of software deployed directly on user's machines and software that coordinated all the clients server. E-collaboration tools can be divided into two groups which are offline and real-

time. For offline e-collaboration tools, the data store hosts the current, consistent view of the shared data, and periodically updated by the users. While for real-time e-collaboration tools, any modification made to the shared will be shown to each team members in real-time. However, some e-collaboration systems provide both offline and real-time collaboration, which give flexibility to the users to choose the synchronization mode. Among the examples of e-collaboration tools used for conducting research activities are Google Docs, OneDrive, MyNetResearch, Mendeley, and Endnote.

The pattern of the research readers of research articles based on the analysis of Mendeley user categories shows that not all research team member participates in using e-collaboration tools (MacMillan, 2012; Mohammadi, Thelwall, Haustein, and Larivière, 2015). Some of the research team member seem to avoid using e-collaboration tools and may prefer to continue with the traditional research practices. Many of the members in research collaboration prepare works independently as part of the research without involving others. As a consequence, other research team members will face problems in understanding certain information due to lack of related resources. Besides that, if research team member exchange resources via email, it is troublesome to scroll through the entire inbox to retrieve the reference file in the future or to find in the download folder that have been long created.

The resistances of research team member to participate in research collaboration by using e-collaboration tools are actually depends on the their behavior on making decision to take part and also the functions of the technology provided. In order to describe the research collaboration process, it is important to understand the context in which the research collaboration activity occurs and emphasizes on the interpersonal factors and user's motivation to take part (Karna and Ko, 2013). Drawing from that, the important behavioral factors in the context of academic research collaboration should be further investigated.

It is also important to look into the technological issues in order to understand the need of the research team member in using e-collaboration tools. E-collaboration tools should provide functions that can support communication, cooperation and

of ideas. E-collaboration tools should be fundamentally focused on utilizing the features that can enhance knowledge sharing between the users (Ireson and Burel, 2010).

Previous finding shows that some research team member's preference are more on individualistic rather than collaborative where they prefer working in their own time and at their own pace without having any commitments with others (Minocha, 2009). Although there is an increasing number of studies conducted on individual characteristics and attitudes towards web-based learning, fewer have specifically attempted to focus on individual characteristics and approaches to knowledge sharing and collaboration with online participation (Chan et al., 2011). For realizing a successful e-collaboration, research team member should be willing to share their knowledge and integrate knowledge from others. If team member view collaboration as an individual matter, they would be less likely to participate in e-collaboration. Other factors that can influence knowledge sharing in e-collaboration may also include experience and the level of difficulty experienced when actually engaging in the knowledge transfer (Harley et al., 2010; Stephen M. Mutula, 2011).

Stephen M. Mutula (2011) revealed there is less participation in research collaboration by using e-collaboration tools because there is lack of trust among research team members. Trust is important in the e-collaboration environment because research team member will be encouraged to operate in the environment where the information they access or received is accurate and reliable. Procter et al. (2010) also highlighted in his paper the significance of formal and informal support in e-collaboration. The interview reported that non-users of e-collaboration stated that one of the main reasons that they did not participate in e-collaboration is because there is no encouragement from the peers. Social support from peers either research team members or superiors are both important to influence participation in e-collaboration. The importance social support has also been highlighted by Yunhwan Kim, Glassman, and Williams (2015), which they mentioned that social relationships and motivation to participate in e-collaboration cannot be separated in practice.

Other issues found in e-collaboration are related to technology aspect and e-collaboration tools features (Candela et al., 2013; Y. Y. Li, Dong, and Huang, 2011; Procter et al., 2010; Van Ostrand et al., 2016). Procter et al. (2010) conducted a qualitative study concerning existing e-collaboration practice among research team member in universities. Finding from the interview reported that the IT support does not meet research team member's needs and there is an inadequate institutional IT support for conducting research. In conducting research, team member needs to deal with a complex research task, which require them to communicate effectively with their research team. The absence of translucent communication in team processes will lead to difficulties because conducting research through e-collaboration requires more defined roles and sequences of action compared to traditional research practices (Van Ostrand et al., 2016). If this continues, this technical frustration will decrease researcher's participation in e-collaboration. Anandarajan (2010) also highlighted in his studies about the problem on the misrepresentation of data due to technological malfunctions. The limitation of variety group supportability features cause team member to decline using e-collaboration tools among their research team (Navid et al., 2013; Zaugg et al., 2011). Besides that, there are also concerns on team member not contributing equally in e-collaboration and questions about the ownership of the resulting product. It is important for e-collaboration tools to provide features that help research team members to fairly coordinate the task division and to track on the activities conducted (Minocha, 2009).

1.3 Problem Statement

Based on the analysis, which has been done in the background of the problem, the problems regarding research team member participation in e-collaboration tools need to be addressed for the success of research collaboration. The main question addressed in this study is "How is research collaboration participation model in Malaysia Research University can be developed?".

The following sub-research questions are outlined to answer the research problems:

- (a) What are the factors that can influence research collaboration participation in Malaysia Research University?
- (b) How to develop a research collaboration participation model in Malaysia Research University?
- (c) How to validate a research collaboration participation model in Malaysia Research University?
- (d) How to identify predictor factors that that can influence research collaboration participation in Malaysia Research University?

1.4 Objectives

The objectives of this research are as follows:

- (a) To investigate the factors that can influence research collaboration participation in Malaysia Research University.
- (b) To develop a research collaboration participation model in Malaysia Research University.
- (c) To validate the research collaboration participation model in Malaysia Research University.
- (d) To identify predictor factors that that can influence research collaboration participation in Malaysia Research University.

1.5 Scope of the Study

The focus of this study is concentrated on Research University in Malaysia. This study analyzes the factors that can influence research collaboration participation in e-collaboration from collaboration and knowledge sharing behavior model and theories. Data will be collected from the researchers from selected Malaysia Research Universities (RU) who have experience in using e-collaboration tools in conducting their research collaboration activities, which are Universiti Teknologi Malaysia, Universiti Malaysia, Universiti Kebangsaan Malaysia, Universiti Sains Malaysia and Universiti Putra Malaysia.

1.6 Significant of the Study

This study will provide a research collaboration participation model for e-collaboration that aligns with research team member needs. Important factors that affect research collaboration participation in e-collaboration are analyzed from collaboration and knowledge sharing studies. This will assist Research University in Malaysia in managing the e-collaboration for research either in intra-collaboration or inter-collaboration. The research collaboration participation model for e-collaboration is expected to give a new insight for software developer to develop e-collaboration tools that can fulfill research team needs in conducting their collaborative research activities.

1.7 Structure of the Thesis

This thesis is organized to provide a fundamental evaluation of relevant information about the topic of research and to discuss relevant literature, which ultimately led to formulation of research model. This research consists of six chapters as follows:

Chapter 1 – Introduction. This chapter presents an introduction, problem background and context of the study. The following sections highlight the objectives, scope and significance of the study.

Chapter 2 – Literature Review. This chapter provides the general overview, discussions on previously used theoretical models and identified factors from previous studies using systematic literature reviews. The potential theory and method to solve the problems are investigated.

Chapter 3 – Research Methodology. This chapter discussed research paradigm and approaches relevant to this study. The diagrammatic operational research framework detailing the activities in phases involved through the study was also developed.

Chapter 4 – Model Development and Instrument Testing. This chapter reported on how research model and hypotheses were derived from the theories of collaboration studies and knowledge sharing behavior studies. The development and validation of the instrument used are also described in this chapter.

Chapter 5 – Data Analysis. This chapter presents the main data analysis relating to test and theory development for the proposed model by applying the Structural Equation Modeling (SEM) analysis with Smart PLS analysis software.

Chapter 6 – Results, Discussion and Conclusion. This chapter explains the key findings that evolved from this study with a discussion of the contributions and implications of the research outcomes. Limitations of the study and suggestion for future research were also presented.

1.8 Summary

This chapter provides an overview of the thesis. The chapter begins by introducing the background of the study in term of defining e-collaboration and e-collaboration tools. Research problem is explained based on the analysis made on the related previous studies found. There is a gap found between the research team member's need and the actual service provided by e-collaboration tools. A comprehensive model is needed to suit research-oriented practices and could be used as the guideline to improve the collaboration technology.

Based on the analysis, participation problem can be classified into two perspectives; knowledge sharing behavior and e-collaboration tools features. Regardless on the availability of e-collaboration technology, research team member are more comfortable working in their own time without having any commitment with others. There would be less likely for team member to share knowledge among research team if they prefer working individually. However, this is contrast with the concept of collaboration, which require team member to participate in research collaboration and work together with research team toward achieving a common goal.

Aside from the finding above, limitation of e-collaboration features is also found as one of the participation barriers. There is an inadequate institutional IT support for conducting research collaboration, which leads to many problems such as the absence of transluence communication, misrepresentation of data and insufficient group supportability features.

To address this issue, this study formulates the research questions and research objective. This study will be conducted based on the data gathered from Malaysia Research Universities (RU). The finding from this study is expected to give a new insight to the (RU) to improve and manage research collaboration both locally and internationally and at the same time provide a guideline for the software developers to develop e-collaboration tools that can fulfill research team member's need in conducting their collaborative research activities.

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