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# THE CONTINGENT ADOPTION OF ICT INNOVATIONS: THE CASE OF AN INDONESIAN UNIVERSITY

Sandra Irawan

*Monash University*, [irawan.sandra@monash.edu](mailto:irawan.sandra@monash.edu)

Susan Foster

*Monash University*

Kerry Tanner

*Monash University*, [Kerry.Tanner@monash.edu](mailto:Kerry.Tanner@monash.edu)

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# THE CONTINGENT ADOPTION OF ICT INNOVATIONS: THE CASE OF AN INDONESIAN UNIVERSITY

Sandra Irawan, Centre for Organisational and Social Informatics, Faculty of Information Technology, Monash University, Melbourne, Australia, irawan.sandra@monash.edu

Susan Foster, Centre for Organisational and Social Informatics, Faculty of Information Technology, Monash University, Melbourne, Australia, sue.foster@monash.edu

Kerry Tanner, Centre for Organisational and Social Informatics, Faculty of Information Technology, Monash University, Melbourne, Australia, kerry.tanner@monash.edu

## Abstract

*Using the context of a university in a developing country, this research is employing a single case study with embedded design to examine the perspective of academics as secondary adopters of managerial ICT innovations. By exploring the influence of mediating factors towards the adoption and implementation of the innovations, this research will contribute to and extend the hybrid innovation diffusion framework advocated by Gallivan (2001) in a university setting in Indonesia.*

*Gallivan (2001) suggests that innovation diffusion studies should accommodate the contingent adoption scenario where the innovation is first adopted at an organisational level, leaving organisation members as secondary adopters. Universities frequently utilise this scenario as university executives initially adopt innovations before mandating them to academics. The framework is therefore a suitable tool to be used to assess ICT innovation diffusion in universities. The research has reviewed the available literature, identified the research gap and developed a preliminary conceptual framework upon which to analyse the case study. After the data is analysed, a refinement of the framework will be undertaken.*

*Keywords: Contingent Adoption Scenario, ICT Innovation Diffusion, Managerial Area, Universities*

# 1 INTRODUCTION

The importance of Information and Communication Technology (ICT) for education was emphasised in the World Education Forum in Korea and the International Conference on ICT in China, both held in May 2015. These sequential forums resulted in the Incheon Declaration and the Qingdao Declaration, which represent a collective global effort in accentuating the importance of harnessing ICT to support education systems and to guarantee effective access to information and services (Incheon Declaration 2015; Qingdao Declaration 2015).

Higher education institutions have engaged ICT for administration since as early as the 1970s, however previous research on this subject has empirically considered primarily the instructional area (knowledge administration) rather than the managerial area (information administration) (Meenakumari and Krishnaveni 2011). Hence, research shows that enhancing the usage of ICT in the managerial area will improve the overall administration (UNESCO 2009). Likewise, a review on the topic of information systems research in developing countries by Walsham and Sahay (2006) concluded that the current landscape demands more contributions in these areas.

In the field of information systems, the diffusion of ICT innovations within organisations has been recognised as a problematic issue for organisation executives. The widespread introduction of innovations within organisations is frequently accompanied by implementation failures and has triggered a great deal of interest (Rogers 2003; Van De Ven and Rogers 1988). Fichman (1992) concluded that previous innovation studies within organisations yielded inconclusive results when applying classical theories based on voluntary decisions of autonomous individuals. He puts forward evidence that these studies have disregarded the realities of when the innovation adoption is decided at an organisational level rather than at an individual level (i.e. contingent adoption) (Fichman 1992; Gallivan 2001).

This research, therefore, focuses on exploring the perspective of individuals, as members of an organisation, towards the diffusion of ICT innovations in a contingent adoption scenario. In this scenario, the organisation executives make an initial decision to adopt the innovations (primary adoption) before mandating or proposing them to these individuals (secondary adoption). Due to the contingent nature of the adoption, managerial interventions in the form of dissemination, training and support are made available by the organisation executives to ensure the successful adoption of the innovations. Along with these interventions, other factors such as subjective norms and facilitating conditions will emerge as the factors mediating primary and secondary adoption (Gallivan 2001).

Using a case study, this research is adapting an innovation diffusion framework (Gallivan 2001), which incorporates key elements from individual as well as organisational levels of analysis to support the contingent adoption scenario. The case study investigates the phenomenon of secondary adoption and assimilation processes of managerial ICT innovations by academics of an Indonesian university located in the eastern part of Java. By exploring factors that mediate primary and secondary adoption, this study seeks to examine the perspective of academics towards the diffusion of ICT innovations. This research-in-progress paper, therefore, is expected to answer the following questions:

- How do university academics perceive and experience managerial ICT innovations in a contingent adoption scenario?
- How do the factors that mediate primary and secondary adoption influence the perspective of the academics towards the diffusion of the innovations?

In regards to theory, this research extends Gallivan's framework by analysing empirical evidence from the diffusion of managerial ICT innovations in the Indonesian university. This research seeks to make a practical contribution by unveiling the experience and obstacles encountered by the academics during the diffusion of ICT innovations. Utilising the research findings, the university executives can evaluate their strategies in introducing future ICT innovations.

## 2 RELATED WORK

The following sections of the paper review related work as a foundation of knowledge with particular focus on the theoretical foundations of innovation diffusion and its application within organisations. The importance of researching managerial ICT innovations using the context of an Indonesian higher education institution is also discussed.

### 2.1 The Diffusion of ICT Innovations

For decades, extensive research has been conducted in the broad area of innovation studies focusing on the adoption, acceptance and diffusion of innovations. Traditional theories and models have been established from across disciplines to accommodate innovation studies and to contribute to the greater body of knowledge. However, Gallivan (2001) argues that these traditional theories and models on the use of innovation within organisations have disregarded the realities of when the adoption of the innovation is decided at an organisational level rather than at an individual level.

Rogers (2003: p. 5) defines diffusion as “the process in which an innovation is communicated through certain channels over time among the members of a social system”. In this research, the class of the innovations and the social system (as the locus of adoption) are of paramount importance. Figure 1 shows an ICT diffusion matrix (Fichman 1992; Gallivan 2001) which illustrates the interplay between the class of innovation and their locus of adoption in the social system. This matrix shows that most traditional theories and models used in past research can best support a scenario where simple innovations are adopted voluntarily by an autonomous individual (cell 1). Other past research results, however, have shown less conclusive results when explaining innovation diffusion in the locus of an organisation (cell 2) or which involves complex innovations (cell 3). Ultimately, many past studies seemed to show inconclusive results in the locus of an organisation that adopts complex innovations (cell 4). The matrix shows that the adoption of a complex innovation within an organisation does not fit well if analysed using traditional theories and models.

		LOCUS OF ADOPTION	
		INDIVIDUAL	ORGANIZATION
CLASS OF INNOVATION	Simple Innovation Low knowledge burden and low user interdependencies	Individual adoption of simple innovation <b>(CELL 1)</b>	Organizational adoption of simple innovation <b>(CELL 2)</b>
	Complex Innovation High knowledge burden and / or high user interdependencies	Individual adoption of complex innovation <b>(CELL 3)</b>	Organizational adoption of complex innovation <b>(CELL 4)</b>

Figure 1. ICT Innovation Adoption Matrix (Modified from Fichman (1992) and Gallivan (2001))

Through a review of organisational innovation studies in the context of higher education, we found that a majority of the studies were done in the locus of an organisation that adopts simple innovations (Chaputula 2012; Gulbahar 2008; Huda & Hussin 2010; Indrayani 2011; Setiawan 2012; Shaikh 2009; Usluel et al. 2008). Although conducted in the context of organisations, studies by Archibong and Effiom (2009) and Wilson et al. (2014) belong to cell 1 (individual adoption of simple innovation) due to the non-contingent nature of the innovation. The adoption matrix for other studies could not be determined, either because they were non-empirical (Nugroho & Surendro 2013; Sulisworo 2012) or did not involve any adoption process (Moertini 2012).

Research by Othman et al. (2013) was conducted in the locus of an organisation that adopted complex innovations. However, the emphasis was to evaluate the case using a SWOT model and therefore did

not specifically focus on the adoption scenario of the ICT innovations within organisations. Further research that accommodates the interplay between complex innovations (as the class of innovation) and organisations (as the locus of the adoption) is needed in this particular context. A further discussion of innovation diffusion within organisations, therefore, is described in the next section.

## **2.2 Innovation Diffusion within Organisations**

Rogers (2003:404) defines an organisation as “a stable system of individuals who work together to achieve common goals through a hierarchy of ranks and a division of labour”. As mentioned by Rogers and within the context of this research, a university is considered as an example of an organisation with the academics and the executives as members, working together to achieve common goals.

Within the context of organisations, Van De Ven and Rogers (1988) argue that innovation diffusion has been recognised as a problematic issue due to implementation failures that frequently accompany the widespread introduction of innovations. After more than five decades, the diffusion of innovation theory by Rogers (2003) has evolved to accommodate complex organisational analyses, such as when the adoption of the innovation is decided at the organisational level rather than at the individual level. In this particular scenario, innovation adoption is considered as a two-stage process consisting of a primary adoption by the organisation, followed by a secondary adoption by its members. This adoption process is contingent in nature and is divided into several known scenarios, namely a contingent adoption scenario, an authority adoption scenario and a collective adoption scenario (Rogers 2003; Zaltman et al. 1973).

Zaltman et al. (1973) reveal that authoritative and collective adoption scenarios are differentiated based on the participation of the members of an organisation in the initiation or pre-adoption stage. While the decision in an authoritative adoption scenario is made by a few individuals who possess power, status or expertise, the decision in a collective adoption scenario is made by all or the majority of members in the adopting unit, which are indicated by way of voting, polling or a political process to determine the use of the innovation (Rogers 2003; Zaltman et al. 1973). Zaltman et al. (1973) further distinguish the authoritative adoption scenario into two types: the participative approach and the authoritative approach. The participative approach is said to take place when the organisation members took part in the decision made by the authority, indicating a wider sharing of power, using a form of consultation or discussion with those affected by the change. In contrast, the authoritative approach occurs when the authority did not consult or discuss the adoption decision with the organisation members.

Rogers (2003) concludes that collective and authority adoption scenarios are more common than optional adoption scenario in most organisations, such as in factories, schools, or government organisations. The university being studied practises these adoption scenarios since the innovation adoption is decided by the executives at the university level. Therefore, the next section further describes the context of Indonesian higher education and how ICT is used in this particular context.

## **2.3 The Context of Indonesian Higher Education**

The rapid growth of Indonesian higher education institutions is consistent with the global enrolment trends, marked by an enrolment rate of 31.5% nationwide for its 92 public, 3,078 private, and 52 Islamic institutions and the two-fold national budget increase over the four-year period of 2008 to 2012 (OECD/Asian Development Bank 2015; Republic of Indonesia 2012). The rapidly increasing student population in higher education accelerated the need for ICT to process, store and retrieve data in a fast, systemic and accurate fashion (UNESCO 2009).

Indonesia is considered a developing country as it is ranked 106<sup>th</sup> out of 152 countries listed in the emerging market and developing economies group with an ICT Development Index (IDI) (International Monetary Fund 2015; International Telecommunication Union 2014). A review by Walsham and Sahay

(2006) concludes that the topic of information systems research in developing countries demands more research contributions.

Regarding the use of ICT for higher education, Meenakumari and Krishnaveni (2011) have identified two main functional areas, namely the instructional area (knowledge administration) and the managerial area (information administration). They define the instructional area as “a cyclic process comprising knowledge acquisition, knowledge delivery and knowledge evaluation”, which includes e-learning and evaluation systems (Meenakumari & Krishnaveni, 2011:52). On the other hand, the managerial area involves “the activities relating to the management of higher education institutions”, such as student administration and general administration (Krishnaveni & Meenakumari, 2010:2). Meenakumari and Krishnaveni (2011) emphasise that previous studies have concentrated primarily on the instructional area and argue that enhancing ICT usage in the managerial area will improve the overall administration of higher education.

The following sections of the paper outline the research design, which highlights the current progress of the research and discusses the framework adopted for this research.

### 3 RESEARCH DESIGN

The research design guiding the structure of this research is illustrated in Figure 2. This section of the paper describes the completed research design to date, while the in-progress work is further explained in section 5.

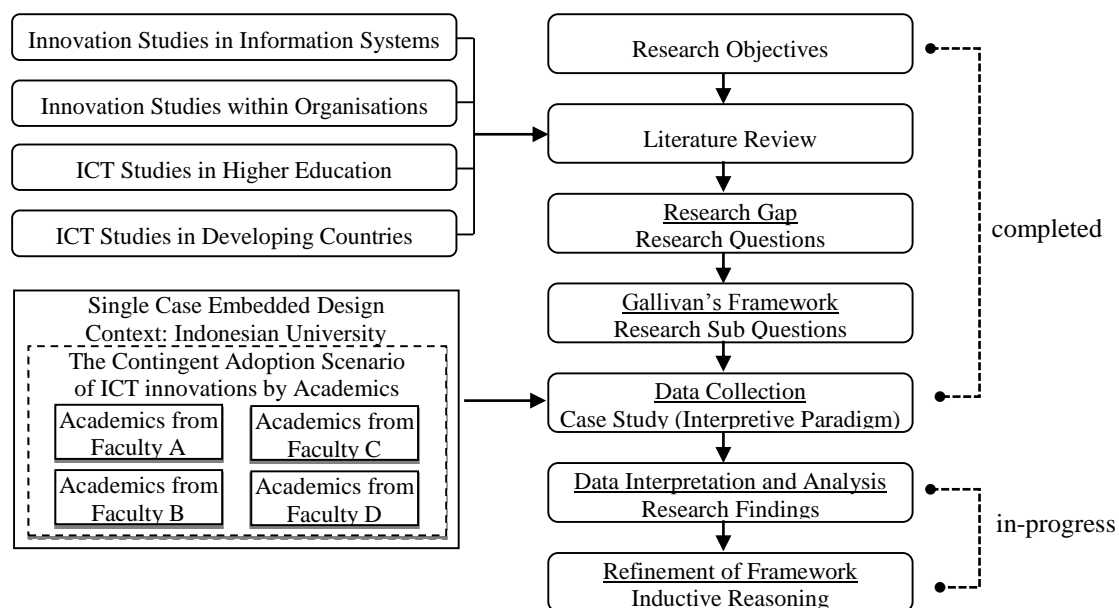


Figure 2. Research Design

The research objectives drive the research theme with the literature focus on innovation studies in information systems, innovation studies within organisations, ICT studies in higher education and ICT studies in developing countries. A mixed approach literature review as advocated by Bandara et al. (2015) was used in this research as the researcher had already decided the research theme when commencing the review with the purpose of gaining a more thorough understanding of the literature. The researcher extracted relevant information systems literature primarily from ProQuest, AISEL, ISI Web of Knowledge and SCOPUS databases and obtained context-related information from UNESCO, World Bank and IMF databases.

The researcher first focused the literature search on “the senior scholars’ basket of journals”, in particularly MIS Quarterly, Information Systems Research and Journal of MIS to get an understanding

of the current issues which are related with the theme being studied. Other literature was also obtained from AIS conferences proceedings (in particularly ICIS, PACIS, ECIS, AMCIS, and ACIS) and from AIS special interest groups such as DIGIT, SIGED, and GLOBDEV. Google Scholar and Monash University Online Library were also used to extract more literature which differed from the previous resources and EndNote was then used to organise these references. In preparing the literature for analysis, the researcher used Microsoft Excel to lay out, compare and contrast the relevant literature based on the categories as classified in EndNote.

Through a thorough literature review focusing on the specific context of higher education institutions in several developing countries, it was found that no study focused on the adoption of managerial ICT innovations. The main focus of these studies has been in the area of instructional ICT innovations (Chaputula 2012; Gulbahar 2008; Othman et al. 2013; Wilson et al. 2014) or the use of ICT in general (Archibong & Effiom 2009; Shaikh 2009; Usluel et al. 2008). Likewise, previous research on Indonesian higher education institutions lacks focus in the managerial area and has mainly concentrated on areas such as implementation barriers (Huda & Hussin 2010; Setiawan 2012), instructional areas (Prabowo 2007; Sedana & Wijaya 2012), knowledge management (Sulisworo 2012), and project management risk (Moertini 2012).

Therefore based on the literature review, previous research focusing on the diffusion of the managerial area of ICT innovation into higher education in developing countries is scarce. This study thus closes this gap by studying the interplay between the contingent adoption scenario, the managerial area of ICT innovations and the context of a university in a developing country, through the lens of Gallivan's framework.

The case study is focusing on an Indonesian university that adopts and implements complex ICT innovations for managerial purposes in a contingent adoption scenario. A case study approach has been chosen to acquire an in-depth understanding of the complex social perspective of academics during the diffusion of ICT innovations. The research tracks ICT diffusion within the university in a scenario where the primary adoption is decided at the university level (contingent adoption scenario). An embedded case design involves research subjects from four representative faculties in the university. An interpretive paradigm has been chosen, with the focus on human interpretation and meanings to gather empirical data. Yin (2014) emphasises that in case study research, the term "contemporary phenomenon" embraces a broad notion of not only studying the present but also the recent past by interviewing people. Therefore, this study is utilising a semi-structured interview technique as the primary technique for data collection, supplemented by direct observation of the ICT usage and examination of organisational documents.

This research explores the perspective of academics focusing on the diffusion of two managerial ICT innovations: the Academic Information System (AIS) and the Google Apps for Education Suite. These innovations were chosen because the adoption process by the academics is contingent upon a prior adoption decision made by the university executives and both are examples of complex innovations. These innovations were adopted by the university academics in 2012 (AIS) and 2013 (Google Apps for Education). This has allowed sufficient time for diffusion of innovation to take place and thus, the research on the uptake of these innovations can be suitably assessed. As a guideline in conducting this research, a preliminary conceptual framework accommodating a contingent adoption scenario used in this research is explained in section 4.

## **4 PRELIMINARY CONCEPTUAL FRAMEWORK**

In this study, the researcher chose to adapt a framework by Gallivan (2001) which was specifically developed to investigate the scenario of contingent adoption of innovations. This framework was chosen due to its "hybrid" nature in combining key elements from individual and organisational levels of analysis as well as factor and process approaches. The framework has been applied in several qualitative

studies such as the investigation of innovation diffusion at the IS divisions of several insurance firms (Gallivan 2001) and within small healthcare organisations (Wainwright & Waring 2007).

The framework is divided into three main segments: primary adoption decision, secondary adoption and organisational assimilation processes, and outcomes. The primary adoption decision describes the executives' decision to adopt an innovation that was found to be a match for the organisation's needs. Gallivan argues the decision itself does not guarantee the successful implementation of the innovation by the organisation members. Given the fact that the ICT innovations being studied in this research have been implemented for several years, the researcher argues the importance of studying the factors and processes influencing the implementation, rather than the reasoning behind the decision itself. By investigating the mediating factors, the secondary adoption and organisational assimilation processes in the second segment, the antecedents of the diffusion can further be traced. Furthermore, Gallivan (2001) underlines that research in this segment is scarce due to previous studies focus heavily on either the primary adoption decision or implementation outcomes of innovations.

In this research, the framework was adapted by incorporating key elements from the Indonesian university being studied, such as university executives and academics (see Figure 3).

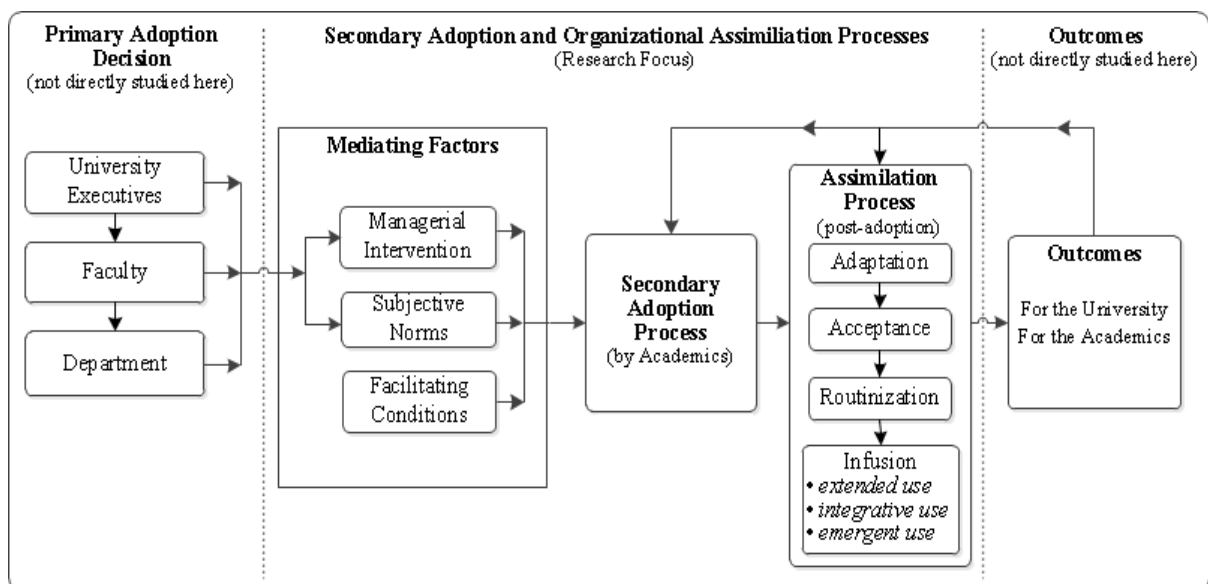


Figure 3. The Framework for Contingent Adoption of Innovations (adapted from Gallivan 2001)

In Figure 3, the primary adoption decision made by the university executives leads to the commissioning of policies to implement the innovations throughout the faculties and the departments, as the home bases for the academics. The secondary adoption and organisational assimilation processes, follow the primary adoption decision and explore the perspective of academics (as secondary adopters) in perceiving and experiencing a set of influences as the innovations assimilate in the university over time. The last segment of the framework explores the outcomes of the diffusion, which can be perceived differently by the academics and the university depending on their expectations. The complexity of the assimilation process is demonstrated through the dynamic “feedback loops”, which provide an iterative process from outcomes through to the organisational assimilation and the secondary adoption processes (Gallivan 2001).

The focus of this research is the middle segment of the framework: the secondary adoption and organisational assimilation process. In this segment, the mediating factors mediate between the primary and secondary adoptions and trigger events at the individual level of analysis. The mediating factors consist of three constructs: managerial interventions, subjective norms, and facilitating conditions. The managerial intervention construct incorporates the dissemination, training, support, resources, and policies made available by the university executives to accelerate secondary adoption by the academics.



The subjective norms construct explores the academics' beliefs regarding the expectations of relevant others (i.e. university executives and fellow academics) regarding their own secondary adoption behaviour, which involves the manner and ways of using the innovation. Using this construct, the organisational culture of the university can be explored, as it is expected to have an important role in shaping the academics' beliefs as the users of the innovations. The facilitating conditions construct involves external categories that captures other factors that can make implementation more or less likely to occur and comprises of innovation, organisational and individual attributes.

The organisational assimilation process utilises a process approach at the organisational level of analysis to determine the degree of implementation of the ICT innovations. This process describes how deeply the innovation assimilates in the university through a series of consecutive stages: adaptation, acceptance, routinization and infusion. Infusion as the final stage of the assimilation process is an indication of how deeply the ICT innovation has penetrated the working culture of the university, which is characterised by their extended, integrative and emergent usages. Through these constructs, processes, and within the context of a university in Indonesia, an extended framework will be developed.

## **5 CURRENT PROGRESS AND FUTURE RESEARCH**

The researcher has acquired data through recent fieldwork at the Indonesian university. During the fieldwork, the researcher has used three sets of questions to interview 34 participants in three different categories, consisting of 19 academics, five top level university executives, and ten university and faculty administrative staff. Although the main interview samples are the academics with their key roles as secondary adopters of the innovations, the nature of the framework allows the researcher to interview the executives (as the policy makers) and the administrative staff in charge of operations and support. The interview questions were designed to explore the diffusion of the innovations using the perspective of the three categories of participants and how this perspective is influenced by the mediating factors.

Currently, the researcher is in the process of transcribing the interviews to undertake a preliminary analysis of the data. During the preliminary analysis, the principles of qualitative data analysis advocated by Miles and Huberman (1994), Miles et al. (2014) and Saldaña, J. (2013) have been used as a reference in combination with a computer-assisted tool (NVivo) to acquire valid meaning from the data. Ongoing work involves proceeding with further analysis on the role of the three constructs (managerial intervention, subjective norms, and facilitating conditions) in accelerating or hindering the adoption of the innovations and in understanding the assimilation stage. Utilising the results of the analysis, it is expected that the preliminary conceptual framework can be extended based on the empirical evidence.

Future research can build upon the extended framework by conducting a study that provides more empirical evidence. Other segments of the current framework that are not directly being studied in this research, such as the primary adoption decision and the outcomes of the ICT innovation, can be further investigated. Furthermore, subsequent investigations of the diffusion of ICT innovation, either using a similar or contrasting context, will enrich the findings of the current study.

Guided by Gallivan's framework, the researcher plans to extend this research into several Indonesian universities, which share a similar background in ICT innovation adoption and implementation. The aim of the multiple case study is to gather empirical evidence of ICT adoption and implementation as a foundation to develop a more robust and rich theoretical framework. As a practical contribution, the updated framework will potentially guide the universities in evaluating the strategies in introducing and implementing future ICT innovations.

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