



**MONASH** University

***THE MANDATED ADOPTION AND IMPLEMENTATION OF AN ACADEMIC  
INFORMATION SYSTEM: THE CASE OF AN INDONESIAN UNIVERSITY***

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A thesis submitted for the degree of *Master of Philosophy* at

Monash University in 2017

Caulfield School of Information Technology

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# Abstract

The widespread introduction of innovations within organisations is frequently accompanied by implementation failures. Under a scenario of contingent authority innovation-decision, the decision to adopt innovations lies in the hands of the managers, leaving employees merely as users of the innovations. To ensure a successful adoption, managerial interventions in the form of mandates and support are commonly made available to mediate between the initial adoption and the subsequent adoption. Although allowing for a rapid adoption, the implementation of the innovation is often plagued with failure, partly due to its non-voluntary nature.

This research focused on the mandated adoption and implementation of an Academic Information System (AIS) for the academics at an Indonesian University. A status upgrade from an institute of teaching and education to a university contributed to a decision to embrace ICT as a solution to cope with the rapid growth in the number of the stakeholders. Using an interpretive case study, this research applied a framework for innovation adoption and implementation to investigate the case of the University. This involves the exploration of the multilevel perspective of the actors involved, including the academics, the university executives, and the administrative staff. Semi-structured interviews were used as the main technique during data collection, supported by documentation and physical artefacts to corroborate the findings.

The results showed that a high amount of resistance was demonstrated by the academics towards the AIS, as a result of the ineffectiveness of the implementation strategy and interventions by the University. The usage mandate imposed by the university executives managed to counter the resistance and allowed the AIS to be adopted by all the academics. Nonetheless, the mandate brought negative implications during the following stages of implementation, as variations in the usage of the AIS were found. The factors mediating between the initial and the subsequent adoption were also identified as they influenced the usage of the AIS by the academics. This study contributed by providing empirical evidence to extend the framework for innovation adoption and implementation, and enabling the university executives to evaluate their strategy in introducing and implementing ICT innovations.

# Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

A request to extend the word count for the thesis was proposed and approved by the Monash Graduate Education (MGE). This thesis does not exceed 43,000 words in length, exclusive of tables, bibliographies, appendices, and footnotes.

Sandra Irawan

23 February 2017

## **Publication during Enrolment**

Irawan, S., Foster, S., & Tanner, K. (2016). The contingent adoption of ICT innovations: The case of an Indonesian University. Paper presented at the 20<sup>th</sup> Pacific Asia Conference on Information Systems (PACIS), Chiayi, Taiwan.

# **Acknowledgement of Professional Editing**

Professional editor Adrian Coen provided copy editing and proofreading services for this thesis, in accordance with the guidelines laid out in the university-endorsed national 'Guidelines for editing research theses'.

# Acknowledgements

This research was supported by the Indonesian Endowment Fund for Education Scholarship (LPDP) provided by the Republic of Indonesia's Ministry of Finance.



First and foremost, I would like to express my sincere gratitude to my supervisors, Dr Susan Foster and Dr Kerry Tanner, who have been unstinting with their guidance and support within the course of this research. In particular, Sue provided me with professional advice, insights, encouragement, constant challenge, and criticism for the betterment of the research. Kerry's wisdom, vast experience, and high attention to detail have ensured that the thesis was sound and well written. The supervisory method was effective and productive as all three of us would always sit together in each meeting to discuss the bits and pieces of the research.

I would like to extend my appreciation to the academic staff of the Caulfield School of IT for their various roles during the research, particularly Professor Sue McKemmish, Professor Frada Burstein, Adjunct Associate Professor Graeme Johanson, Dr Steve Wright, Dr Tom Denison, Dr Kirsty Williamson, Dr Michael Morgan, Dr Mahbubur Rahim, Dr Maria Indrawan. My special thanks goes to Allison Mitchell, Helen Cridland, Michelle Ketchen, Diana Sussman, Rafiq Tjahjadi, and Julie Holden for their smooth administrative and technical support.

I am also indebted to fellow Indonesian colleagues and students in the faculty for the fruitful long hours discussions, especially Danny Ardianto, Misita Anwar, Iwan Handoyo, Hadi Hariyanto, Dwi Rahayu, and Ariesta Lestari. I would like to extend my gratitude to fellow research students for the wonderful study and research experience, including Ayesha Sadiq, Amanda Cosham, Sepehr Minagar, Tennyson Yuan, Musleh Alsulami, Lizzy Daniels, Prajwol Sangat, Peter Serwylo, Mohammed Aladalah, Goh Tian Yu, Abdullah Alghamdi, Yahya Kazemzadeh, and many others.

I could not have finished this thesis without the relentless support, wabil khusus from the asatidz of the Social Researchers Forum, who more often than not were willing to hear me

rambling about my research, particularly Edi Riyanto, Ervan Nurtawab, Agus Mutohar, Noor Huda Ismail, and Dipa Nugraha. I also offer my sincere thanks for the support of various communities and groups in Melbourne, such as LPDP Monash, LPDP Victoria, Merah Putih Monash, Wacana FIT, MIIS, N2M Ongisnade, Clayton and Westall Community.

I would like to thank my parents who always have faith in me, especially my mother who passed away in the first year of my study just before the confirmation seminar (This thesis is dedicated for you). Finally, my warm gratitude goes to my little family whom I always drag everywhere either for business or pleasure. I am utterly convinced that all of this would not have come to fruition if not from the constant prayer of my wife Sendang Pradani and the festive company of my three young kids: Mikha, Kayla, and Hana.



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# 1 Overview of the Research

## 1.1 Introduction

This thesis explores the adoption and implementation of an Academic Information System (AIS) by an Indonesian University. It focuses particularly on a scenario of contingent authority innovation-decision, in which upon the initial adoption of the AIS by the university executives, a mandate was given for the academics to adopt it. Utilising a case study, the research sought to understand the nature of the mandated adoption and the influence of the factors mediating between the initial and the subsequent adoption.

This chapter starts with the background of the research and is then followed by a description of the aim and methods of the research. The following sections describe the motivation and the significance of the research. The chapter concludes with an outline of the structure of the thesis.

## 1.2 Research Background

The widespread introduction of innovations in organisations is frequently accompanied by implementation failures, thus posing a problematic issue for managers, as well as triggering a great deal of interest among researchers (Dwivedi et al., 2013; Gallivan, 2001a; Heeks, 2002; Lyytinen & Hirschheim, 1988; Myers, 1994; Rogers, 2003; Venkatesh & Bala, 2008).

Under the scenario of contingent authority innovation-decisions, the initial decision to adopt an innovation lies in the hands of the managers of an organisation, leaving the employees with no choice but to adopt it (Gallivan, 2001b). With the contingent nature of the adoption, managerial interventions such as in the form of training and support are commonly made available to ensure a successful adoption by the employees (Gallivan, 2001b; Venkatesh & Bala, 2008). Along with these interventions, subjective norms and facilitating conditions can emerge as factors that mediate between the initial adoption by the organisation and the subsequent adoption by its employees (Gallivan, 2001b).

Although the mandatory setting may guarantee the adoption of the innovation by the employees, the following stages of implementation are often problematic (Agarwal & Prasad, 1997; Brown et al., 2002; Gallivan, 2001b; Rogers, 2003). The employees who are not fully committed or not ready to use the innovation may choose to delay, resist, or even sabotage the

implementation (Brown et al., 2002; Hartwick & Barki, 1994; Leonard-Barton, 1988a; Markus, 1983). Even in a case where a decision to adopt was then made, the employees may still circumvent, underutilise or even delegate the use of the innovation (Burton-Jones & Straub Jr, 2006; Tong et al., 2008; Wilkin & Davern, 2012).

At the same time, higher education institutions worldwide have rapidly embraced ICT (Information and Communications Technology) innovations as a solution to their problems, which provide reliable, efficient and effective services (UNESCO, 2005, 2012, 2013, 2014, 2015). The global increase in student enrolment has accelerated the need for ICT to process, store, and retrieve data in a fast, systemic, and accurate fashion (UNESCO, 2009, 2014). The implementation of ICT requires higher education institutions to devise effective strategies that minimises any obstacles they may encounter (Asian Development Bank, 2011).

Nevertheless, a literature review during this research suggested that prior research focusing on the mandated adoption of innovations in the context of higher education institutions is scarce. The issue of mandated innovation adoption was also rarely examined from the multilevel perspective of the actors involved, as a single-level perspective of the case had often been preferred (Archibong & Effiom, 2009; Burton-Jones & Gallivan, 2007; Chaputula, 2012; Huda & Hussin, 2010; Setiawan, 2012; Usluel et al., 2008; Wilson et al., 2014).

This thesis therefore explored the case of a mandated adoption of an Academic Information System (AIS) by an Indonesian University using the multilevel perspective. Utilising case study research, a framework for innovation adoption and implementation was used as a theoretical lens to examine the case. At the organisational level, the decisions and actions of the university executives were examined as they ensure the successful implementation of the AIS. At the individual level, the perspectives and experience of the academics were explored in their capacity as users. To strengthen the analysis, information was also retrieved from the administrative staff involved in the implementation of the AIS.

By accommodating the multilevel perspective from different categories of participants, a thorough understanding of the case can be captured. Such an understanding can be utilised as a means for the university executives to reflect upon past events, evaluate the current implementation, and prepare an effective method for introducing and implementing future innovations.

### 1.3 Research Aim and Methods

The aim of this research was to explore in depth the nature of the adoption and implementation of an AIS in an Indonesian University. Utilising a case study, this research sought to address the following questions:

1. *What is the nature of the adoption and implementation of the AIS in the Indonesian University?*
2. *How do the academics use the AIS in the University?*
3. *How do the mediating factors influence the adoption and use of the AIS by the academics?*

To address these research questions, this research follows the standards of the interpretivist tradition, particularly by utilising constructivism as its philosophical grounding (Williamson & Johanson, 2013). Utilising this approach, collective meanings were constructed from the research participants by taking account of the norms and values embedded in their beliefs, decisions, and actions with regard to the case being studied (Myers, 2013; Orlikowski & Baroudi, 1991; Walsham, 2006; Williamson & Johanson, 2013).

The case study research method was chosen, as it was considered appropriate to accommodate the focus on human interpretations and meanings, with regard to the phenomenon being studied (Walsham, 1995). An in-depth case study requires the researcher to visit the field site over a period of time (Walsham, 1995) and therefore fieldwork was conducted in during a limited period from November to December 2015 at the Indonesian University. The main technique used during data collection was semi-structured interviews, supported by additional techniques, including documentation and physical artefacts (Yin, 2014).

### 1.4 Research Motivation

An integral part of research involves the process of outlining the researcher's motivation for conducting a study (Wolcott, 2010). The researcher was motivated by a professional interest in understanding the nature of the adoption and implementation of an AIS by an Indonesian University.

With eight years experience working as a staff member of the University, the researcher became intrigued by a high amount of resistance shown by the academics during the adoption and implementation of the AIS, which was supposedly developed to assist them with their academic tasks. Even several years after it was first introduced, there were still indications of



workarounds of the AIS by the academics. It was suspected that the mandated adoption of the AIS might be a factor which triggered such issues.

Upon securing a scholarship from the Indonesian government, the researcher became more motivated to conduct research that explores the issues of resistance and workarounds of the AIS by academics. Research that explores the mandated adoption of innovations, as is commonly practised within the bureaucratic higher education institutions in Indonesia, was also considered to be pivotal. Conducting research into such a topic and context is considered a way for the researcher to give back to his institution and the government for having been awarded the scholarship.

Eventually, the research topic was communicated to the executives in the University and the then-potential research supervisors. After further discussions, it was decided that such a research project may provide a potential contribution, as the findings could assist the University in introducing and implementing future innovations as well as revealing the current use of the AIS by the academics.

## **1.5 Significance of the Study**

This study is significant in several ways.

Firstly, with the exception of the seminal work from Ram and Jung (1991) and Ball (2005, 2011, 2015), research that focuses on exploring the mandated adoption of innovations in the context of higher education institutions was scarce. The issue of mandatoriness was often taken for granted and yet it may prove to be significant in influencing the subsequent adoption of the innovations by the users. An exploration of such an issue in the context of higher education institutions is needed, as they rapidly embrace ICT innovations as a means of providing effective and efficient services.

Secondly, the research sought to extend a framework for innovation adoption and implementation by providing empirical evidence from the case of an Indonesian University. The research is expected to achieve a thorough understanding by analysing the case from the multilevel perspective of the stakeholders involved, including the university executives as the decision makers, the university academics as the users, and the administrative staff at the operational level.

By analysing the case using the multilevel perspective, this research sought to address the issue of the 'key informant research tradition', which relies only on information from key individuals

in an organisation (e.g. the CEO, the CIO, or senior management) to study the adoption of innovations by many employees in that organisation (Gallivan, 2001b; Rogers, 2003).

Finally, the research is expected to unveil the actual usage of the AIS by the academics in the University. Based on the findings, the research can provide information and recommendations, which enable the university executives to evaluate the current implementation of its AIS and to prepare effective methods to introduce and implement future innovations.

## **1.6 Structure of the Thesis**

This thesis comprises eight chapters:

Chapter 1 presents the background of the research, the aim and methods, the motivation of the researcher, the significance of the study, and how the overall thesis is structured. Chapter 2 reviews the literature by providing an outline of the organisational adoption and implementation of innovations and the past theories on innovation studies. A framework for innovation adoption and implementation, which was used as a theoretical lens to guide this research, is also presented in this chapter. Chapter 3 highlights the methodological discussion on the paradigm and methods used in the study as well as the techniques for data collection and analysis.

Chapters 4 to 6 present the empirical findings of the study. Chapter 4 elaborates on the context of the case study. Based on the context, Chapter 5 discusses the pre-implementation phase of the AIS, which includes the exploration of the primary adoption process and the pre-implementation interventions by the executives at the University. Chapter 6 analyses the post-implementation phase of the AIS, which includes the secondary adoption and the assimilation process of the AIS, based on the perspectives and experience of the academics. The influence of the mediating factors towards the adoption and use of the AIS by the academics is also presented in this chapter.

Chapter 7 presents the refined framework for innovation adoption and implementation resulting from this thesis. Finally, Chapter 8 provides a summary of the key findings and highlights the contributions of the research to theory and practice. This chapter concludes by highlighting the avenues for future research.

## **2 Literature Review**

### **2.1 Introduction**

This chapter provides a review of the literature with regard to the adoption and the implementation of innovations within an organisation. The particular focus of the review is the mandated adoption of innovations that occur under the scenario of contingent authority innovation-decisions.

The chapter starts by providing an overview of the adoption of innovations in an organisation. First, the notion of innovation, as it is commonly interpreted in studies of organisations, is introduced. The innovation adoption initiatives within an organisation are then illustrated, which leads to the description of the scenario of contingent authority innovation-decisions. The next section provides an overview of the implementation of innovations in an organisation, which includes a description of the implementation strategies, the implementation stages, and the assimilation process of the innovations in the organisation.

The theories used in past innovation studies are outlined in the following section. A summary of these theories, as well as the preliminary framework chosen to guide this research are then provided in the last section of this chapter. A further review of the literature pertaining to the context of the case study and the previous innovation studies within the context of higher education is presented in Chapter 4 of this thesis.

### **2.2 Organisational Adoption of Innovations**

#### **2.2.1 The Notion of Innovation**

The term ‘innovation’, within the context of organisation studies, can be defined as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003: p. 12). This definition implies that the degree of newness of the innovation measured since its first discovery is considered irrelevant as it will be subjectively dependent on the perception of the individual or the organisation adopting it (Rogers, 2003; Tilton, 1971). In addition, even though the individual or the organisation already has previous knowledge of the innovation, it is still considered novel until they decide to adopt it.

In the context of an organisation, innovations are commonly used to support day-to-day tasks and are known as 'work place innovations' (Fichman, 1992; Gallivan, 2001b). Many classifications have been made to distinguish such innovations. Based on their types, the innovations are divided into radical and incremental innovations (Van de Ven et al., 2008). While radical innovations tend to disrupt the whole process of the organisation, by entirely replacing the previous systems used, incremental innovations tend to supplement or enhance the existing systems.

Based on their technological class, the innovations can be divided into simple innovations and complex innovations (Fichman, 1992). A simple innovation is characterised by its low knowledge burden and low user interdependencies, whereas a complex innovation demands a high level of these attributes. The 'knowledge burden' indicates whether the innovation requires specific knowledge from the adopters to use the innovation. The 'user interdependencies' indicates whether or not the innovation significantly affects the routine functions of an organisation. It also indicates whether or not the innovation is subject to network externalities, in which its use value is dependent on the number of people using it in the organisation.

Among the examples of simple innovations are PCs, laptops, and cell phones. Examples of complex innovations with high knowledge burdens are programming software and graphic design software. Complex innovations, that can significantly affect the routine functions in an organisation, may include complex administration systems and ERP (Enterprise Resource Planning) systems. Another example of a complex innovation that requires network externalities is an email system, where its use value is dependent on the percentage of individuals using it in an organisation.

This section has described the concept and classification of innovations, based on previous studies. Nonetheless, an innovation should be classified carefully on a case-by-case basis, as per Fichman's (1992) argument that one particular innovation can be perceived differently depending on the individual or the organisation adopting it.

### **2.2.2 Innovation Adoption Initiatives**

This section describes the initiatives to adopt innovations within organisations and their interplay with the technological class of the innovation. Table 2.1 illustrates the innovation adoption initiatives.

Table 2.1 Innovation Adoption Initiatives (Based on Fichman, 1992; Gallivan, 2001b)

| <b>Initiative</b><br><b>Class</b> | <b>Bottom-Up</b> | <b>Top-Down</b> |
|-----------------------------------|------------------|-----------------|
| <b>Simple Innovation</b>          | Cell 1           | Cell 3          |
| <b>Complex Innovation</b>         | Cell 2           | Cell 4          |

Based on the table, the initiatives to adopt innovations in an organisation can occur either as bottom-up or top-down initiatives. Cells 1 and 2 represent 'bottom-up adoptions' or 'grassroots initiatives' (Gallivan, 2001b) where autonomous individual employees of an organisation adopt simple and complex innovations without any prior adoption by their organisation. The decision to adopt the innovations occurs in a voluntary setting, solely based on the free will of the employees and without any intervention from their organisation. An adoption which occurs in a voluntary setting is basically "one in which users perceive the technology adoption or use decision to be a wilful choice" (Brown et al., 2002:p.284).

Cells 3 and 4 depict 'top-down initiatives' (Gallivan, 2001b) as the adoption of an innovation by employees follows its prior adoption by their organisation. Even though the adoption is decided top-down, it may still be possible for the innovation to be made voluntary for the employees. However, as the innovation is adopted with the purpose of achieving certain organisational goals, it is common for the organisation to encourage or mandate its employees to adopt it (Gallivan, 2001b; Ram & Jung, 1991; Rogers, 2003).

An adoption which takes place in a mandatory setting creates a condition "where users perceive its use to be organisationally compulsory" (Brown et al., 2002:p.284). In an extreme case where the adoption of an innovation is absolutely mandatory, mandatoriness can be defined as "one in which users are required to use a specific technology or system in order to keep and perform their jobs" (Brown et al., 2002: p.283).

This study is concerned with the adoption initiative depicted in Cell 4 where the adoption of complex innovations is decided top-down and a mandate is given for the employees to adopt it. Such an adoption initiative may lead to the scenario of contingent authority innovation-decisions, which is further described in the next section.

### 2.2.3 Contingent Authority Innovation-decision

This section elaborates on the contingent authority innovation-decision, a term coined by Gallivan (2001b) that involves a top-down initiative for the initial adoption of an innovation by the managers in an organisation and followed by a mandate for the employees to adopt it. As described in Table 2.2, the term of contingent authority innovation-decision is rooted in other terms and concepts from previous innovation studies (Rogers, 2003; Zaltman et al., 1973).

Table 2.2 Terms and Concepts for Organisational Innovation Adoption

| Rogers (1962, 2003)   | Zaltman et al. (1973)                             | Gallivan (2001)                           |
|---|---|---|
| 1. Optional innovation-decisions<br>2. Collective innovation-decisions<br>3. Authority innovation-decisions<br>4. Contingent innovation-decisions | 1. Collective decisions<br>2. Authority decisions | Contingent authority innovation-decisions |

Rogers (2003, p. 28) argued that the adoption of innovations specifically within the context of organisations has included several variations as follows:

- (1) Optional innovation-decisions are choices to adopt or reject an innovation that are made by an individual independent of the decision of the other members of the system;
- (2) Collective innovation-decisions are choices to adopt or reject an innovation that are made by consensus among the members of a system;
- (3) Authority innovation-decisions are choices to adopt or reject an innovation that are made by a relatively few individuals in a system who possess power, status, or technical expertise; and
- (4) Contingent innovation-decisions are choices to adopt or reject that can only be made only after a prior innovation-decision.

The term 'optional innovation-decisions' indicates that the decision is made voluntarily by an autonomous individual without any interventions. The terms 'collective innovation-decisions' and 'authority innovation-decisions' by Rogers (2003) are synonymous with the terms 'collective decisions' and 'authority decisions' of Zaltman et al. (1973). Zaltman et al. (1973) further distinguish 'authority decisions' into two types, namely the participative approach and the authoritarian approach. The participative approach takes place when the employees take part in the decision made by the managers, indicating a wider sharing of power, such as using a form of consultation with those affected by the change. In contrast, the authoritarian

approach occurs when the decision by the managers is not accompanied by employees' participation and involvement.

The term 'contingent innovation-decision' indicates that employees can only adopt an innovation after a prior adoption decision has been made by the organisation (Rogers, 2003). This suggests that the innovation would not be easily adopted by the employees without the intervention of the organisation.

The terms and concepts coined by Rogers (1962, 2003) and Zaltman et al. (1973) have become a foundation for other researchers to build on. Gallivan (2001b) combined the terms 'contingent innovation-decisions' and 'authority innovation-decisions', which resulted in a new term, the 'contingent-authority innovation-decisions'. This compound term describes a scenario in which "authorities make the initial decision to adopt and targeted users have few alternatives but to adopt the innovation and make necessary adjustments for using it to perform their job" (Gallivan, 2001b: p. 52).

Under the contingent authority innovation-decision, the managers in an organisation utilise a top-down initiative in adopting the innovation and then mandate the employees to adopt it. In this particular case, the mandated setting may influence the subsequent adoption of the innovation by the employees.

The adoption of innovation by organisations is typically followed by an effort to implement the innovation. The following section discusses several topics concerning the implementation of innovations by organisations.

## **2.3 Organisational Implementation of Innovations**

### **2.3.1 Implementation Strategies**

Within the context of organisations, the implementation of innovations has been recognised as a problematic issue for the managers in organisations. The widespread introduction of innovations within organisations is frequently accompanied by implementation failures (Heeks, 2002; Klein & Sorra, 1996; Rogers, 2003; Van De Ven & Rogers, 1988). Implementation failures do not always mean that the innovation was never implemented or was implemented but later abandoned, but may also mean that the use of the innovation was unanticipated and may have caused undesirable outcomes for the organisation (Heeks, 2002; Klein & Sorra, 1996; Wilkin & Davern, 2012).

It is therefore vital for an organisation to devise an appropriate implementation strategy that corresponds with its situation and context before implementing an innovation (Eason, 1988). With regard to the implementation of an innovation, there are five strategies that are commonly used within the context of organisations: the big bang, parallel running, phased introduction, trials and dissemination, and infrastructure and incremental application (Eason, 1988).

The strategies for the implementation of innovations are illustrated in Figure 2.1.

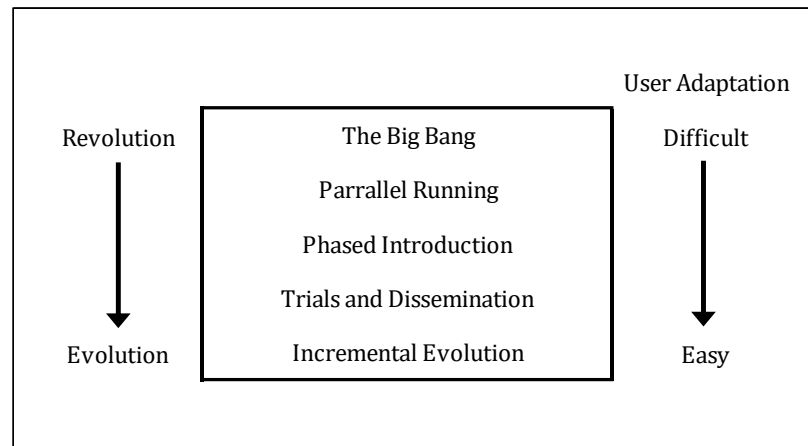


Figure 2.1 Implementation Strategies (Eason, 1988)

The 'big bang' strategy refers to the instant revolutionary switch from the previous system to using the innovation on a given date (Eason, 1988). This strategy can be used when the innovation is mission critical, thus signalling a higher need for the innovation to be fully implemented by all of its users at the same time. Inevitably, employees who are not well prepared may take longer to adjust, make more mistakes, or even show resistance as the innovation is implemented and replaces the previous system (Eason, 1988).

The 'parallel running' strategy involves operating the existing system and the innovation simultaneously until the users become accustomed to the innovation (Eason, 1988). This strategy reduces some of the risks and minimises the failure in the implementation, although extra effort must be taken to run both the status quo system and the innovation at the same time.

The 'phased introduction' strategy can be done by gradually introducing the features of the innovation to all the users, or by gradually implementing the whole innovation in one division of the organisation before moving on to others (Eason, 1988). The 'trials and dissemination' strategy involves the testing of the innovation on a small group before its mass deployment,



while ‘infrastructure and incremental application’ is more of a combination of strategies, with the main purpose of designing a customised and localised innovation (Eason, 1988).

Other than the implementation strategies, the dynamics of innovation implementation within an organisation is also reflected through the sequential stages of the implementation, which is explained in the following section.

### 2.3.2 Implementation Stages

The study of innovation implementation within organisations is mainly conducted either using the factors approach or the process approach (Cooper & Zmud, 1990). The factors approach focuses more on identifying static forces within the implementation of innovations, while the process approach focuses on the dynamics of the implementation by examining the behaviour of the stakeholders over time.

Table 2.3 illustrates three substantial past studies that utilised the process approach to describe the stages of innovation implementation: the change model (Lewin, 1947), the five stages of innovation process (Rogers, 2003), and the IT implementation process (Cooper & Zmud, 1990).

Table 2.3 Implementation Stages (Cooper & Zmud, 1990; Lewin, 1947; Rogers, 2003)

|   | Stages         |                 |            |            |               |          |
|---|----------------|-----------------|------------|------------|---------------|----------|
| <b>Change Model</b><br>(Lewin, 1947)                      | Unfreezing     | Change (Moving) |            | Refreezing |               |          |
| <b>Innovation Process</b><br>(Rogers, 2003)               | Agenda-Setting | Matching        | Redefining | Clarifying | Routinising   |          |
| <b>IT Implementation Process</b><br>(Cooper & Zmud, 1990) | Initiation     | Adoption        | Adaptation | Acceptance | Routinisation | Infusion |

Lewin’s (1947) change model is known as one of the earliest models of organisational change, which comprises of unfreezing, change (moving), and refreezing stages. Another implementation model proposed by Rogers (2003) consisted of two main processes, which were further broken down into five stages. The initiation process consists of agenda-setting and matching stages that result in the decision to adopt the innovation. The second process is the implementation process that consists of redefining, clarifying, and routinising stages and highlights the beginning of when the innovation is put into use in the organisation.

Cooper and Zmud's (1990) IT implementation process was built upon Lewin's (1947) change model and consists of six stages of implementation: initiation, adoption, adaptation, acceptance, routinisation, and infusion. This model is regarded as one of the best implementation models as it has complete and consistent construct definitions (Gallivan, 2001b; Prescott & Conger, 1995). The IT implementation process inspired other studies that were conducted using the process approach (Gallivan, 2001b; Venkatesh & Bala, 2008).

As depicted in the table, Lewin's unfreezing stage corresponds with Rogers' agenda-setting stage and Cooper and Zmud's initiation stage. At this stage, the organisation is opening up towards change by scanning for a solution to its organisational problems. In the next stage, Lewin's change stage represents the organisation's decision to adopt and implement the innovation. Cooper and Zmud extend Lewin's change stage into two stages: the adoption and adaptation stages. Lewin's change stage can also be associated with Rogers' matching and redefining stages.

In the adoption stage, the decision to adopt an innovation is made by the organisation, which is followed by a commitment to invest the resources needed to accommodate the implementation. The adaptation stage not only involves the process of developing, installing and maintaining the innovation, but also the process of training the employees in the required techniques for the innovation. The goal of the adaptation stage is to prepare the innovation so that it is available to the employees (Cooper & Zmud, 1990).

Lewin's refreezing stage correlates with Rogers' clarifying and routinising stages, and Cooper and Zmud's acceptance, routinisation, and infusion stages. In the refreezing stage, the organisation accepts the innovation and even embraces it as a part of its working culture (Lewin, 1947). The next paragraph further describes the refreezing stage based on Cooper and Zmud's stage classification (i.e., acceptance, routinisation, and infusion stages).

In the acceptance stage, the employees begin to implement the innovation, which cause an increase in its acceptance rate. The routinisation stage is reached when the employees of the organisation no longer perceive the innovation as something new, but as a part of their normal daily work activities (Cooper & Zmud, 1990). Cooper and Zmud (1990) highlighted infusion as the final stage of the process where the innovation is used to its full potential and this is marked by an increase in the effectiveness of the organisation. The three different aspects that surface from the infusion stage are: extensive use, integrative use, and emergent use (Gallivan, 2001b; Saga & Zmud, 1993).

Gallivan (2001b) argued that following the early stages of innovation implementation (i.e. initiation and organisational adoption), the innovation will then be adopted and used by the employees. The use of the innovation by the employees signals the beginning of the assimilation process (Gallivan, 2001b), which is described in the following section.

### **2.3.3 Assimilation Process**

Gallivan (2001b) argued that the assimilation process describes the extent to which an innovation penetrates the organisation. As a way of understanding the assimilation process, an effort can be made to investigate the use of the innovation by the employees, to establish the relationship between the actual usage, the intended usage, and the usage outcomes of the innovation (Wilkin & Davern, 2012).

In a case where the innovation triggers procedural changes affecting the employees of the organisation, the implementation will be open to resistance (Zaltman & Duncan, 1977). The employees who are not fully committed or are not ready to use the innovation may choose to resist, delay or even sabotage the implementation (Brown et al., 2002; Hartwick & Barki, 1994; Leonard-Barton, 1988a; Markus, 1983).

In an absolute mandatory setting, the adoption of an innovation by the employees is regarded more as a means to avoid punishment and gain rewards, rather than a personal drive based on their beliefs and attitudes concerning the innovation (Brown et al., 2002; Klein & Sorra, 1996). Thus it is possible for the employees to have negative beliefs and attitudes towards an innovation (e.g., as a form of resistance), but then ultimately adopt and use the innovation due to the mandate (Brown et al., 2002; Hwang et al., 2016).

Other reasons for the adoption may emerge due to influences from within the organisation, such as the influence from relevant others (e.g., peers, supervisors, subordinates, colleagues) regarding the innovation (Brown et al., 2002; Gallivan, 2001b); influence from managerial interventions (Gallivan, 2001b; Venkatesh & Bala, 2008); or influence from other facilitating conditions (Gallivan, 2001b; Orlikowski, 1993).

Although the adoption is mandated, the use of the innovation by the employees is considered 'fundamentally volitional' as different extents of use can be demonstrated (Hartwick & Barki, 1994). The employees may still circumvent, underutilise or even delegate the use of the innovation (Burton-Jones & Straub Jr, 2006; Tong et al., 2008; Wilkin & Davern, 2012).

Past studies have developed concepts and classifications with regard to the adoption and use of innovations by employees (Burton-Jones & Straub Jr, 2006; Rogers, 2003; Tong et al., 2008;

Wilkin & Davern, 2012). Based on the adoption decision, the employees may either decide to adopt or reject an innovation (Burton-Jones & Straub Jr, 2006). The decision to adopt leads them to either directly or indirectly use the innovation (Burton-Jones & Straub Jr, 2006; Tong et al., 2008).

Direct use occurs when “a user independently uses an Information System to accomplish an organisational task” (Tong et al., 2008, p. 2). With regard to indirect use, Tong et al. (2008) defined it as “the state in which a user employs an IS indirectly through one or more intermediaries (i.e., other colleagues) to accomplish an organisational task” (p. 2). In the case of the indirect use of the innovation, the employees may appoint surrogates to operate the innovation for them, as a form of avoidance from using the innovation directly.

Wilkin and Davern (2012) developed the taxonomy of system usage to identify several types of usage of a system by the users (See Table 2.4).

Table 2.4 Taxonomy of System Usage (Wilkin & Davern, 2012, p. 13)

| Type of System Usage | Faithfulness to Spirit | Performance Outcomes   |
|----------------------|------------------------|--|
| Normal Usage         | Faithful               | Outcomes are consistent with system design and data quality is unaffected.   |
| System Domination    | Faithful               | Outcomes are consistent with system design but usage can be ineffective (which users may or may not perceive).   |
| Circumvention        | Unfaithful             | Workarounds arise due to poor functionality or perception of this due to a lack of knowledge. Outcomes are inconsistent with system design and have negative effects on others as usage is individualized or inconsistent. Data quality is likely to be affected due to inconsistency. |
| User Innovation      | Unfaithful             | Innovation occurs in response to poor functionality. Outcomes are inconsistent with system design but are often agreed upon to meet common goals and so are seen as positive. Data quality is likely to be affected due to inconsistency.  |

Based on the taxonomy, the usage of a system is assessed based on its faithfulness to the objective spirit of the system as intended by the developers (Wilkin & Davern, 2012). Faithful usage of the system leads to normal usage and system domination, while unfaithful usage leads to circumvention and user innovation.

Wilkin and Davern (2012) elaborated the taxonomy by introducing the concept of ‘disconnect’, which are “inconsistencies between the objective spirit and a user’s subjective conception of the spirit with respect to desired operational outputs and/or a manager’s operational or strategic goals” (Wilkin & Davern, 2012). This resulted in the presence-perception-usage model (See Figure 2.2).

|               |                   | Presence               | Perception              | Usage                                     |
|---------------|-------------------|------------------------|-------------------------|---|
| Type of Usage | Normal Usage      | No disconnect          | No disconnect perceived | Usage is consistent with objective spirit |
|               | System Domination | - by Inflexibility*    | Disconnect present      | No disconnect perceived                   |
|               |                   | - by Inaction*         | Disconnect present      | Disconnect perceived                      |
|               | Circumvention     | - by False Perception* | Disconnect not present  | Disconnect perceived                      |
|               |                   | - by Misperception*    | Disconnect present      | Nature of disconnect misperceived         |
|               |                   | - by Misaction*        | Disconnect present      | Disconnect perceived                      |
|               | User Innovation   | - by Consent           | Disconnect present      | Disconnect perceived                      |

Figure 2.2 Presence-Perception-Usage Model (Wilkin &amp; Davern, 2012, p. 14)

In the case of ‘system domination’, a problem or an inconsistency (i.e., disconnect) is present in the functions of the system. The employees could either be unaware of the problem (i.e., inflexibility) or perceive the problem, but are incapable of fixing it (i.e., inaction). In the case of circumvention, the employees can falsely perceive (circumvention by false perception) that a problem existed, or misperceive (circumvention by misperception) a problem in the functions of the system and then introduce unnecessary or inappropriate workarounds (Wilkin & Davern, 2012).

Another case of circumvention may involve the employees perceiving the problem, but then introduce workarounds that bring negative effect for the organisation (circumvention by misaction). In the case of ‘user innovation by consent’, a problem was found in the function of the system and a positive workaround was demonstrated by the employees, which become a new and accepted way of performing a task (Wilkin & Davern, 2012).

This section has described the topics related to the assimilation of innovations within an organisation. A review of the past theories of innovation studies is presented in the next section.

## 2.4 Past Theories on Innovation Studies

Past theories have been established from across various disciplines to accommodate future studies within the broad area of innovation studies and to contribute to the greater body of knowledge. A thorough review of these theories and models is beyond the scope of this research. However, an outline of several prominent theories related to the adoption and implementation of innovations is provided.

Among the theories outlined in this section are the Diffusion of Innovation (DoI) theory (Rogers, 1962, 2003), the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), the Theory of Planned Behaviour (TPB) (Ajzen, 1985, 1991), and the Technology Acceptance Model (TAM) (Davis, 1986, 1989; Davis et al., 1989). Several of the more recent theories are also presented, including TAM2 (Venkatesh & Davis, 2000), the hybrid framework for innovation adoption and implementation (Gallivan, 2001b), TAM3 (Venkatesh & Bala, 2008), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), and UTAUT2 (Venkatesh et al., 2012).

### **2.4.1 Outline of the Theories**

#### **The Diffusion of Innovation (DoI) Theory**

The Diffusion of Innovation theory (Rogers, 1962, 2003) appeared in 1962 from the area of sociology. The classical diffusion model evolved out of early investigations into the adoption of innovations by autonomous individuals. After more than five decades, DOI has evolved to accommodate complex organisational analyses where the adoption of innovations is commonly decided at the organisational level rather than at the individual level.

Reflecting on past innovation diffusion studies within organisations, Rogers (2003) criticised the issues of validity and reliability for studies which gather data by only relying on key individuals within an organisation (e.g. the CEO, the CIO, or senior management) to study the diffusion of innovations that are adopted by many employees within the organisation. While it is important to interview the key individuals as the decision makers and initial adopters of the innovation, obtaining the perspectives of the employees, as the users of the innovations, may reveal a more realistic description of the phenomenon (Gallivan, 2001b; Rogers, 2003).

Another criticism is addressed towards past studies that claimed to have investigated the determinants of innovation diffusion, but in fact only explored the initial decision to adopt an innovation, rather than investigating its implementation (Rogers, 2003). In this particular case, innovation adoptions are sometimes treated as merely an initiative by the managers to procure an innovation, rather than an actual implementation process (Gallivan, 2001b).

#### **The Theory of Reasoned Action (TRA)**

The Theory of Reasoned Action by (Fishbein & Ajzen, 1975) is among the classical theories established in the area of social psychology. Fishbein and Ajzen (1975) posited that human behavioural intentions are determined by two main constructs: attitude and subjective norms. The actual behaviours and actions performed by people are preceded by the behavioural

intentions. TRA was specifically developed to understand the behaviour of an individual in a voluntary setting.

### **The Theory of Planned Behaviour (TPB)**

The Theory of Planned Behaviour (Ajzen, 1985, 1991) was developed to improve the predictive power of TRA by adding the construct of perceived behavioural control on top of the attitude and subjective norms constructs. The perceived behavioural control adds more predictive power towards the actual behavioural intention by examining whether an individual considers performing a certain behaviour as easy or difficult.

### **The Technology Acceptance Model (TAM)**

The Technology Acceptance Model (Davis, 1986, 1989; Davis et al., 1989), established in the area of information systems, is a further adaptation of TRA. The parsimony of TAM only incorporated two scales of measurement for predicting the user's acceptance of information technology, namely perceived usefulness and perceived ease of use.

### **The Technology Acceptance Model 2 (TAM2)**

In 2000, TAM2 (Venkatesh & Davis, 2000) was proposed; this takes account of the social consequences of an adoption of innovations by organisations and incorporates the social influence process (subjective norms, voluntariness, and image) and the cognitive instrumental process (job relevance, output quality, and result demonstrability) as determinants of perceived usefulness into the model. Perceived usefulness and perceived ease of use remain as the two main constructs, and experience and voluntariness are incorporated as the moderating variables to support these constructs in the model.

### **The Technology Acceptance Model 3 (TAM3)**

In 2008, TAM3 (Venkatesh & Bala, 2008) was proposed as an integrated model of technology acceptance that extends TAM2 by incorporating the determinants of perceived ease of use (Venkatesh, 2000), namely the anchors for individuals' general belief (i.e., computer self-efficacy, computer playfulness, computer anxiety, and perceptions of external control) and system-related adjustments (i.e., perceived enjoyment and objective usability).

### **The Unified Theory of Acceptance and Use of Technology (UTAUT)**

The Unified Theory of Acceptance and Use of Technology, as formulated by Venkatesh et al. (2003), integrates eight prominent information technology acceptance models, including the previously discussed DOI, TRA, and TAM. With the goal of achieving a unified view of user

acceptance, UTAUT integrates elements from across the eight models and results in four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions.

### **The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)**

In 2012, UTAUT2 (Venkatesh et al., 2012) was proposed to specifically address the acceptance and use of a technology in a consumer use context. Due to the voluntary nature of technology in the consumer context, the voluntariness of use, as one of the moderating constructs in UTAUT, was abandoned and three relevant constructs were incorporated, namely hedonic motivation, price value, and habit.

Despite the comprehensive research conducted, past theories and models on the adoption and acceptance of innovations within organisations have disregarded the scenario of when the adoption of the innovation is decided at an organisational level, rather than at an individual level (Gallivan, 2001b). A framework that accommodates organisational and individual levels of analysis, developed by Gallivan (2001b), is described in the next section.

### **The Hybrid Framework for Innovation Adoption and Implementation**

Gallivan's (2001b) framework focused specifically on the organisational adoption and implementation of innovations. He described his framework as a hybrid as it "combines some constructs from traditional individual adoption models with features of process and stage research models of organisational-level implementation" (Gallivan, 2001b, p. 78). In particular, the organisational level implementation was adapted from the IT implementation process (Cooper & Zmud, 1990), which comprises of initiation, adoption, adaptation, acceptance, routinisation, and infusion stages.

Upon developing the framework, Gallivan (2001b) applied it to investigate the implementation of a client/server development in the IS (Information System) division of four large insurance firms. He further advocated the use of the framework as a theoretical lens for future research to analyse the organisational adoption and implementation of innovations in different contexts. The framework is as follows:



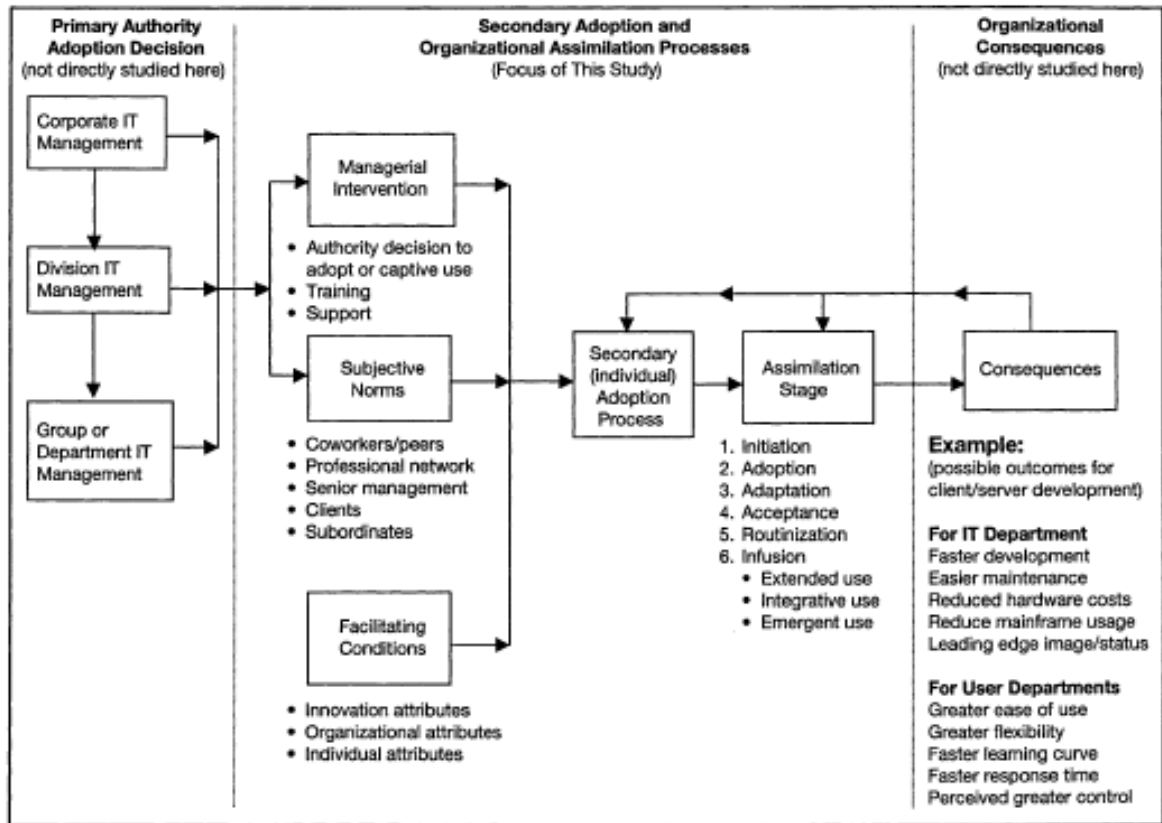


Figure 2.3 Framework for Innovation Adoption and Implementation (Gallivan, 2001b, p. 60)

The framework follows the scenario of contingent authority innovation-decisions, in which innovation adoption is regarded as a two-stage process (Leonard-Barton & Deschamps, 1988; Zaltman et al., 1973), consisting of a primary adoption by the managers of an organisation, followed by a secondary adoption by the employees (Frambach & Schillewaert, 2002; Gallivan, 2001b).

Following the objectives and intentions for change, the managers decides to seek an available technological innovation before making the primary adoption decision (Gallivan, 2001b). Once the primary adoption decision is made, a mandate is then given for the employees to adopt the innovation in a secondary innovation adoption process. Aside from the mandate given by the managers to adopt the innovation, other factors will influence the secondary adoption process by the employees.

The vertical dotted lines separate the framework into three segments; namely primary adoption decision; secondary adoption and organisational assimilation processes; and outcomes (Gallivan, 2001b). The first segment describes the primary adoption decision by the managers, either at the corporate, division or department level of the organisation. The second segment investigates the secondary adoption and the assimilation processes after the primary

innovation adoption decision is made. Finally, the last segment of the framework focuses on the consequences of the implementation.

Following the primary adoption by management, several factors will then emerge to influence the perspectives of the employees during the secondary adoption process. These factors are termed 'the mediating factors', which refer to "the factors that mediate between primary and secondary adoption" (Gallivan, 2001b, p. 61). The 'mediating factors' comprised three major constructs: namely managerial interventions, subjective norms, and facilitating conditions.

Managerial interventions describe "the actions taken and resources made available by managers to expedite secondary adoption, including mandating usage" (Gallivan, 2001b, p. 61). The managerial intervention may comprise of training, support, and resources made available by the managers to accelerate the secondary adoption by the employees.

The subjective norms construct describes "individuals' belief about the expectation of relevant others regarding their own secondary adoption behaviour" (Gallivan, 2001b, p. 61). The subjective norms construct originates from the Theory of Reasoned Action (Fishbein & Ajzen, 1975). The facilitating conditions construct is "a broad category that captures other factors that can make implementation more- or less-likely to occur" (Gallivan, 2001b, p. 61) and comprises of innovation, organisational and individual attributes.

The secondary adoption process refers to the subsequent adoption of the innovation by the employees. However, in a scenario of contingent authority innovation-decision, the issue is "not whether employees adopt the innovation (since this is assumed), but rather when and how they adopt it -- through what experiences, with what obstacles encountered, and how these events influence organizational assimilation and outcomes" (Gallivan, 2001b, p. 62).

The organisational assimilation process describes "how deeply the innovation penetrates the adoption unit" (Gallivan, 2001b, p. 62). This process also refers to the post-adoption stages following the secondary adoption by the employees.

### **2.4.2 Summary of the Theories**

Among other theories and models, TAM is "generally referred to as the most influential and commonly employed theory in information systems" (Benbasat & Barki, 2007). Quantitative studies utilising theories such as TAM are abundant as it has been shown to predict about 40% of the variance in the individuals' intention to use information technology (Venkatesh & Bala, 2008). However, the legacy of TAM as the dominant theory for many decades, has not been free of criticism (Bagozzi, 2007; Benbasat & Barki, 2007; Chuttur, 2009; Lee et al., 2003).

Among the criticisms is that TAM has only focused on an individual's decision to accept or reject a technology and very much disregarded any decision-making aspects that involved group, social, and cultural aspects (Bagozzi, 2007). Among the hindrances of using quantitative-based theories such as TAM and UTAUT are the difficulties in providing the managers with actionable advice based on the result of the research (Benbasat & Barki, 2007; Brown et al., 2002; Lee et al., 2003).

With the passing of time, TAM has come to accommodate a more complex organisational analysis by taking account of social influences and facilitating conditions constructs as determinants in predicting individual intentions. However, it is believed that the addition of these constructs has led these theories and models to return 'full circle' to their predecessors (i.e. TRA and TPB), as the constructs of social influence and facilitating conditions overlap with past constructs, such as the subjective norms and perceived behavioural intentions (Benbasat & Barki, 2007).

In the study of the organisational adoption and implementation of innovations, recent studies suggested that future research should explore the importance of managerial interventions (Gallivan, 2001b; Venkatesh & Bala, 2008). Within the context of an organisation, a useful contribution can be made by informing the managers regarding the various interventions and other influences that can accelerate the adoption by the employees and assist the implementation of the innovation. Past studies focusing on the key role of managerial interventions were limited, although they have the potential to provide a better understanding of the phenomenon and assist managers in taking action (Venkatesh & Bala, 2008; Venkatesh et al., 2007).

It has also been advocated that a deeper understanding of organisational adoption and implementation can be achieved by examining the multilevel perspective (individual, group, and organisational levels) of the actors involved (Burton-Jones & Gallivan, 2007). Burton-Jones and Gallivan (2007) further revealed the three benefits of utilising a multilevel perspective in innovation studies, which are: "(1) avoiding errors of inclusion and omission in measurements, (2) forging new research directions in studies of the antecedents and consequences of system usage, and (3) deepening insights into the IT artefact by conceptualizing systems in new ways" (p. 674).

Referring to the initial motivation for this research, a practical contribution was expected to be made by way of informing the managers with regard to the adoption and implementation of innovations in an organisation. An investigation of the initial and subsequent adoption of

innovations is needed and requires an adaptable framework to explore the phenomenon by accommodating individual and organisational levels of analysis. The preliminary conceptual framework that was used in this thesis is presented in the following section.

### **2.4.3 Preliminary Conceptual Framework**

A preliminary conceptual framework based on previous studies is an important part of case study research (Shanks & Nargiza, 2013; Yin, 2014). Such a framework “creates a sensible theoretical basis to inform the topics and approach of the early empirical work” (Walsham, 1995: p. 76).

Based on the analysis of the past theories on innovation studies, the hybrid framework for the organisational adoption and implementation of innovations established by Gallivan (2001b) was used as a theoretical lens to explore the case in this research. The qualitative nature of the framework has a degree of flexibility to anticipate novel and potential empirical findings with regard to the managerial interventions as well as other factors that may influence the adoption and implementation of innovations by the employees.

However, applying the framework as provided by Gallivan has been found to be challenging, as the specific arrangement of when the constructs in the mediating factors (i.e., managerial interventions, subjective norms, and facilitating conditions) begin to influence the adoption and implementation was not specifically mentioned. In addition, although the case of the adoption of an innovation in this research was expected to follow the scenario of contingent authority innovation-decisions, the nature of the innovation and the context of the case are different.

In terms of the context, Gallivan focused his investigation on insurance firms, while this research focuses on a university. In terms of the innovation, Gallivan’s research investigated the adoption of a client/server development software that was purchased commercially, while this research focuses on the adoption of an academic information system that was developed in-house. Such a distinction demanded framework modifications by the researcher to anticipate the different types of interventions and the in-house development of the innovation.

The classification of pre- and post-implementation phases and new concepts of managerial interventions in Venkatesh and Bala’s (2008) ‘research agenda for interventions’ was an advancement of the literature and thus considered useful to address the modification of the framework. As Venkatesh and Bala’s (2008) ‘research agenda of interventions’ was also inspired by the IT implementation process (Cooper and Zmud, 1990), it was considered as

compatible to be incorporated in the modified framework. The modified framework for organisational adoption and implementation of innovations is illustrated in Figure 2.4.

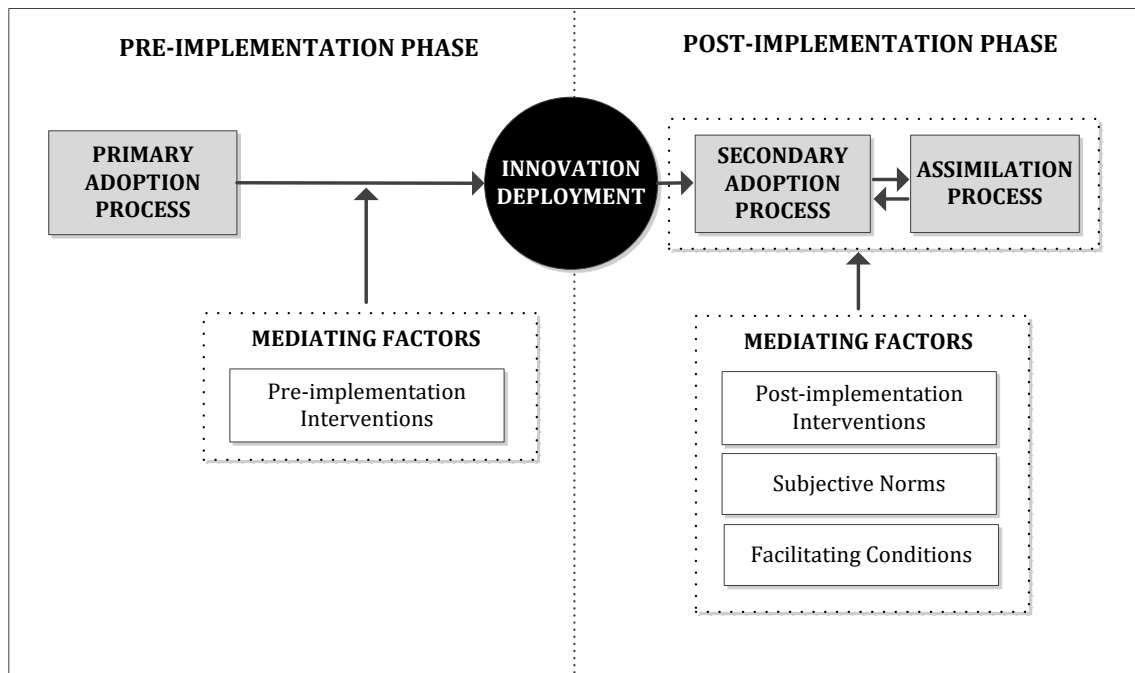


Figure 2.4 Modified Framework for Innovation Adoption and Implementation  
(Based on Gallivan, 2001b; Venkatesh & Bala, 2008)

In this modified framework, the implementation of an innovation consists of two phases: pre-implementation and post-implementation (Venkatesh & Bala, 2008). Three main processes are described during the implementation of the innovation: primary adoption process, secondary adoption process, and assimilation process.

The pre-implementation phase explores the decisions and actions made by the managers during the initial implementation of the innovation. This phase includes the stages of initiation, organisational adoption, and adaptation that occurs prior to and during the deployment of the innovation (Venkatesh & Bala, 2008). This phase involves the primary adoption process and the pre-implementation interventions prior to deployment of the innovation.

The primary adoption process describes the initial decision made by the managers as the primary adopters of the innovation. To mediate between the primary adoption and the secondary adoption, factors such as the pre-implementation interventions are deliberately made by the managers prior to the deployment of the innovation, to support and to accelerate its secondary adoption by the employees.

The post-implementation phase investigates the perspectives and experience of the employees as the secondary adopters of the innovation. This phase includes the stages of user acceptance,

routinisation, and infusion that follow the deployment of the innovation (Venkatesh & Bala, 2008). In the framework, this phase is divided into the secondary adoption process and the assimilation process. This phase also covers an analysis of other mediating factors (i.e., post-implementation interventions, subjective norms, and facilitating conditions) that emerged following the deployment of the innovation and may significantly influence the secondary adoption and the assimilation processes.

The secondary adoption process is relevant to the user acceptance stage, which indicates that the employees started to play their role as secondary adopters and users of the innovation. The assimilation process reflects the use of the innovation by the employees as it assimilates into the organisation through the following stages of routinisation and infusion.

To analyse the assimilation process, this research used the taxonomy of system usage (Wilkin & Davern, 2012) to investigate the relationship and the consistency between the actual usage by the employees and the usage as intended by system developers. The taxonomy was slightly modified by the researcher to anticipate findings with regard to the indirect use of innovations by employees. This was done by incorporating the indirect method of use (Burton-Jones & Straub Jr, 2006; Tong et al., 2008) and providing descriptions for each variation of usage. This is illustrated in Table 2.5.

Table 2.5 Modified Taxonomy of System Usage (Based on Wilkin &amp; Davern, 2012)

| Method of Usage | Usage Type        |                     | Description   |
|-----------------|-------------------|---------------------|---|
| Direct Use      | Normal Usage      |                     | Outcomes are desirable and usage is anticipated based on the design of the innovation.  |
|                 | System Domination | By Inflexibility    | A problem with the innovation results in ineffective usage, however the outcomes are anticipated based on the design of the innovation. Users do not perceive the problem and therefore no action is taken.                                       |
|                 |                   | By Inaction         | A problem with the innovation results in ineffective usage, however the outcomes are anticipated based on the design of the innovation. Users perceive the problem but are incapable of providing a remedy.                                       |
|                 | Circumvention     | By False Perception | Users falsely perceive that a problem exist in the innovation and so introduce unnecessary workarounds that are unanticipated based on the design of the innovation.  |
|                 |                   | By Misperception    | A problem in the innovation results in undesirable outcomes based on the design of the innovation. Users misperceive the problem and so introduce misguided workarounds.  |
|                 |                   | By Misaction        | A problem in the innovation results in undesirable outcomes based on the design of the innovation. Users perceive the problem but introduce workarounds that result in negative effects on the operational and/or managerial requirements         |
|                 | User Innovation   | By Consent          | A problem in the innovation results in undesirable outcomes based on the design of the innovation. Users perceive the problem and so introduce innovative workarounds that have a positive effect and become an accepted way to perform the task. |
| Indirect Use    | Use Delegation    |                     | Users decide to delegate the use of the innovation to surrogates. Usage is unanticipated and there may be risks concerning the security of the innovation or the quality of the output.   |

\* The indirect method of use (Burton-Jones & Straub Jr, 2006; Tong et al., 2008) was added to the taxonomy of system use by the researcher

Based on the modified taxonomy, the usage method of an innovation is classified into direct use and indirect use (Burton-Jones & Straub Jr, 2006; Tong et al., 2008). The direct use of an innovation can further be classified into normal usage, system domination (by inflexibility and by inaction), circumvention (by false perception, by misperception, and by misaction), and user innovation (by consent) (Wilkin & Davern, 2012). The indirect use will lead to the use

delegation of the innovation to surrogates. The description for each variation of usage is described in the taxonomy.

Finally, by incorporating key elements from the individual and organisational levels of analysis, this research examined the innovation adoption and implementation using a multilevel perspective of the actors involved (Burton-Jones & Gallivan, 2007). By so doing, the researcher expects to avoid any level bias, as well as providing a deeper understanding and a richer explanation that may inform the managers. It is expected that the managers will be able to make informed decisions regarding any future introduction and implementation of innovations, using the results of this research.

## **2.5 Conclusion**

This chapter has provided a literature review of the organisational adoption and implementation of innovations. It has a specific focus aimed at the literature pertaining to the scenario of contingent authority innovation-decisions. To elaborate such a scenario of mandated adoption, different concepts and terms have been presented.

The theories used in past innovation studies have also been outlined. A preliminary conceptual framework was presented as a theoretical lens to explore the case in this study. Building upon the framework, a better understanding of the adoption and implementation of innovations within an organisation is expected to be achieved.



## **3 Research Methodology**

### **3.1 Introduction**

This chapter discusses the methodology used in this research. The chapter starts by outlining the underlying philosophical assumptions that guided the researcher during the conduct of the study. Based on a chosen paradigm, the relevant methods used in this project are described, including their intended purpose and the justification behind their use.

In the next section, the research design is presented as it highlights the overview of the case study, the role of the researcher, the ethical issues, and the preliminary framework used in the study. This section is followed by a description of the techniques employed for the data collection and data analysis.

### **3.2 Research Methodology**

In this research, methodology is understood as “an overall logic of inquiry involving philosophical assumptions behind an inquiry, the strategy of conducting research such as research design and selection and adoption of research methods and techniques as well as arguments for knowledge construction and justification” (Cecez-Kecmanovic & Kennan, 2013: p. 116). As with the outset of any research, it is essential to outline the philosophical assumption as this determines the views of the researcher and the relationship between the paradigm, method, and techniques that are used in the research (Cecez-Kecmanovic & Kennan, 2013).

Paradigm is taken as “the broadest unit of consensus within a science and serves to differentiate one scientific community (or sub community) from another” (Ritzer, 1975: p. 157). For a researcher conducting a project, a paradigm serves as a “basic set of beliefs that guides action” (Guba, 1990: p. 17). It is the underlying philosophical assumptions that determine how the researcher construes reality, identifies the methods to answer inquiries, makes claims and provides logical reasoning, and creates knowledge from the study (Guba & Lincoln, 1994; Williamson & Johanson, 2013).

Constructivism, one of the paradigms under the ‘umbrella term’ of interpretivism, is further specified as the philosophical grounding for this particular study (Williamson & Johanson,

2013). The researcher is regarded as a social constructionist who considers the collective meanings shared by the social actors as a social construction resulting from intersubjectivity rather than objectivity (Myers, 2013; Orlikowski & Baroudi, 1991; Walsham, 2006; Williamson & Johanson, 2013).

Although recognising the influence of norms and values within the beliefs and actions of the social actors, the researcher does not take any particular stance as the research purpose is solely “to understand social phenomena, social actions, processes and institutions, as subjectively meaningful and socially constructed” (Cecez-Kecmanovic, 2011a: p.442). In the field of information systems, the aim of such an interpretive study is “producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context” (Walsham, 1993).

Regarding its constituents, a paradigm is illustrated as a “net that contains the researcher’s epistemological, ontological, and methodological premises” (Denzin & Lincoln, 2011: p. 13). The ontological belief of this research is that there are multiple realities which are socially constructed into multiple meanings based on the perspectives of the social actors involved (Denzin & Lincoln, 2011; Guba, 1990; Meyer, 2000; Weber, 2004; Williamson & Johanson, 2013). Epistemologically, the knowledge in this study was created based on the investigation of the perspective of these social actors and their interaction with the researcher (Guba, 1990; Guba & Lincoln, 1994).

The strategy for conducting this research, including the choice of the method, the research design, and the techniques adopted is described in the next section.

### **3.3 Research Method**

The research method is defined as “the specific processes and procedures for conducting empirical research and collecting and processing data” (Cecez-Kecmanovic, 2011b: p. 2). In particular, this study utilised case study research as its preferred method. The following is a description of case study research.

A case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organisations). The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used. (Benbasat et al., 1987, p. 370)

Case study research is considered to be appropriate for investigating the implementation of complex innovations, such as information systems, within the context of organisations (Roger et al., 2013; Shanks & Nargiza, 2013). It is also “well suited to understanding the interactions between information technology (IT)-related innovations and organisational contexts” (Darke et al., 1998), as the innovations are naturally embedded in the social context in which they are implemented (Orlikowski & Baroudi, 1991). The benefits of using a case study is that it allows the researcher to retain a holistic perspective (Yin, 2014), understand the dynamics (Eisenhardt, 1989), and comprehend the complexity of the processes taking place in their natural setting (Benbasat et al., 1987).

The single case design was specifically chosen because it accommodates the focus of the breadth and depth of the case (Yin, 2014). It obtains a better and richer understanding (Stake, 1995) and lesson-learned information from the experience of the actors and the organisation (Creswell, 2013), as well as addressing the time limitations of the project. Single case studies value particularity rather than generalisability as perception and meanings emerge and translate into themes and concepts based on the context (Creswell, 2014).

Trustworthiness can be established by way of assessing the naturalistic inquiry based on aspects of its credibility, transferability, dependability, and confirmability (Guba, 1981; Krefting, 1991). In this research, trustworthiness was established by triangulating from various data sources using multiple techniques (i.e. interviews, documentation, and physical artefacts) and by integrating the different perspectives and experience of the participants in order to justify the interpretation (Guba, 1981; Krefting, 1991).

Data saturation was achieved by way of interviewing the participants and reinterviewing them whenever necessary up to the point where nothing new was disclosed (Bowen, 2008). By way of combining trustworthiness and saturation while conducting the research, this research has more confidence in presenting its findings (Bowen, 2008).

### **3.4 Research Design**

The research design elaborates the logic that links the research questions, the preliminary conceptual framework, and the unit of analysis with the kinds of data to be collected (Denzin & Lincoln, 2011; Yin, 2014). The purpose of the research design is to assist the researcher in retrieving appropriate and accurate evidence (Yin, 2014). Subsequently, the design will lead the researcher to devise a strategy for interpreting and analysing the findings based on the collected data (Yin, 2014).

The research design outlining this study is illustrated in Figure 3.1.

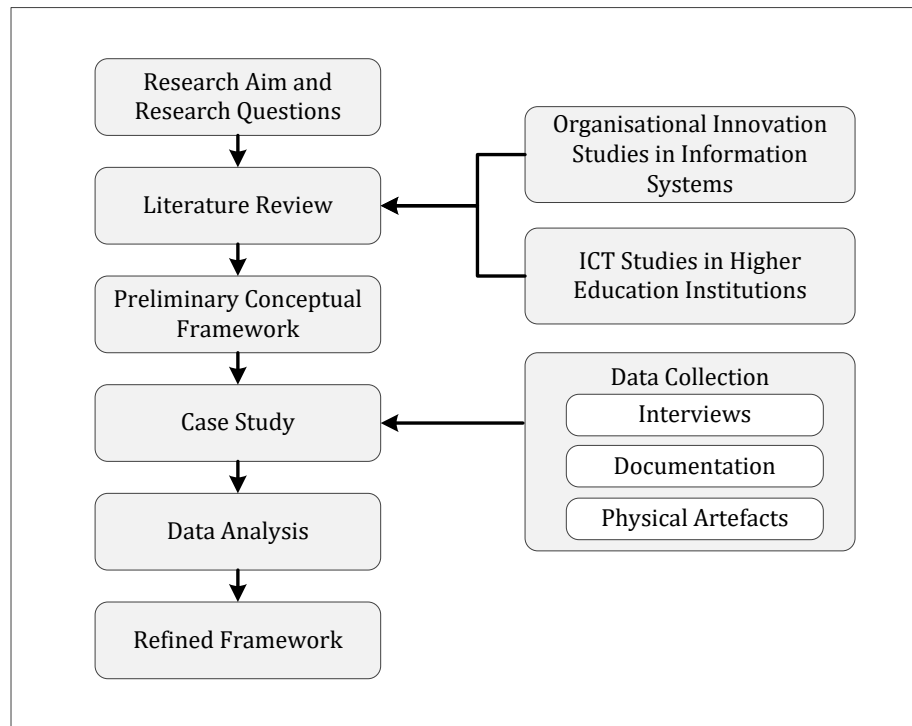


Figure 3.1 Research Design

The aim and questions of the research drive the research theme to focus on the literature concerning organisational innovation studies of information systems and ICT studies in higher education institutions. A mixed approach literature review was used in this research as the researcher had already decided the research theme prior to commencing the review with the purpose of gaining a thorough understanding of the literature (Bandara et al., 2015; Boell & Cecez-Kecmanovic, 2015). The researcher extracted the relevant literature primarily from AISEL (Association for Information Systems electronic Library), SCOPUS, ProQuest, and ISI (Institute for Scientific Information) Web of Knowledge databases and obtained context-related information from UNESCO, ADB (Asian Development Bank), World Bank, and IMF (International Monetary Fund) databases.

The researcher first focused the literature search on “the senior scholars’ basket of journals”, particularly from the MIS Quarterly, Information Systems Research, and Journal of MIS to get an understanding of the current issues with regard to the theme being studied. Other literature was also obtained from the proceedings of AIS conferences (i.e., ICIS, ACIS, PACIS, ECIS, and AMCIS) and from the AIS special interest groups such as DIGIT (Diffusion Interest Group in Information Technology), SIGEd (Special Interest Group on Education), and GlobDev (Global Development). In preparing the literature for analysis, EndNote was used to organise these

references and Microsoft Excel was then used to lay out, compare, and contrast the relevant literature based on the categorisation from EndNote.

Other important aspects of the research design, including the overview of the case study, the role of the researcher, and the ethical issues are discussed in the next section.

### **3.4.1 Case Study Overview**

This research investigated the case of the organisational adoption and implementation of an Academic Information System (AIS) by an Indonesian University located in the Province of East Java. An AIS was chosen because it was considered to be a complex innovation and its adoption process by the academics was contingent upon its prior adoption by the University. The AIS was first introduced to the academics in 2012, allowing sufficient time for the assimilation to take place and for the research to assess its uptake. Further details regarding the landscape of the Indonesian Higher Education and context of the case study are presented in Chapter 4.

Defining the unit of analysis is a significant step to take prior to conducting the case study, especially when examining a single case (Yin, 2015). As this is an organisational study, the unit of analysis was the Indonesian University, which had adopted and implemented the AIS for their academics.

The case of the University was explored using a multilevel perspective that integrated the perspectives and experience from the individual level and the organisational level (Burton-Jones & Gallivan, 2007). Interviews were conducted with the executives and the administrative staff at the university level and the academics at the individual level. The purposes of this approach were to avoid single-level bias by capturing in-depth perspectives from all the participants and to open up opportunities for theory development (Burton-Jones & Gallivan, 2007). By accommodating the organisational level and not solely focusing on the individual level, the study remains an organisational study and not a study of individual employees (Yin, 2015).

### **3.4.2 Researcher Role**

As the researcher is the sole key instrument for gathering, examining, and reporting the empirical evidence throughout the study, it is therefore important to clarify his role and background (Creswell, 2013). This is done by explicitly indicating his personal, cultural, and historical background as well as his experience, as it has the potential to inform and shape the interpretation of the study (Creswell, 2014; Crotty, 1998).

In general, the role of a researcher in a study can be divided into two categories: the outside observer and the involved researcher (insider researcher) (Hewitt-Taylor, 2002; Unluer, 2012; Walsham, 1995). In this study, the researcher was an insider as he was recruited as a staff member at the ICT Centre and was to take part in a major ICT development in the University that began in 2008.

Among the unique advantages of an insider researcher are speaking the same language as the participants, understanding the local values, knowledge and taboos, knowing the formal and informal power structures, and the convenience of being known when collecting data (Unluer, 2012). His role as a staff member at the ICT Centre has given the researcher the advantages of building trust with the participants of the study and having access to information and resources during the data collection process. The central role of the ICT Centre has allowed him to experience, follow, and tap into significant events during the development of ICT at the University.

Despite the advantages of being an insider researcher, it is also important for the researcher to anticipate its disadvantages, such as the role duality, overlooking certain routine behaviour, making assumptions, not seeking clarification, and not seeing all the dimensions of the bigger picture (Unluer, 2012). The researcher may assume he knows the participants' views and vice versa, the participants may assume that he already knows what they know (Unluer, 2012).

Additionally, the researcher is a native Indonesian who has lived in East Java for most of his life. His local identity is beneficial for understanding the Javanese culture, in which most of the people being interviewed are enmeshed. His background also assisted him in conducting the interviews, which were done in the Indonesian language. Aside from a better understanding of difficult Indonesian terms, the researcher could comprehend local Javanese terms that frequently emerged and could not be translated easily into English, but had the potential to add a richer insight to the case.

### **3.4.3 Ethical Issues**

This research was carried out with full consideration of the ethical issues as they are vital in the practice of information systems and are proven to be relevant during the conduct of research (Mingers & Walsham, 2010). Following a verbal consent from the Vice-Rector of the University, a permission letter to conduct the fieldwork was obtained. As a follow-up, an ethics application and the data collection protocol were submitted to Monash University Human

Research Ethics Committee (MUHREC) and a human ethics certificate of approval was obtained in October 2015 (See Appendix A).

Conforming to the proper conduct of fieldwork, the researcher took measures to obtain the consent of and develop an atmosphere of mutual trust with the participants (Walsham, 2006). With respect to the participants' recruitment, the researcher invited each of the participants to voluntarily take part in the research. Upon indicating their willingness to join as participants, an explanatory statement of the project was then provided for each of them (See Appendices C1, C2, and C3).

The explanatory statement explicitly stated the aim of the research, the data collection techniques, the reason why the participant was invited to participate, the possible benefits and risks, how to provide consent, and how to withdraw from the project at a later time. A local contact person was also appointed to accommodate any concerns or complaints regarding the conduct of the research.

Upon gaining approval to take part in the project, each participant was then provided with a consent form detailing the techniques for data collection, along with the name and approval signature of the participant. The confidentiality of the participants was strictly protected so as not to disclose their identity when reporting any results (Corbin & Strauss, 2015; Walsham, 2006). This effort was amplified by the non-disclosure of the identity of the faculties and the University, as well as the use of unique coded identifiers to refer to the academics and the administrative staff.

The data collected from this research is also kept in a confidential and secure manner, using the facilities provided by Monash University for a period of five years after which it will be destroyed. The data collected during the field study in the designated location could only be accessed by the researcher and was kept secure in an encrypted external hard drive for convenience and in a cloud facility equipped with a password for the purpose of data backup.

The next section describes the data collection techniques and then is followed by the data analysis strategy for this research.

### **3.5 Data Collection**

In case study research, the researcher needs to get up close to the case being studied by undertaking fieldwork (Yin, 2014) and collecting data by interacting face-to-face with the participants as they experience the issues under study (Creswell, 2013; Eisenhardt & Graebner,

2007). The researcher therefore engaged in fieldwork at the designated location to gather primary and secondary data during November and December 2015.

With regard to the data collection, it is highly desirable for a case study to rely on multiple techniques to acquire sources of evidence with data needing to converge in triangulating fashion (Yin, 2014). A description of the techniques used in this research is presented in this section.

### 3.5.1 Semi-structured Interviews

This study utilised a semi-structured interview as its main data collection technique. Interview is known to be the best available technique for accessing the interpretations, views and aspirations of the participants, and the events that have occurred or are currently taking place (Myers & Newman, 2007; Walsham, 1995).

A general overview of the interviewed participants is presented in Table 3.1 Further detailed demographic information of the participants is presented in Chapters 5 and 6.

Table 3.1 Interviewed Participants at the University

|       |            | Participant |            |                        |              | Total |
|-------|------------|-------------|------------|------------------------|--------------|-------|
|       |            | Academics   | Executives | Administrative Staff   |              |       |
|       |            |             |            | Head of Administration | Staff Member |       |
| Level | University | -           | 5          | 3                      | 1            | 9     |
|       | Faculty A  | 3           | -          | 1                      | -            | 4     |
|       | Faculty B  | 6           | -          | 1                      | 1            | 8     |
|       | Faculty C  | 4           | -          | -                      | 2            | 6     |
|       | Faculty D  | 6           | -          | -                      | 1            | 7     |
| Total |            | 19          | 5          | 5                      | 5            | 34    |

The interviews were carried out with 34 stakeholders of the University, who were involved in the adoption and implementation of the AIS by the University. These stakeholders were divided into three categories: the university academics (19 participants), the university executives (five participants), and the administrative staff (ten participants). Each of the categories had different roles and therefore was given a different set of questions during their



interviews. The explanatory statements and the interview guides for the academics, executives, and administrative staff are provided in Appendix C1, C2, and C3 of this thesis, respectively.

There were eight faculties at the University during the research period. However, the research concentrated on only four of them: Faculties A, B, C, and D. Faculties A and B represented the social disciplines, while Faculties C and D represented the technical disciplines. The focus of the research was more towards the individual perspective and experience of the academics rather than the characteristics of the faculties.

The semi-structured interviews lasted approximately 30-60 minutes each and were all audio-recorded to guarantee preciseness. The transcription of the interviews took up a considerable amount of research time and resulted in 224 pages of interview manuscript with 125 pages retrieved from the interviews with the academics, 30 pages from the interviews with the executives, and 69 pages from the interviews with the administrative staff. The researcher personally transcribed all of the recordings to ensure their accuracy based on the given situation and context.

The interviews were mainly conducted using the Indonesian language. However, the replies from the interviewees were sometimes uttered in the local Javanese language. The exact translation of key terms (e.g., *tridharma*, *sosialisasi*, and *pendampingan*) are included based on their true meanings and are explained in the footnotes to clarify the terminology into English.

### 3.5.2 Documentation

The main purpose of collecting documentary evidence is to corroborate and augment empirical findings from other data sources (Yin, 2014). Documentation is useful as it can provide specific and broad information regarding the phenomenon and can be useful in verifying names, dates, and terms that were mentioned during the interviews (Yin, 2014).

The documentary evidence collected during the fieldwork is listed in Table 3.2.

Table 3.2 List of the Documentary Evidence

| No | Types of Documents              | Description  |
|----|---------------------------------|--|
| 1  | Online documents                | Online articles and posts taken from the University's official website and two blogs during the period of 2008-2015. |
| 2  | Lustrum report book (2009-2014) | A lustrum (five-year period) report book from the university rector during the period of 2009-2014                   |

| No | Types of Documents   | Description   |
|----|--|---|
| 3  | University reflection book (2006-2014)   | A reflection book containing a summary of the university development during the period of 2006-2014   |
| 4  | University staff album book (2014)   | An album containing information of the university staff that was written in 2014  |
| 5  | Presidential decree (1999)   | The presidential decree was established in 1999 to expand the University's role from an institute for teaching and education to a university. |
| 6  | Ministry of Finance on the Public Service Concept Decree (2008)                              | The decree from the Ministry of Finance in 2008 for the establishment of the Public Service Concept (Badan Layanan Umum) for the University   |
| 7  | Policy of the Ministry of Education and Culture on the organisation of the University (2012) | The policy was established in 2012 and governed the organisation and working procedure of the University                                      |
| 8  | Policy of the Ministry of Education and Culture on the Statute of the University (2012)      | The policy was established in 2012 and detailing the statute of the University  |
| 9  | University Statistical Reports (2011-2015)   | Reports containing detailed statistics of the academics, staff, and students during the period of 2011-2015                                   |
| 10 | Higher Education Law 12/2012   | The aim of act is to grant greater autonomy in management and use of resources for Indonesian higher education providers                      |

As described in Table 3.2, the documentary evidence collected during this research was in the form of online and offline documents. The online documents were retrieved from the official website and two blogs maintained by the University. The offline documents were obtained from three books, two decrees, two written policies, and one statistical report of the University. The main purpose of analysing these sources of evidence was to help the researcher to obtain detailed information on the adoption and implementation of the AIS. The results from the documentation were then used to provide a contextual account of the case being studied and to corroborate the information from the interviews.

### 3.5.3 Physical Artefacts

Physical artefacts may involve tools, instruments, or technological devices (Yin, 2015). An exploration of the physical artefacts was needed as the case involved a transformation from

the previous system to a new system. Table 3.3 list the physical artefacts that were explored during the fieldwork.

Table 3.3 List of the Physical Artefacts

| No | Types of Artefact                 | Description  |
|----|-----------------------------------|--|
| 1  | Optical Scanner (OpScan)          | The scanner was used to scan paper-based academic forms in the previous system           |
| 2  | Academic Information System (AIS) | AIS is an online website which serves as an innovation that replaces the previous system |

Important physical artefacts from the previous system were the Optical Scanners (OpScan), which were used to scan forms in the previous paper-based system. Meanwhile, the physical artefact which was considered as the innovation was the Academic Information System (AIS).

Aside from examining the physical artefacts, interviews were also conducted with two of the administrative staff in charge of the artefacts. The purpose of exploring the physical artefacts was to get an insight and a comparison of the technical operations and the workflow of the previous system and the innovation (Yin, 2015).

The next section provides an illustration of the strategy that was used to analyse the acquired data.

### 3.6 Data Analysis

To acquire a valid meaning from the qualitative data, the method of analysis as advocated by Miles et al. (2014) and (Saldaña, 2015) was employed. Figure 3.2 illustrates the method for data analysis used in this research.

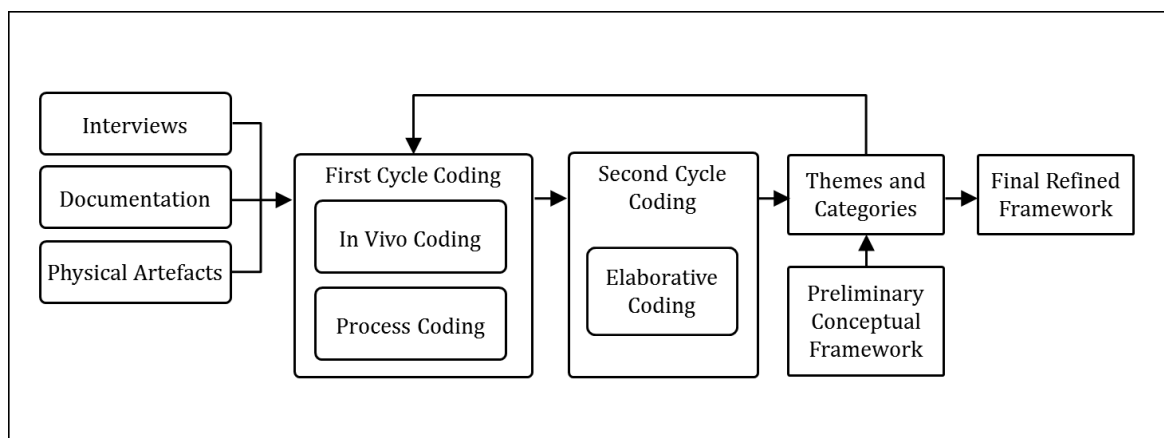


Figure 3.2 Method for Data Analysis

Due to the interpretive nature of the study, the researcher referred to the principles from Klein and Myers (1999) as a guide to analysing the data. The principle of multiple interpretations was utilised as the researcher confronted different and at times contradictory perspectives from the participants (i.e., the executives and the academics) (Klein & Myers, 1999). The principle of dialogical reasoning was also used as the preliminary conceptual framework was constantly refined based on the findings (Klein & Myers, 1999).

The coding phase was divided into the first cycle coding and second cycle coding as the data sources were analysed using thematic analysis. During the first cycle coding, the researcher employed 'in vivo coding' and 'process coding' methods (Miles et al., 2014; Saldaña, 2015). These methods extracted the participants' own words as the source for the codes, in an attempt to honour their perspective of the case. As the researcher was guided by a preliminary framework, 'elaborative coding' was selected as the second cycle coding method, as this method not only preserves the themes and categories from the preliminary framework, but also allows new themes and categories to emerge during the data analysis (Miles et al., 2014; Saldaña, 2015).

The researcher utilised NVivo as a tool to assist the qualitative data analysis (Creswell, 2014). The fundamental knowledge for using NVivo was obtained by the researcher through training and continuous practice. NVivo assisted the researcher in organising, sorting, and searching for information that was relevant by using queries (Creswell, 2014). Using NVivo, the relevant text was assigned based on the codes and then classified based on the existing and emerging categories and themes.

### **3.7 Conclusion**

This chapter has addressed the issues of the methodology pertaining to the conduct of this research. The methodology encompassed the paradigm of the research, the methods, and the techniques used in the collection and analysis of the data. By using constructivism as its paradigm, this research considered the case as being socially constructed from the shared meaning of the actors involved.

The research method utilised case study with a single-case design and accommodated the multilevel perspective to acquire information from the participants. The main data collection technique was semi-structured interviews. However, other techniques (i.e., documentation and physical artefacts) were also used. Finally, the strategy for data analysis was also described to provide insight on how the analysis was carried out.

## 4 Case Study Context

### 4.1 Introduction

This chapter provides a contextual account of the adoption and implementation of an AIS by an Indonesian University. The information presented in this chapter was retrieved mainly from the documentation and the exploration of the physical artefacts used by the University.

The chapter starts by describing the landscape of higher education in Indonesia. The following section discusses a brief profile of the Indonesian University, including its historical and ICT background and the role of the adopted innovation. This chapter concludes with a summary of previous ICT studies in the context of higher education.

### 4.2 Landscape of the Indonesian Higher Education

The Indonesian Higher Education Institutions (IHEIs) offer qualifications ranging from diplomas to doctoral degrees and come in various forms: universities, institutes, colleges, polytechnics, academies or a community academies (Republic of Indonesia, 2012). According to the Higher Education Law 12/2012, IHEIs have a strategic role to develop the intellectuality of the nation, advancing science and technology, and generating innovative and competitive academicians through the implementation the *tridharma*<sup>1</sup> (Republic of Indonesia, 2012).

As an initiative from the government, the database for the management of IHEIs was centralised and integrated under the PDPT (Pangkalan Data Perguruan Tinggi or Higher Education Database), as a source of information that can be publicly accessed (Republic of Indonesia, 2012). Table 4.1 illustrates the information that was taken from PDPT concerning the national statistics of IHEIs.

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<sup>1</sup> *Tridharma* is the three obligations that are demanded from academics and students in the IHEIs. The *tridharma* comprises of education, research and community service.

Table 4.1 National Statistics of IHEIs (Retrieved 9 March 2017 from PDDIKTI (2016))

|               | Number of IHEIs |         |       | Number of Academic Staff |         |         |
|---------------|-----------------|---------|-------|--------------------------|---------|---------|
|               | Public          | Private | Total | Public                   | Private | Total   |
| <b>MORTHE</b> | 122             | 3,131   | 3,253 | 71,500                   | 163,112 | 234,612 |
| <b>MORA</b>   | 77              | 981     | 1,058 | 12,024                   | 10,277  | 22,301  |
| <b>Others</b> | 224             | 1       | 225   | 9,599                    | 0       | 9,599   |
| <b>Total</b>  | 423             | 4,113   | 4,536 | 93,123                   | 173,389 | 266,512 |

The table shows that the majority of the IHEIs are managed by the Ministry of Research, Technology, and Higher Education (MORTHE), while other religious IHEIs are managed by the Ministry of Religious Affairs (MORA), and the rest are under management of various ministries (OECD/ADB, 2015; Republic of Indonesia, 2012). The management of public IHEIs is mainly controlled by the government, while the management of private IHEIs is mainly carried out by communities through private foundations (Republic of Indonesia, 2012).

Based on the table, the public IHEIs account for less than 10% of the total number of IHEIs, however their academics account for nearly 35% of the total number of academics. Additional data acquired in 2012 showed that student enrolment in public IHEIs had reached over 25% of the total enrolment (OECD/ADB, 2015). The disparity in the number of academics and student enrolment between public and private IHEIs showed that public IHEIs are generally of considerable size when compared to private IHEIs (OECD/ADB, 2015).

The rapid growth of IHEIs was marked by the two-fold budget increase over the four-year period from 2008 to 2012 (OECD/ADB, 2015). This was also evident from the significant increase in the national student enrolment rates from just 14.8% in 2002 to 31.3% in 2013 (UNESCO Institute for Statistics, 2016). As a result, the Indonesian higher education student population had increased by about 1.6 million students in a time span of four years, from approximately 4.8 million in 2009 to around 6.4 million in 2013 (PDDIKTI, 2016).

New IHEIs have also been established every year with the majority being private IHEIs to meet the demands from the growing student enrolment numbers. However, the increase in the number of IHEIs has not been able to keep up with the high influx of new students coming through secondary schooling (OECD/ADB, 2015). The population growth of students demands a more diversified, financially sustainable, and quality-assured structure of supply from the IHEIs (OECD/ADB, 2015).

Important initiatives have been made by the government to increase the autonomy of IHEIs. Among them is by establishing PTNBH (Perguruan Tinggi Negeri Berbadan Hukum or Public IHEIs with Legal Entity) for seven top tier public IHEIs and BLU (Badan Layanan Umum or Public Service Concept) for 21 other public IHEIs (OECD/ADB, 2015). PTNBH is a legal status that allows the seven IHEIs to have a greater autonomy such as in aspects of their organisation, financing, staffing and academic matters, while the autonomy of BLU is limited to managing only their financial matters (OECD/ADB, 2015).

The following section further describes the brief profile of the Indonesian University that was explored in this research.

### **4.3 Profile of the Indonesian University**

#### **4.3.1 Historical Background**

The Indonesian University studied has always had a strong focus in the field of education, especially in providing training to enable its students to become teachers or educational staff. This is apparent as it was first established as a Teachers College in 1954, and then became an Institute for Teaching and Education in 1963.

The institute was further expanded to become a public university through the 1999 presidential decree. Although its focus remained on the field of education, the expansion led the University to broaden its scope to include basic science and applied science.

In 2008, through a decree from the Ministry of Finance, the public university was given BLU status. Although its management remained under ministerial authority, the University had autonomy with regard to managing its financial matters.

Due to the 1999 status expansion from an institute to a university, there was an issue with the rapid growth in the number of stakeholders in the University. Based on the December 2016 data, the public university has grown to accommodate 107 departments in eight faculties and one postgraduate program. In terms of the stakeholders, the University had 985 academics, 32,820 students, and 1,158 administrative staff.

#### **4.3.2 ICT Background**

This section describes the ICT background in the University. Based on the exploration of the documentation, the ICT background can be divided into two periods: the early period and the ICT rapid growth period.

**Early Period (1986-2008)**

In 1986, the Computer Centre Unit (CCU) was established to manage the academic process. To support the effort, the institution organised the procurement of supporting infrastructure in the form of minicomputers, OMR (Optical Mark Reader) devices, and external tape backups.

The CCU produced several academic forms that could be scanned using the OMR devices and resulted in a digital output that was capable of being stored in the external tape backups. The academic forms were course enrolment forms, student attendance forms, student academic records, and course evaluation forms. Such academic processes continued for years with additional procurements of similar infrastructure to support the process in the early 1990s.

In 2002, a further ICT initiative was carried out by establishing an Information Systems Development Team (ISDT) in partnership with a third party consultant to develop a desktop system to manage the output from the OMR devices. To support the initiative, the University organised the procurement of more infrastructure, such as servers to contain the database and a backbone intranet using traditional UTP cable to connect the CCU to the faculties.

However, this initiative was regarded as unsuccessful as the desktop system still relied heavily on the same academic forms that had been in use since 1986. The ISDT was dismissed and a further ICT initiative was needed to deal with the lengthy and slow academic process that was unable to cope with the increase in the number of stakeholders.

**ICT Rapid Growth (2008 to date)**

In 2008, the rapid growth of ICT started as the University was given BLU status by the Indonesian Ministry of Finance. With this BLU status, the University had more autonomy in managing its financial matters, such as the autonomy to hold a procurement for ICT-related infrastructure. A tremendous amount of investment was made by the University to prepare its infrastructure for further ICT initiatives.

In the same year, the CCU was upgraded to an ICT Centre with the added responsibility of supervising the installation of a fibre optical backbone throughout the University to supply a much faster network access. The ICT Centre was also given the task of pioneering the development of the University website and many information systems.

The rapid growth of the ICT in the University was reflected through the increase in the internet bandwidth from year after year since 2008 (See Figure 4.1). A more detailed description of the ICT historical context is provided in Appendix B of this thesis.



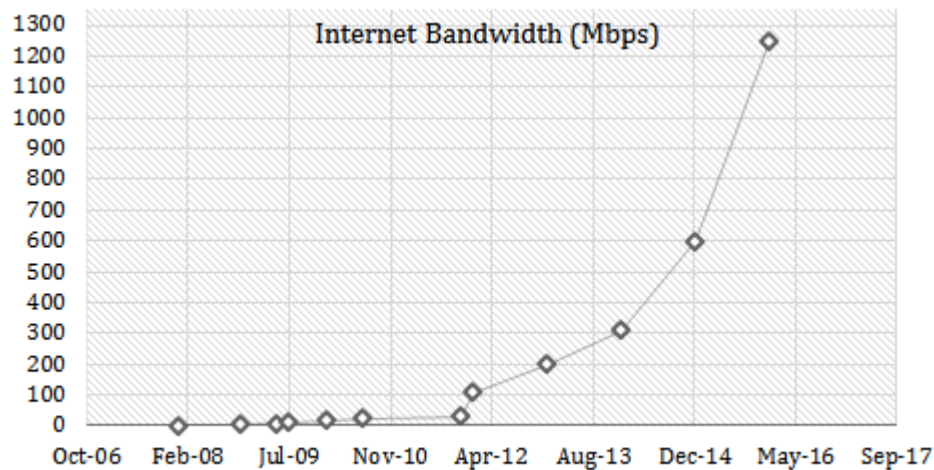


Figure 4.1 Internet Bandwidth Growth

Based on the figure, the internet bandwidth grew from just one Mbps in 2008 up to 1,250 Mbps in 2016. In particular, the internet bandwidth experienced a significant growth after 2012 to support an ICT Revitalisation Policy, which was initiated by the University in April 2012.

The ICT Revitalisation Policy later resulted in the development of 22 new information systems to increase the effectiveness and efficiency of the university management. These information systems are classified into four categories: academic information systems, supporting information systems, e-governance information systems and public access information systems. The users of these systems are all of the stakeholders, including the executives, the academics, the students, and the administrative staff.

#### 4.3.3 Academic Information System (AIS)

This section elaborates on the Academic Information System (AIS) that was adopted by the University. The AIS is an in-house online information system that was developed by the ICT Centre to manage the academic activities of the University. The system was introduced and used by the academics during the grade submission session at the end of 2012.

Unlike Moodle or Blackboard, the AIS is not a Learning Management System (LMS) as it does not publish any course or assignment materials. The AIS was a system that assists the academics to perform their administrative tasks, such as submitting students' grade and providing advice for students. Using the grade submission function, the academics were able to submit student grades online from anywhere and at any time. The advisory function also allowed the academics to monitor the progress of the students and to provide accurate advice for the students.

AIS is considered as a complex ICT innovation as it requires not only high interdependencies among different stakeholders of the system but also interdependencies with other systems such as the email system and the SMS gateway system that were used for the grade submission function. Its usage also determines the successful execution of several other subsequent processes such as the decision support systems for the executives and the classroom allotment for the students.

The next section discusses previous ICT studies in higher education institutions in several countries and their correlation with the adoption and implementation of the AIS as the focus of this research.

#### **4.4 Previous ICT Studies in Higher Education**

A previous study identified two main dimensions concerning the utilisation of ICT in higher education, namely the instructional dimension (knowledge administration) and the managerial dimension (information administration) (Meenakumari & Krishnaveni, 2011).

The use of ICT in the instructional dimension is described as a process to acquire, deliver, and evaluate knowledge-related information, such as e-learning, e-library, online examination, and evaluation systems (Meenakumari & Krishnaveni, 2011). From the managerial dimension, ICT is viewed as a means to administer activities pertaining to the management of higher education institutions, which involves general day-to-day operational activities such as student enrolment, staff recruitment, and tuition payment (Krishnaveni & Meenakumari, 2010).

With regard to the technological class and dimension, the AIS is considered as a complex innovation that is utilised in the managerial dimension. As a managerial ICT innovation, the AIS not only assists the administration of the day-to-day tasks of academics, but also assists in the management of the academic system in the University. Studies of innovations in the managerial dimension are scarce, as previous studies in the higher education context commonly placed more emphasis on innovations pertaining to the instructional dimension (Meenakumari & Krishnaveni, 2011).

To provide a state-of-the-art landscape of research in higher education, a review was conducted of previous ICT studies with regard to this context. This is illustrated in Table 4.2.

Table 4.2 Previous ICT Studies in the Context of Higher Education

| No | Author & Country                   | Research Topic & ICT Artefact  | Source of Data  | Key Findings  |
|----|------------------------------------|--|---|---|
| 1  | Archibong & Effiom (2009), Nigeria | Examining the use of simple ICT innovations (PC and internet) for research, teaching, and learning   | Survey of 80 academics in a Nigerian University                                     | Weak infrastructure and the need of training for staff  |
| 2  | Wilson et al. (2014), Ghana        | Examining the usage of simple ICT innovations (mobile phones, TV, radio, PC, laptop, digital camera, voice recorder) for student's personal learning | Questionnaire to 500 students and focus-group discussion in a Ghana University      | Student and teacher have low technology literacy skills and training is needed  |
| 3  | Gulbahar (2008), Turkey            | Examining the usage simple ICT innovations (PC, internet, TV, video and OHP) as an instructional media in teaching activities                        | Questionnaire to 6 administrators, 25 instructors, and 558 students                 | Positive attitude towards ICT, inadequacy of training and courses   |
| 4  | Shaikh (2009), Pakistan            | Examining the role of simple ICT innovations (Ms Office, Google) in teaching and learning  | Survey to 30 faculty members, students, parents, admin staff, and ICT policy makers | Lack of training for teaching / support staff, poor infrastructure, and lack of effective ICT policy                                  |
| 5  | Chaputula (2012), Malawi           | Examining the adoption of simple ICT innovations (word processor, internet, laptop and mobile phone) for teaching, research and internet browsing    | Survey of 317 students and 113 academic staffs and one librarian                    | Poor infrastructure and lack of ICT skills, high cost of internet access and persistent power outages                                 |
| 6  | Othman et al. (2013), Libya        | Examining the usage of simple ICT innovations (online learning, virtual classroom and e-module) for student learning activities                      | Open and closed-ended questionnaire   | Support staff needed to reduce academic staff's burden, a fixed budget to maintain and develop ICT, training and incentives for staff |
| 7  | Huda & Hussin (2010), Indonesia    | Examining the implementation barriers of ICT in general (administration, teaching, learning, and research).  | Interviews of 2 top-level university executives                                     | The main inhibitors are work culture and individual perception towards ICT  |
| 8  | Setiawan (2012), Indonesia         | Examining the implementation barriers and challenges for ICT in general  | Interviews of 20 staff, informal discussion and document collection in a university | Limited human resources, lack of management commitment, funding and rewards and ineffective communication and coordination            |

| No | Author & Country                | Research Topic & ICT Artefact  | Source of Data   | Key Findings  |
|----|---------------------------------|--|--|---|
| 9  | Prabowo (2007), Indonesia       | Describing the integration of multi-channel learning (a blended learning system) for the teaching and learning process | Comparing the before and after the implementation of the multi-channel learning      | The utilisation of the multi-channel learning is improving following the implementation   |
| 10 | Sedana & Wijaya 2012, Indonesia | Utilising UTAUT to examine the use of a learning management system (LMS)   | Questionnaire to 281 university students using the LMS                               | The findings are consistent with UTAUT theory.  |
| 11 | Indrayani (2011), Indonesia     | Examining the impact of the academic information system towards the performance of higher education                    | Survey of 988 lecturers and 1579 students from 18 universities in Bandung, West Java | ICT facilities and human resource quality had significant contribution towards the AIS, while ICT culture and system effectiveness had less contribution  |
| 12 | Moertini (2012), Indonesia      | Investigating project management risk for building modules in Academic Information System                              | Non-empirical  | (1) Top management was unaware that their involvement was needed<br>(2) The way of thinking and working style were unorganised<br>(3) Departments and lecturers were reluctant to changes in academic procedure |

The literature review suggested that state-of-the-art research focusing on the mandated adoption of complex managerial innovations in higher education institutions was scarce. None of the studies that were reviewed had a specific focus on the mandated adoption of innovations. The majority of the focus was more towards the identification of barriers and challenges that possibly inhibited the performance of higher education institutions.

Based on the technological class and dimension, the majority of the studies were focusing on simple innovations in the instructional dimension (Archibong & Effiom, 2009; Chaputula, 2012; Gulbahar, 2008; Othman et al., 2013; Shaikh, 2009; Wilson et al., 2014). The study by Indrayani (2011) focused on complex innovations in the managerial innovations, while two studies in particular concentrated on complex innovations in the instructional dimension (Prabowo, 2007; Sedana & Wijaya, 2012).

Two other studies that were reviewed did not specifically mention the innovations being studied and were more concerned with the general use of ICT as a supporting facility (Huda & Hussin, 2010; Setiawan, 2012). Finally, several other studies were found to be non-empirical,

such as studies that investigated the project management risk of a system (Moertini, 2012), proposed a model for university governance (Nugroho & Surendro, 2013), and a model of ICT and knowledge management (Sulisworo, 2012).

Based on the above review, the previous studies did not provide enough attention to the scenario of the mandated adoption of complex managerial innovations in higher education institutions. This research therefore chose to explore the AIS as it was considered to be a complex managerial ICT innovation that posed challenges due to its contingent and mandated adoption in the University. Further enhancing the managerial role of the AIS may significantly improve the overall administration of the University (Meenakumari & Krishnaveni, 2011). As the AIS was introduced to the academics in 2012, this research is therefore in a position to assess its uptake as sufficient time had passed for it to be assimilated into the University.

## **4.5 Conclusion**

This chapter has presented the context of the case study in this research. This includes describing the landscape of the IHEIs, the profile of the Indonesian University, and the innovation being studied as well as the summary of the previous ICT studies.

Based on the context outlined in this chapter, the next chapter further explores the adoption and implementation of the AIS by focusing on the decisions and actions made by the university executives at the university level.

## 5 Pre-implementation Phase

### 5.1 Introduction

This chapter explores the decisions and actions, as envisaged by the executives, who were involved as the decision makers in the pre-implementation phase of the AIS at the University. Information was also retrieved from the administrative staff to substantiate details at the operational level, which could not be provided by the executives.

The focus of this chapter is the pre-implementation phase, as shown in the shaded area of the framework (See Figure 5.1). The area in the right-hand of the framework refers to the post-implementation phase, which is further discussed in Chapter 6 of this thesis. The description of the underlying theory pertaining to the pre-implementation and post-implementation phases was delineated in the literature review chapter.

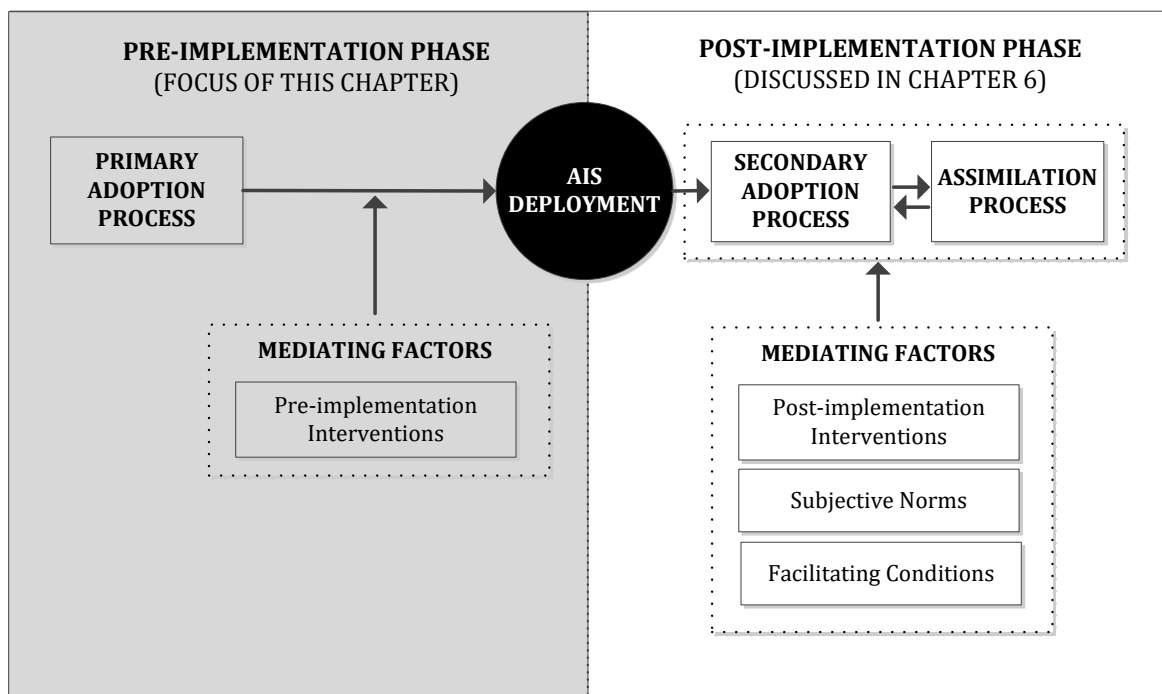


Figure 5.1 Focus of Chapter 5 based on the Preliminary Framework  
(Modified from Gallivan, 2001b; Venkatesh & Bala, 2008)

The pre-implementation phase involves the analysis of the primary adoption process and the pre-implementation interventions. The primary adoption process describes the initial

adoption of the AIS by the university executives. Following this adoption, the pre-implementation interventions were given by the executives in order to support the deployment of the AIS and to accelerate the secondary adoption by the academics.

The next section provides an overview of the interviewed executives and administrative staff of the University.

## 5.2 Overview of the Top-level Executives and the Administrative Staff

This section provides an overview of the top-level executives and the administrative staff who were involved in the adoption and implementation of the AIS by the University. The detailed information regarding the academics is presented in the next chapter as their role started to unfold.

### 5.2.1 Top-level Executives

Five top-level university executives were interviewed during the fieldwork. The demographic information of the top-level executives is provided in Table 5.1.

Table 5.1 Demographic Information of the Top-level Executives

| No | Job Role                              | Job Description   | Involvement   | Gender | Age | Working Years |
|----|---------------------------------------|---|---|--------|-----|---------------|
| 1  | Vice-Rector A                         | Assisting the rector with issues related to academic matters, research, and community service   | Member of the University Board                              | M      | 50s | 28            |
| 2  | Vice-Rector B                         | Assisting the rector with issues related to external affairs, planning, and information systems | Member of the University Board                              | M      | 50s | 28            |
| 3  | Director of ICT (also a faculty dean) | Directing the revitalisation and implementation of ICT in the University                        | Member of the University Board and has ICT expertise        | M      | 50s | 31            |
| 4  | Head of the ICT Centre                | Ensuring the successful execution of ICT in the University                                      | Has influence on the University Board and has ICT expertise | M      | 30s | 7             |

| No | Job Role                  | Job Description  | Involvement   | Gender | Age | Working Years |
|----|---------------------------|--|---|--------|-----|---------------|
| 5  | Head of Quality Assurance | In charge of quality assurance and the provisioning of the AIS | Has influence on the University Board and has quality assurance expertise | M      | 50s | 30            |

All of the top-level executives interviewed were male. With the exception of the Head of the ICT Centre, all of them were over 50 years old and had already worked in the University for roughly 30 years. The Head of the ICT Centre was 30 years old and had only been working for the University for 7 years.

Vice-Rector A, Vice Rector B, and the Director of ICT were interviewed as members of the University Board, which is the highest authority in charge for the management of the University. The members of the University Board include 16 top-level executives which comprise the Rector, four Vice-Rectors, eight Faculty Deans, the Director of the Postgraduate Program, the Head of the Research and Community Service Body, and the Head of the Education and Teaching Development Body. The Director of ICT was also a dean in one of the faculties and therefore a member of the University Board.

Although the Head of the ICT Centre and the Head of Quality Assurance were not members of the University Board, their roles were essential during the adoption and implementation processes as they possessed the technical expertise pertaining to the ICT and the quality assurance of the AIS. They provided influential technical advice to the University Board regarding the initial decision to adopt the innovation and during its implementation. With regard to this research, Vice-Rector A had an important role in overseeing the online transformation of the academic service at the University. The role of Vice-Rector B was influential as the ICT Centre and the management of the information system were under his direct responsibility and supervision.

### 5.2.2 Administrative Staff

Interviews were also conducted with administrative staff from the university and faculty levels. The purpose of interviewing the administrative staff was to substantiate details about the implementation at the operational level, which could not be provided by the executives. The demographic information of the administrative staff is provided in Table 5.2.



Table 5.2 Demographic Information of the Administrative Staff

| Participant Code | Role   | Level                        | Gender | Age | Working Years |
|------------------|--|------------------------------|--------|-----|---------------|
| S1               | Head of Administration (also the lead programmer of AIS) | University (ICT Centre)      | M      | 30s | 8             |
| S2               | Head of Administration                                   | University (Academic Bureau) | M      | 50s | 35            |
| S3               | Head of Administration                                   | University (Academic Bureau) | F      | 50s | 35            |
| S4               | Staff Member   | University (Academic Bureau) | M      | 40s | 16            |
| S5               | Head of Administration                                   | Faculty A                    | M      | 30s | 10            |
| S6               | Head of Administration                                   | Faculty B                    | F      | 50s | 30            |
| S7               | Staff Member   | Faculty B                    | M      | 40s | 13            |
| S8               | Staff Member   | Faculty C                    | M      | 30s | 8             |
| S9               | Staff Member   | Faculty C                    | M      | 30s | 7             |
| S10              | Staff Member   | Faculty D                    | F      | 30s | 9             |

There were in total ten administrative staff interviewed; five of these were heads of administration, while the other five were staff members. Seven of the administrative staff were male and the other three female. Five administrative staff were in their 30s, while the others were in their 40s and 50s. The administrative staff varied in terms of their working years, starting from eight years up to 35 years.

The four administrative staff at the university level administered the university-wide operation of the AIS, while the six administrative staff at the faculty level were in charge of the operation at each faculty as well as interacting directly with the academics. In Faculties C and D, the heads of administration were not involved in the implementation of the AIS. Therefore, the interviews instead focused on the staff members who were involved with the implementation.

In particular, Staff member S4 was interviewed for his key role at the operational level for the previous paper-based system. He was the one operating the OpScan device that was used to

scan the forms in the paper-based system. Staff member S1 was interviewed with regard to his role as the lead programmer of the AIS. By interviewing these two staff, the researcher could obtain an understanding of the workflow of the previous paper-based system and the AIS.

### 5.3 Primary Adoption Process

This section presents a historical perspective of the adoption of the AIS at the university level. The antecedents of the adoption of the AIS and the process leading to the primary adoption decision are discussed.

#### 5.3.1 Problems in the Previous System

Based on the interview data, the problems with the previous paper-based system were found to be the main antecedents for the adoption of the AIS. These problems were classified into four categories, which were problems with decision-making, students' grade submissions, the student advisory process, and academic data demand.

##### Problems with Decision-making

Vice-Rector B stated that there were problems in acquiring academic data to support decision-making by the executives due to the lengthy procedure in the previous system. The Director of ICT confirmed this statement and added that the executives were highly dependent upon academic data for their internal decision-making.

*The background behind the adoption of the AIS was the problems faced by the University in accessing data promptly. It was important for the decision-making process to be based on data. With the data, we can immediately decide. For instance, how many students do we have? We can immediately know it. Back then, it was manually done. We were forced to wait for a long time for such a statistic. (Vice-Rector B)*

*The academic data have an important role in the decision support system. The internal decision support system requires data regarding students' achievements, teaching and learning effectiveness and so on and so forth. When using the previous system, you were not left with any data in case you needed it afterwards. A simple request for a student's GPA was considered difficult to fulfil. (Director of ICT)*

Through an interview with Staff Member S4, the lengthy procedure used for the students' grade submissions in the previous system was revealed. He explained that staff at the university level obtained the students' grade forms from the university's publishing unit. The student grade forms were customised for each academic, listing the classes they taught and the names of the participating students.

The forms were then distributed to each faculty and then to every academic in that faculty. The forms were then marked by the academics by filling in circles representing the letter grades. Once the marking was done, the forms were submitted to the faculty staff and then returned to the university staff. The university staff then scanned the forms using several OMR devices to get a CSV (Comma Separated Value) data output. This data output was then modified into customised information based on the request of the stakeholders.

This lengthy procedure was considered tedious by the top-level executives. They were also academics involved in teaching and learning. With this drawn-out procedure, not only were they confronted with predicaments when making decisions on policies, it was also a nuisance for them to organise their teaching and learning activities.

### **Problems with the Grade Submission Process**

Vice-Rector B indicated grave problems with regard to the students' grade submissions in the previous system. Cases of students' grade manipulation, signature counterfeiting, and the illegal graduation of participants had occurred and finding the offenders was taxing due to the lengthy procedure and the fact that the process involved a considerable number of staff.

*There used to be a long delay for the students' grade submissions in the faculties. Grade manipulation was also possible. People other than the relevant academics were handling the students' grade forms and the final output sometimes did not match with the grades given by the academics. It happened everywhere. We knew it at the departmental level. It was hard to figure out who did the manipulation due to the lengthy procedure. My signature was among the ones counterfeited. There were even students graduating although they had not finished their studies. It was because of the use of a manual system in the old days. It could be easily misused.*

Several administrative staff confirmed that these fraudulent practices were indeed taking place and they thoroughly embraced the adoption of the AIS as a solution, as the previous system was considered to be a waste of their time and energy. They saw that the adoption of the AIS

helped recover their dignity and liberated them from any accusations with regard to fraudulent practices.

*I think online is better. It's obvious. All of us don't have to waste time and energy. As staff, we don't have much time left at work. (Staff S3)*

*I support the new system, especially with regard to the online grade submission. It adds trust to the academic-student relationship. There were no longer subjective accusations on grades being manipulated by staff upon requests from the students. I don't know whether it did happen or not, but there were indeed accusations. With the new system, our dignity as administrative staff was restored. (Staff S6)*

The Head of the ICT Centre added that the academics who were out of town or were assigned abroad used to have difficulties in submitting their student grade forms while they were located away from the University during the final week of marking. With the online nature of the AIS, the academics had the flexibility of submitting grades from anywhere and at any time.

*Back then, the students' grade forms needed to be submitted and processed directly by the academic bureau of the University. Using the online system, academics can submit grades from anywhere provided that internet access is available and their cell phones are active for verification purposes. Therefore, there is no reason for not submitting grades due to not having time to go to campus or still being out of town. Yesterday, an academic was on duty in China and he could submit grades from there, so it is quite helpful.*

### **Problems with the Student Advisory Process**

For the students' advisory function, each academic was in charge of providing academic advice to a number of students. The Head of the ICT Centre expressed that the previous system posed difficulties in acquiring complete and accurate academic records of the students. The academics were unable to monitor the development of their students and this affected their ability to provide timely advice to the students and information for the parents.

*The academics were having difficulties in getting information regarding their students. Information that may assist the academics includes the courses the students have taken and what future courses are potentially open for them. Academics also do not have any information regarding their students who are approaching the end of their study, but still have low GPAs. In such cases, the*

*academics must contact and discuss the students' problems with their parents and figure out an appropriate solution. Also for unidentified problems where the students told their parents that they have no problems, but in fact were never attending classes.*

### **Problems with Satisfying the Academic Data Demand**

Through the Higher Education Database (HED) project, the Ministry of Research, Technology, and Higher Education (MORTHE) regularly collects academic data and information from higher education institutions in Indonesia.

The Director of ICT identified a problem in the previous system that posed difficulties for the University to process the requests demanded by the MORTHE.

*It is also for the macro need of the HED. You can imagine if at the time we did not organise the data as such. We couldn't have satisfied the need for the national HED.*

The problem with the previous system was that it would take a long time for such a request to be fulfilled and with much less information accuracy. This was due to the fact that the University must compile information from different units and faculties before it could be compiled based on the requested format from MORTHE.

A summary of the problems that were identified from the previous systems is presented in Table 5.3.

Table 5.3 Summary of the Problems in the Previous Paper-based System

| Categories                       | Identified Problems  |
|----------------------------------|--|
| Decision-making Process          | Slow decision-making due to difficulties in accessing real-time academic information |
| Student Grade Submission Process | Involving too many staff   |
|                                  | Students' grade manipulation   |
|                                  | Signature counterfeiting   |
|                                  | Illegal graduate participants  |
|                                  | Difficult to find the offender   |
| Student Advisory Process         | No control over students' academic development                                       |
|                                  | Difficulties in advising students without sufficient academic information            |
|                                  | Could not provide information to the parents   |
| Academic Data Demand             | Difficulties in satisfying the academic data and information demand from MORTHE      |

The problems with the traditional paper-based system were rooted in its main characteristics, which were its lengthy processes and the difficulties in accessing real-time academic information. This led to further problems with the decision-making process, student grade submissions, student advisory functions, and the difficulties in satisfying the data demand from the MORTHE.

All of the stakeholders were affected by the slow performance of the academic system. These problems impacted on the performance of the overall academic system and led the executives to adopt AIS as a solution.

### 5.3.2 Primary Adoption Decision

This section describes the primary adoption decision of the AIS by the top-level executives. The themes with regard to the adoption decision are divided as follows: antecedents of the AIS adoption, the ICT Revitalisation Policy, and the top-down initiatives.

### **Antecedents of the AIS Adoption**

The Director of ICT explained that the AIS was adopted as a solution to address the problems of the previous paper-based system and to cope with the rapid growth of stakeholders in the University. Further expanding the statement of the Director of ICT, Vice-Rector B envisaged the effective utilisation of ICT for the university's management by referring to world-renowned universities.

*It is inevitable, with so many users and so many subjects to deal with. An ICT-based academic information system has features such as ease of use, speediness, and its organised and integrated manner. (The Director of ICT)*

*If we refer to top universities, the orientation is towards administrative excellence by utilising ICT. (Vice-Rector B)*

The Head of Administration at the ICT Centre, Staff member S1, added that the online grade submission function was chosen as a solution as it could simplify the procedure of the previous paper-based system.

*The grade submission function in the AIS eliminated several procedures. This is done to make it easier for the academics to submit grades if compared to the previous paper-based system. (Staff S1)*

By incorporating ICT in the academic system, it was expected that the University could benefit from better data management, which would lead to data integration and effective data and information processing.

### **The ICT Revitalisation Policy**

The Director of ICT stated that the decision to adopt the AIS was a part of the University's Strategic Plan, which involves two main pillars: the accessibility and equality of education; and the effectiveness, efficiency, and accountability of the university governance.

*The foundation that we used was the University's Strategic Plan, which is for the accessibility and equality of education. The second one is the effectiveness, efficiency, and accountability of the university's governance. These two strategic pillars led to the development of an ICT-based integrated information system.*

Prior to the adoption of the AIS, the ICT Revitalisation Policy was institutionalised in April 2012 as an effort to revitalise the university's ICT infrastructure and information systems. This ICT

policy required the development of reliable information systems that could guarantee: (1) the availability of comprehensive, accurate, and up-to-date data in the university's database; (2) prompt, easy, and online access to information for stakeholders; (3) the availability of valid and trusted grounds for the decision-making process by the university's executives.

Based on the policy, an ICT Revitalisation Team was established to carry out the revitalisation effort and the Director of ICT was appointed to lead the team. The revitalisation effort was set to be achieved by undertaking four fundamental tasks: (1) developing an integrated information system, (2) developing a reliable warehouse system, (3) developing an accurate decision support system, and (4) independently developing information systems to support management and policy.

### **Bureaucratic Culture – A Top-Down Initiative**

With regard to policies such as the ICT Revitalisation Policy, the Director of ICT stated that it was decided by the University Board as the highest authority in charge of the management of the University.

*The University Board is concerned with policy. What is discussed there is the policy in regard to the universal needs of the University. Meetings will be held to discuss these issues and needs. They decide whether or not something will be useful for all of the stakeholders.*

Regarding the initial adoption of the AIS, both Vice-Rectors and the Head of Quality Assurance suggested that it was decided by the University Board without any participation or direct involvement of the academics.

*Regarding the academics' involvement, we question whether there is a decision-making process anywhere that involves all the employees? That's not possible. (Vice-Rector A)*

*Bottom-up decision-making? We did not use bottom-up decision-making. (Vice-Rector B)*

*We viewed it as a demand for technology. In such cases, we don't really need to consult with the academics. The meetings held by the University Board were enough to decide its adoption. (Head of Quality Assurance)*

The statements from the executives indicates that the initial adoption was done in a top-down initiative. The University Board, through its members, was acting on behalf of the University in the decision to adopt the AIS for the academics.



The next section presents a discussion of the primary adoption process of the AIS, which is then followed by an analysis of the pre-implementation interventions given by the executives to accelerate subsequent adoption of the AIS by the academics.

### 5.3.3 Discussion of the Primary Adoption Process

The analysis of the interviews with the executives and the administrative staff pertaining to the antecedents of the adoption of the AIS was presented. Figure 5.2 shows the process leading to the primary adoption decision and the development of the AIS by the University.

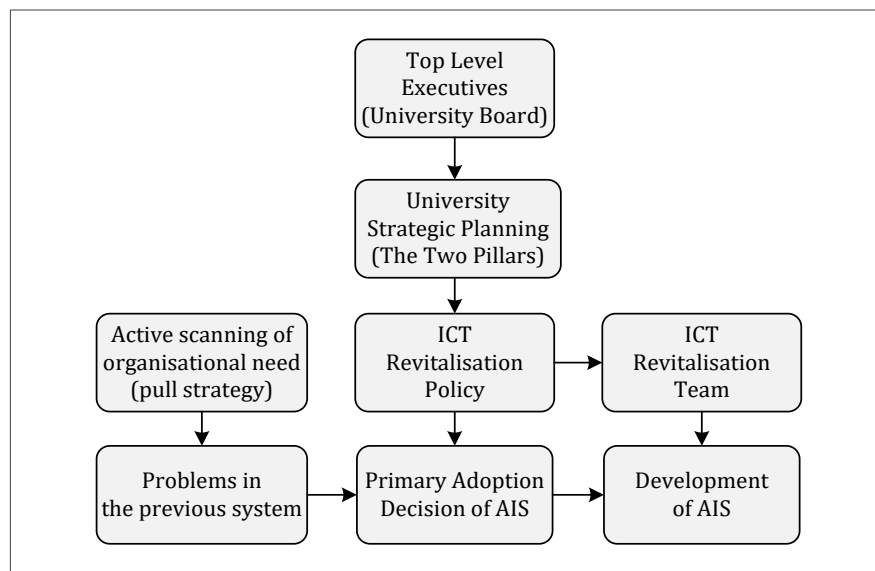


Figure 5.2 Primary Adoption Process

In line with Cooper and Zmud (1990), the process of the active scanning of organisational need (a pull strategy) by the executives revealed problems in the previous system and resulted in pressure to change by adopting the AIS in the University. The initial adoption of the AIS for the academics was mainly driven by problems rooted in the main characteristics of the previous paper-based system: the lengthy procedures and its non-real time nature. The problems were exacerbated with the increase in the number of stakeholders in the University.

Nevertheless, the decision to adopt the AIS for the academics was also part of a larger strategic plan, specifically the initiative of revitalising ICT at the University. By taking such an initiative, long-term and more substantial benefits were expected by the University, such as providing administrative excellence for its stakeholders.

The top-level executives, as members of the University Board, with their objectives and intentions for change and to address problems with the previous system, decided to adopt the

AIS using a top-down initiative as part of the ICT Revitalisation Policy. Through the policy, an ICT Revitalisation Team was established with the task of developing the AIS for the academics.

The public university is owned, operated, and funded by the government and tends to follow a bureaucratic culture (Asian Development Bank, 2012; Boyne, 2002). Therefore, decision-making in the public university was highly centralised and any initiative was dependent on the collective agreement of the executives (Caudle et al., 1991; Heintze & Bretschneider, 2000). The decision to adopt the AIS is said to follow an authoritarian approach, instead of the participatory approach, as the primary adoption was solely decided by the executives without involving the academics (Zaltman et al., 1973).

As the initial adoption of the AIS was explained in this section, the next section discusses the interventions that emerged following the primary adoption process.

## 5.4 Pre-implementation Interventions

This section discusses the pre-implementation interventions that were deliberately made available by the executives to accelerate the adoption of the AIS by the academics (Gallivan, 2001b; Venkatesh & Bala, 2008). These pre-implementation interventions were among the factors that mediated between the primary and secondary adoption; these consisted of the efforts to develop the AIS, provided a dissemination seminar for the academics, and mandated the use of the AIS to the academics.

### 5.4.1 Development of the AIS

As a further measure following the ICT Revitalisation Policy, the ICT Revitalisation Team was assigned to develop the AIS for the academics. The Director of ICT stated that the development of the AIS for the academics was among the tasks given to the ICT Revitalisation Team.

*We were appointed by the Board and thus formulated the AIS. The Board encourages, supports, protects, and is responsible for the realisation of such an information system.*

It was decided by the University that all information systems must be developed independently and in-house, rather than purchasing a commercial system or outsourcing their development to another party. The reasoning for this was stated by the Director of ICT.

*The AIS was developed in-house to replace the previous paper-based system. It was developed internally, so that we didn't have to rely on a third party*

*company and so that we won't have any difficulties in adding new features. The addition of new features is highly dependent on the changing of procedures due to the changing policy.*

The Director of ICT reflected upon a past partnership with a third party consultant in developing a system at the University. The partnership proved to be unsatisfying as the University was heavily dependent on the consultant whenever any changes needed to be made to the system. He argued that the concept for the in-house development of the information system was to allow for flexible modification and the addition of new features in the AIS to adapt to procedural changes.

The Director of ICT and the Head of the ICT Centre had an important role as they were the ones who largely made the technical decisions for the in-house development as well as the initial implementation of the AIS.

*To formulate this, with friends who have the managerial skills and supported by our friends from the ICT Centre who have the knowledge and expertise, we developed the information system. (Director of ICT)*

The development of the AIS for the academics was carried out by the software division of the ICT Centre following a consultation with the top-level executives and the Head of the Quality Assurance. The Head of the ICT Centre further expressed that the ICT Centre translated the University's policy by providing infrastructure and developing the information system.

*The ICT Centre developed the AIS. Our main duty was to translate policies into day-to-day applications or information systems. The central role of the ICT Centre is in the development of the information system, not in the policy-making nor directly operating the information system.*

In a relatively short time, through the ICT revitalisation effort, the ICT Centre developed 22 new and revitalised online academic information systems, which can be classified into four categories: academic systems, supporting systems, e-governance systems and publicly accessed systems. The AIS was among the systems that were categorised as an academic system.

The Head of the ICT Centre stated that a user manual had already been provided for the basic operation of the AIS and could be downloaded at any time from the AIS website.

*If the user manual provided is considered to be enough, especially for new academics, who are adaptive towards technology, training on the basic features may not be needed.*

He assumed that newly recruited, younger, and technology-savvy academics could make use of the user manual instead of having to join any AIS training.

#### **5.4.2 Dissemination Seminar <sup>2</sup>**

The implementation of an innovation includes the activities of introducing and diffusing it to the potential adopters (Van de Ven et al., 2008). Following the development of the AIS, a dissemination seminar was held to introduce the AIS to the academics.

Vice-Rector B stated that a dissemination seminar is always conducted whenever the University needs to disperse new information to its stakeholders. The Director of ICT also expressed the importance of the dissemination seminar to describe the features of the AIS to the academics.

*We always hold dissemination seminars. (Vice-Rector B)*

*We presented it (AIS) to the academics in the form of dissemination seminars and by listing the shortcomings that have not yet been addressed based on their demands. (Director of ICT)*

Information was also sought afterwards from the administrative staff regarding the dissemination seminar. The Head of Administration at the university level, Staff member S10, stated that the dissemination seminar for the AIS was organised by the University in several phases based on the faculties.

*At the time, the dissemination seminar was divided into several phases based on the faculties. We gave a description on how to use the new system.*

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<sup>2</sup> The exact Indonesian term that was provided during the interviews was 'sosialisasi', which directly translates to 'socialisation'. However, the term 'sosialisasi' has developed an additional meaning which differs from 'socialisation' as it is defined in the Indonesian dictionary as 'the effort of spreading something so that it can be known, understood, and livened up by a community' (Nasional, 2008). The term 'sosialisasi' is more relevant to 'dissemination', which is "active and planned effort to persuade target groups to adopt an innovation" (Greenhalgh et al., 2004, p. 582). Based on its activity, 'dissemination seminar' was considered the appropriate term for 'sosialisasi'.

Aside from introducing the AIS as a replacement for the previous system, demonstrations on how to use the AIS were provided for the academics.

### 5.4.3 Usage Mandate

During the dissemination seminar at the university level, the top-level executives communicated the mandate for the university academics to adopt the AIS. This issue is explained in three themes: the usage mandate based on the perspective of the executives, the consequences of the mandate, and the mandatoriness based on the characteristics of the AIS.

#### Usage Mandate based on the Perspective of the Executives

The Director of ICT regarded the AIS as a mandatory innovation that had to be adopted by all the academics in the University. The Head of the ICT Centre supported this statement and added that the implementation of the AIS was based on the university's policy and must be adhered to by all academics without exception.

*For the AIS, it is clearly mandatory. It is obligatory. It is a must whether you want it or not because it is a portal that you have to pass through. (Director of ICT)*

*Since it was the policy of the University that the academic system must be implemented in such a way, therefore all the academics, whether they like it or not, have to use it. (Head of the ICT Centre)*

The Head of the ICT Centre stated that the AIS was one of the realisations of the *tridharma* of higher education. The AIS specifically extended the education obligation of the *tridharma* as it assisted the management in the teaching and learning activities in the University. As the execution of the *tridharma* is the responsibility of every academic, therefore the academics in the University must adopt the AIS as a part of their duty.

*The AIS is mandatory in nature because it is a part of the implementation of the tridharma by higher education, in particularly with regard to the obligation in education. The record for the administration process of the academics and the students can be found in the AIS. Therefore, whether they want it or not, because it is mandatory and it is their duty, so they must use it.*

#### Consequences of the Mandate

As a method to guarantee the successful adoption of the AIS, any non-compliance of the usage mandate would trigger warning mechanisms from the faculties. With the students' grade

submission function for instance, a warning letter will be given when the academics are late in submitting the grades within the grade submission's timeline.

*The sanction is given if for some reason they don't want to submit the grades.  
(Head of the ICT Centre)*

*There should be a consequence or else there wouldn't be any progress. (Head  
of Quality Assurance)*

This information was verified with the administrative staff, who confirmed that the warning mechanisms also involved the role of the Quality Assurance Office. In the internal processes of a faculty, such a problem would first be handled by the department, but it could be escalated to the faculty level if needed.

*The sanction is in the form of a warning and reprimand from the faculty.  
Usually, the data about the academics who are late with their grade  
submissions are sent by the Quality Assurance Office to the faculties for the  
further process of giving a reprimand to the academics. (Staff S1)*

*After the grade submission period is over, we verify the academics who have or  
have not submitted grades. Those who have not submitted will receive a letter  
from their head of the department to immediately proceed with the  
submission. The department will contact the academics regarding that matter.  
If the head of the department cannot solve it, we would escalate the problem  
to the Vice-Dean and let him take care of the matter. Usually, the problem is  
resolved once it reaches the Vice-Dean. (Staff S5)*

The warning mechanisms from the faculties and the University can be considered as a by-product of the usage mandate and as a consequence for non-compliance with the mandate.

The academics were also asked whether any incentive was given to reward the academics who adopted IS. The academics said that no incentive was given and most of them did not even see it as a necessity.

*Those thoughts about incentives never crossed my mind because it (AIS) is  
already part of our duties. (A3, 60s, male, Faculty A)*

There was only one academic who felt that there should be an incentive from the University. Nonetheless, the incentive that she mentioned was not in the form of any reward but technical support in the form of an internet data package to access the AIS. She felt that she was having difficulties in accessing the AIS even on the campus.

*It should be pushed towards that direction so that we can access it wherever possible. For instance, we cannot even access it from here (the laboratory). Maybe they can give us incentives for a data package. (A19, 50s, female, Faculty D)*

### **The Mandatoriness based on the Characteristics of AIS**

A staff member stated that with the implementation of the AIS, the students could immediately find out whether or not the academics had finished submitting their grades. In the event that the academics were behind schedule in submitting their grades, the students could immediately consult with the relevant academic on the matter

*The online grade submission made the job easier for us as the students will complain directly to the academics whenever their grades didn't show up. Aside from getting warning letters from the faculty, the students will also keep on chasing them (the academics) for the grades. (Staff S5)*

It was considered impossible for the academics to abandon the AIS completely as its usage was interdependent with other process. The AIS was regarded as having a high interdependency, especially in its grade submission function, as the late submission of the student grades may disrupt the flow of the academic processes. The AIS itself was also dependent on other systems, such as the email system and the SMS gateway system used to send emails and the PIN numbers to the academics.

#### **5.4.4 Infrastructure Support**

Vice-Rector B stated that there is a constant effort to support the utilisation of ICT in the University by investing a considerable amount of the budget on infrastructure. This effort involves the annual procurement of servers, network equipment, and bandwidth to support the infrastructure in the University.

*A large portion of our budget is directed towards ICT, to develop ICT, to increase the bandwidth and so on. We also encourage the addition of ICT staff and so on. We always push towards that avenue.*

The support for infrastructure could not be separated from the strategic role of the ICT Centre. As acknowledged by Vice-Rector A and Vice-Rector B:

*The ICT Centre has a strategic role for this institution since the future needs will be based on ICT. Their main function is as a facilitator that preserves the uniqueness, expertise, and culture of each of the faculties. (Vice-Rector A)*

*The policy for the development of hardware and software lies in the ICT Centre, but the policy to use the data and so on lies with each person in charge. The ICT Centre is the provider of data for all the activities with regard to the academic administration. (Vice-Rector B)*

As suggested by the two Vice-Rectors, the ICT Centre functions as a facilitator for ICT's needs. As for other functions concerning policy-making and other data usage, they remain the responsibility of the University.

#### **5.4.5 Summary and Discussion of the Pre-implementation Interventions**

The development of the AIS, the dissemination seminar, and the usage mandate were the three interventions that emerged during the pre-implementation phase. These interventions were made available by the top-level executives prior to the deployment of the AIS.

Reflecting on the prior unpleasant experience of purchasing a system from a third party, the AIS was developed in-house and in a centralised manner by involving the ICT Centre. The user manual and online helpdesk were also provided and embedded in the functions of the AIS. The independent effort was to ensure there is the flexibility to modify the AIS when needed at a future time. Following the development of the AIS, a dissemination seminar was conducted as the first attempt to properly introduce the AIS to the academics.

During the seminar, the top-level executives stated that the AIS was a mandatory innovation as it formed a part of the professional duty of the academics. The phrase “whether they like it or not” was used repeatedly by the executives during the interviews and reinforced the fact that there was no choice for the academics other than to adopt the AIS. The mandate was then substantiated via the warning mechanisms for the academics who may have chosen to delay or reject the use of the AIS.

This is in line with Rogers (2003), who argued that authority adoption scenarios are commonly associated with organisations such as factories, schools, or government institutions. As a social system, the University is considered to have a bureaucratic culture that inherited a hierarchical structure, in which the top-level executives have the right to impose decisions in order for them to be carried out by the academics, who are seen to be of lower rank (Rogers, 2003).



Other than the usage mandate, the mandatoriness of an innovation can also be determined based on its characteristics using two dimensions: its necessity to the adopting unit and its level of interdependence (Brown et al., 2002). By design, the AIS is a mission-critical system, where a single case of an academic deciding to abandon this innovation could negatively impact the workflow of the academic process. The explicit usage mandate, the mission-critical design that demanded high interdependencies, and the necessity to resolve problems from the previous system indicated that the AIS was an absolute mandatory innovation, which left the academics with no choice but to adopt it.

It can be concluded that the adoption of the AIS corresponds with the scenario of contingent authority innovation-decisions as the primary adoption was decided using the top-down initiative and a mandate was given to the academics to adopt it (Brown et al., 2002; Gallivan, 2001b). The efforts of the University in developing the AIS and providing the dissemination seminar also made it impossible for the academics to adopt an innovation as complex as the AIS by themselves without any intervention from the University. This suggests that the adoption of the AIS by the academics was contingent upon its prior adoption by the University (Gallivan, 2001b; Rogers, 2003).

The analysis of the pre-implementation interventions in this section was limited to the perspectives of the executives and the administrative staff. Although the interventions were identified, further analysis of their influence to the subsequent adoption and use of the AIS by the academics is yet to be done. The exploration of the perspective and experience of the academics as they adopt and use the AIS may unveil other important and interesting aspects of the case. These further efforts are presented in Chapter 6, which provides a more elaborated analysis of the influence of the pre-implementation interventions.

## 5.5 Conclusion

This chapter described the decisions and actions made by the top-level executives during the pre-implementation phase of the AIS. The problems with the previous system were found to be the main antecedents of the primary adoption of the AIS by the university's executives.

In general, the findings in this chapter suggested that the AIS was adopted under the scenario of contingent authority innovation-decisions. To ensure the successful adoption of the AIS, several interventions were deliberately given, including by mandating the use of the AIS for the academics.

This chapter has analysed the events that occurred during the initial stages of implementation and prior to the deployment of the AIS. Further investigation is needed to understand the influence of the primary adoption decision and the interventions towards the secondary adoption by the academics. The perspective of the academics with regard to the interventions expedited by the executives in the pre-implementation phase and their experience as secondary adopters of the AIS is presented in the next chapter.

## 6 Post-implementation Phase

### 6.1 Introduction

This chapter focuses on the perspective and experience of the academics as they begin to adopt and use the AIS in the post-implementation phase. The perspective of the executives and the administrative staff of the University are also presented to substantiate the findings. The focus of this chapter is shown in the shaded area of Figure 6.1.

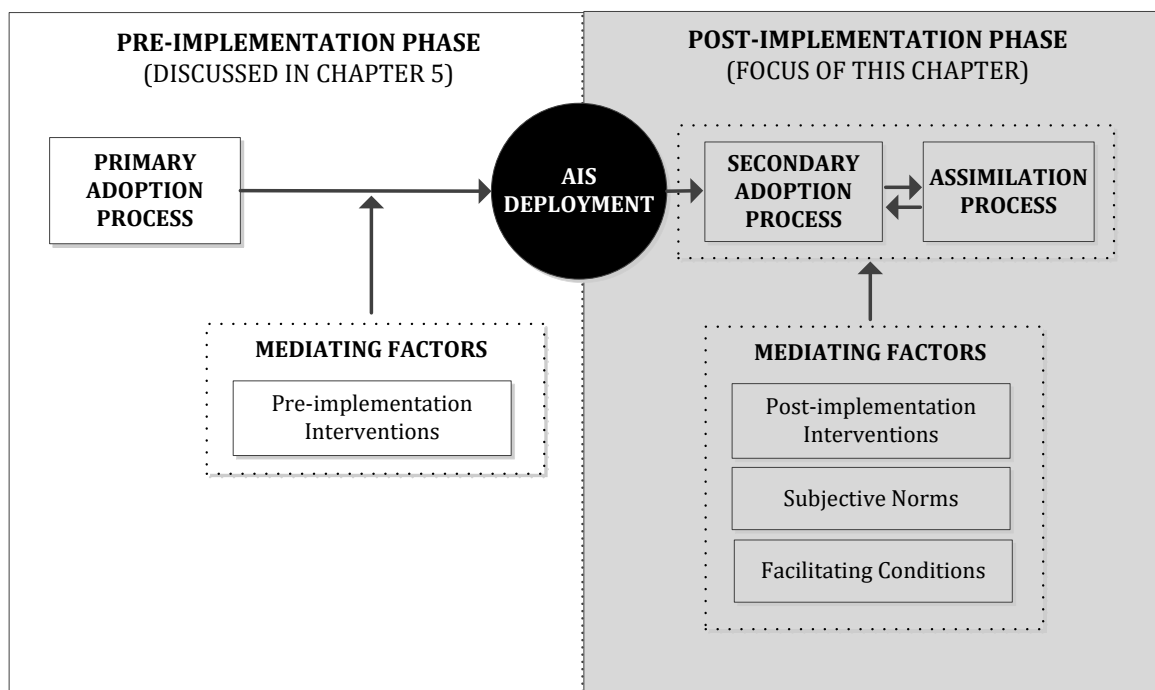


Figure 6.1 Focus of Chapter 6 based on the Preliminary Framework  
(Modified from Gallivan, 2001b; Venkatesh & Bala, 2008)

The exploration of the post-implementation phase is conducted through an analysis of the secondary adoption process and the assimilation process. An investigation of the mediating factors is also presented through an analysis of the post-implementation interventions, the subjective norms, and the facilitating conditions.

The next section provides an overview of the interviewed university academics of the University.

## 6.2 Overview of the University Academics

In analysing this chapter, data were obtained from the in-depth interviews with the academics. The demographic information of the academics was also retrieved as it may assist in correlating between the individual attributes of the academics and their usage of the AIS. The interviewed academics and their demographic information are presented in Table 6.1.

Table 6.1 Demographic Information of the Academics

| Participant Code | Gender | Age Group | Working Years | Base Faculty | ICT Background |
|------------------|--------|-----------|---------------|--------------|----------------|
| A1               | M      | 50s       | 32            | Faculty A    | Limited        |
| A2               | F      | 60s       | 36            | Faculty A    | Limited        |
| A3               | M      | 60s       | 35            | Faculty A    | Limited        |
| A4               | M      | 30s       | 10            | Faculty B    | Informal       |
| A5               | M      | 50s       | 30            | Faculty B    | Limited        |
| A6               | M      | 40s       | 13            | Faculty B    | Limited        |
| A7               | F      | 30s       | 8             | Faculty B    | Informal       |
| A8               | F      | 30s       | 10            | Faculty B    | Formal         |
| A9               | M      | 40s       | 16            | Faculty B    | Formal         |
| A10              | M      | 40s       | 16            | Faculty C    | Formal         |
| A11              | F      | 30s       | 2             | Faculty C    | Limited        |
| A12              | F      | 60s       | 34            | Faculty C    | Informal       |
| A13              | M      | 60s       | 40            | Faculty C    | Informal       |
| A14              | M      | 60s       | 30            | Faculty D    | Informal       |
| A15              | F      | 30s       | 8             | Faculty D    | Informal       |
| A16              | M      | 50s       | 30            | Faculty D    | Limited        |
| A17              | M      | 30s       | 11            | Faculty D    | Formal         |
| A18              | F      | 50s       | 32            | Faculty D    | Limited        |
| A19              | F      | 50s       | 26            | Faculty D    | Limited        |

All of the academics interviewed were civil servants with permanent tenure. Unique coded identifiers and age group classifications were used to conceal their identities. A relatively

balanced number of academics were sought, based on their gender and age, to ensure a fair representation across the spectrum of the academics.

Based on age groups, six academics were in their 30s, three were in their 40s, five were in their 50s, and five were in their 60s. Based on gender, the academics consisted of 11 males and eight females. The working years of the academics spanned from 2 years to 40 years, which is relatively consistent with their age groups, as civil servant academics are permanently tenured.

During the interviews, the academics were asked whether or not they had any formal or informal ICT background. A formal ICT background refers to a formal education in computer science or information systems. Academics with an informal ICT background did not have such a background but had some ICT-related experience or were educated abroad and received some exposures to ICT. Those academics who did not have a formal or informal ICT background are shown as having a limited ICT background.

The next section explores the secondary adoption process of the AIS by the academics in the University.

### 6.3 Secondary Adoption Process

The adoption of the AIS is associated with the scenario of contingent authority innovation-decisions, which renders the AIS as a mandatory innovation that made it impossible for the academics not to adopt it. In this scenario, the focus of the secondary adoption process is more on the perspective and experience of the academics rather than whether or not they adopt the AIS (Gallivan, 2001b). The influence of prior events in the pre-implementation phase, from the perspective of the academics, is also analysed.

#### 6.3.1 Resistance by the Academics

Following its deployment, the AIS was immediately set to replace the previous system and the academics were instructed to use it for submitting student grades during the grade submission session. However, as stated by the academics during the interviews, a high level of resistance was demonstrated by the academics following the adoption of the AIS. The Head of the ICT Centre added that the resistance was expressed in the form of protests and complaints to the executives and the staff at the ICT Centre.

*At first, we tend to choose the previous system, almost all of us because we were used to it. The point is, many of us disagree. (A10, 40s, male, Faculty C)*

*For the AIS, especially for the grade submission that has to be done online, we were reluctant to use it at first. (A8, 30s, female, Faculty B)*

*For the AIS, there was a large amount of resistance when it was first introduced due to the transition from manual or semi-digital to fully digital. The resistance was in the form of protests and complaints: "Why do we have to use such a system?" However, they still used it with various approaches. (The Head of the ICT Centre)*

The resistance to the AIS was reported to last for several semesters, especially during the grade submission sessions, when most of the academics had to submit student grades. However, the resistance did not result in the academics rejecting or sabotaging the implementation of the AIS at the University.

The Head of the ICT Centre stated that all of the academics adopted the AIS when it was first imposed on them. Nonetheless, it took several semesters for the majority of the academics to become accustomed to the AIS and to realise its benefits, compared to the previous system.

*We began using it and the benefits were soon felt after two to three semesters, such as when we want to find the documentation for the grades. We tended to be careless with records using the manual way. (A10, 40s, male, Faculty C)*

*Now we don't have that many complaints from fellow academics. Back then, I think it was only natural to have problems with a new system. When it's running well, people started to know the workflow and followed suit. (A9, 40s, male, Faculty B)*

On the other hand, several academics argued that the administrative staff were the ones who should operate the AIS for them, as it was in the previous system. As the Head of Administration in Faculty A, Staff member S5 stated that the adoption of the AIS posed a drastic change for the academics, from their passive role to an active role, and thus contributed to the resistance in his faculty. Compared to the previous system, the AIS forced them to be active and independent as they could no longer hand over paper-based grade forms to the administrative staff.

*In the previous system, the administrative staff were in charge of grade submission and now it has to be carried out by us. Don't you think that we should go back to the previous system? Okay then. We can use the AIS, but the administrative staff are the ones who have to operate the AIS. Academics only need to hand over the grades to them. (A18, 50s, female, Faculty D)*

*Before, we simply filled in the student grade forms and handed them over to the staff. (A8, 30s, female, Faculty B)*

*It was a drastic change as they went from circling the grades on a paper to filling in an online form in the AIS. There was turmoil. (Staff S5)*

A high amount of resistance toward the AIS was experienced by the academics. The next section provides an analysis of how the primary adoption decision and the pre-implementation interventions influenced the perspective of the academics concerning the adoption of the AIS.

### **6.3.2 Influence of the Primary Adoption Decision**

It was found in the previous chapter that the initial adoption of the AIS was decided solely by the top-level executives through the University Board. Based on the interviews with the academics, they confirmed the fact that they were not involved in the initial decision to adopt the AIS. The academics added that they also received no information concerning the AIS, as they first knew about it through the dissemination seminar.

*They were not asking for our consideration, but immediately gave a dissemination seminar. (A1, 50s, male, Faculty A)*

*Never (asked)! It was immediately introduced in the dissemination seminar, which means that there were no votes or anything to decide its adoption. (A19, 50s, female, Faculty D)*

*There was no information. We only knew about it from the dissemination seminar. We did not know about it beforehand. (A10, 40s, male, Faculty C)*

Staff member S5 added that only ‘certain people’ in his faculty were given information regarding the AIS and became involved in its adoption. He later hinted that the ‘certain people’ referred to the executives at his faculty. The Head of the ICT Centre confirmed the lack of information regarding the AIS and that it contributed to the resistance.

*There was no involvement. Not everyone knew about the decision, only certain people. (Staff S5)*

*The resistance mostly occurred due to their lack of information, that it was easier this way, more useful to the academics or students. When they had more knowledge of the system, the resistance tended to decrease (The Head of the ICT Centre).*

Aside from the lack of information concerning the adoption of the AIS, the academics also perceived its implementation to be abrupt. Several academics complained about having insufficient time for them to adapt, as they were instructed to use the AIS just a couple of weeks following the dissemination seminar.

*It was immediately executed. (A1, 50s, male, Faculty A)*

*It was abruptly implemented and finally, we had to use it. (A3, 60s, male, Faculty A)*

*Immediately it (the previous system) must be abandoned and changed into the AIS not long after the dissemination seminar was held. (A19, 50s, female, Faculty D)*

Regarding their lack of participation and involvement in the primary adoption decision, many of the academics chose to show their tolerance and perceived the decision as a part of their obligation as academics of the University.

*I choose to see it this way. The decision has been made and it is obligatory, it has to be done. It is the academics' obligation based on the standard operational procedure. (A16, 50s, male, Faculty D)*

*We obey the rules. We were never asked. But because the rule was made, we have to do it whether we want to or not. (A19, 50s, female, Faculty D)*

*Building a system would trigger pros and cons. But if the action is towards a positive and better direction, I think it will have a good impact. (A10, 40s, male, Faculty C)*

The lack of information regarding the AIS and its abrupt implementation were seen as the main contributors towards resistance to the new system as the academics were not given enough time to adapt to it. However, their absence of involvement in the primary adoption decision did not seem to have the same influence as the academics showed their tolerance towards the decision.

### **6.3.3 Influence of the Pre-implementation Interventions**

The influence of the interventions during the pre-implementation phase of the AIS is discussed in this section; this includes the influence from the AIS, the dissemination seminar, and the usage mandate.



### **Influence from the AIS**

During its early use, the academics expressed not only that the AIS was a new system for them, but the grade submission function of the AIS was also considered tedious. As the AIS was set to replace the previous system, the academics were obligated to fill in at least five raw score components for the students, for all of the class offerings they taught during the limited grade submission session. The academics who were not used to utilising such a system tended to forget their login account and then repeatedly consulted the ICT Centre on the matter.

*We tended to have problems because it was new. It was impossible for us to quickly attune to it. My problem was in comprehending the menus. It took a long time for me. (A14, 60s, male, Faculty D)*

*At the initial use, we had problems with filling out the grade submission forms one by one, as we deal with many class offerings. The initial problem for me and my friends was we tended to forget our passwords. (A10, 40s, male, Faculty C)*

Staff member S1, the main programmer of the AIS, confirmed this issue and recalled that the early version of the AIS was indeed problematic and unstable. Staff member S6 added that the AIS was felt to be too cumbersome for the academics in her faculty.

*The system was unstable in the initial version. The academics were also unfamiliar with the features and the menus. (Staff S1)*

*The acceptance rate was low from the very beginning, but we kept on providing them with the facility. It was because they perceived it (AIS) as something that was very cumbersome. (Staff S6)*

### **The AIS User Manual and Online Helpdesk**

The academics mentioned that the user manual for the AIS was helpful. It was found to be particularly useful for academics who had an engineering background, due to the fact that they were accustomed to reading user manuals in their daily work.

*Yes, the user manual is important. As our background is engineering, we tended to understand more by reading the manual, instead of being taught about the system by friends. That's probably one of the characteristics of the academics in this faculty. We are used to working with the students in the lab using the manuals. Whenever there are difficulties in operating a machine, we will turn to the manual. (A16, 50s, male, Faculty D)*

*AIS has a user manual that can be downloaded. The manual helped us as our friends who did not join the dissemination seminar could learn from it. (A6, 40s, male, Faculty B)*

The academics also expressed that there should be a helpdesk facility for them to consult with regard to the AIS.

*Because users have different comprehension levels, there should be a facility to ask for help for those who still don't understand, for instance, a helpdesk or an email that we can contact. (A8, 30s, female, Faculty B)*

*They already provided us with the manual and helpdesk for the user interface. So we didn't have any problem with using it. (A10, 40s, male, Faculty C)*

An online helpdesk feature had in fact existed since the early version of the AIS, however many of the academics seemed to have a misperception of this feature.

### **Influence from the Dissemination Seminar**

The Director of ICT stated that it was important for the University to provide intervention in the form of a dissemination seminar to anticipate the resistance from the academics. He suspected that resistance towards the AIS was caused mainly by the lack of information for the academics.

*The lack of information about new programs will lead to resistance caused by ignorance. That commonly happens everywhere. The solution is by providing them with enough information through a dissemination seminar. In the end, we have to convince them that it (AIS) will be implemented and executed. (Director of ICT)*

However, the Head of Quality Assurance considered the execution of the dissemination seminar at the university level to be ineffective. Although the dissemination seminar was done in several phases based on the faculties, with almost a thousand academics in the University, he argued that it was difficult to encourage the academics to join the event.

*There was not enough communication from top to bottom. The University Board have made its policy, but it would take a long time to reach the bottom level. The dissemination to the user level is still problematic.*

The academics from Faculties C and D stated that other than the ones held at the university level, additional dissemination seminars were also held in their faculties and departments. The

academics from Faculty D further added that the dissemination seminars were held as an initiative from their faculty and their execution was more effective at the department level as fewer academics were involved and more hands-on practice was available.

*The faculty instructed each department to provide additional dissemination seminars. Therefore, the Head of the Department provided such needs for their academics. (A10, 40s, M, faculty C)*

*The faculty held a dissemination seminar, which was repeated at the department level. It was held in the faculty with a PowerPoint presentation in front of a large hall. In the department, those who brought laptops could immediately open them and examples were given in front of the hall. (A15, 30s, female, Faculty D)*

*The dissemination seminar was very helpful as it gave us a description on how to submit the grades. With the dissemination seminar, the AIS became easier to understand. The dissemination seminar was the key. (A16, 50s, male, Faculty D)*

The Director of ICT assumed that the dissemination seminar held at the University level was enough to inform the academics concerning the AIS. However, the fact that further dissemination seminars were held in the faculties and departments without coordination with the University showed that the dissemination seminar at the university level was ineffective.

### **Influence from the Usage Mandate**

Confirming the statements made by the executives regarding the mandated adoption of the AIS, all of the academics interviewed felt obligated to use the AIS. One academic in particular mentioned that there was no choice but to adopt the AIS, as it was imposed by the Vice-Dean at the faculty level.

*We decided to use it because it was obligated, based on the letter from the Vice-Dean for academic affairs. The AIS was made mandatory from the institution, so whether we like it or not, all academics must use it. Taking the responsibility of adopting the AIS will later lead to its use becoming a habit after a certain period. There is no excuse for not using it in this faculty. It is mandatory. (A10, 40s, male, Faculty C)*

The phrase “whether you like it or not” that was repeatedly used by the executives reappeared during the interviews with the academics. This implies that the academics themselves realised they did not have any choice but to adopt the AIS.

Confirming the statements of the executives and the administrative staff in the previous chapter, one academic stated that warning mechanisms would be given by the faculty management in the event that the AIS was not used or its use delayed.

*There's a session for that (students' grade submission) and you must follow the schedule. If not, you will be given warnings. (A16, 50s, male, Faculty D)*

As a consequence of the usage mandate, warning mechanisms were given by the executives in the cases where the academics delayed or rejected the use of the AIS. The warning mechanisms were confirmed by the academics and left them with no choice but to adopt the AIS.

### **Infrastructure Support**

Several academics said that they had no complaints concerning the infrastructure, particularly the internet to access the AIS. The faculties and departments also provided the academics with the freedom to borrow and use laptops and PCs and also funding assistance to buy them.

*Our faculty is spoiled in terms of infrastructure and networking. The internet connection is not bad. In terms of funding for buying a laptop for teaching and for using the AIS, the department bought them for us and we can pay in instalments. We also have cable access in the academic's office. They provided us with PCs, printers, and laptops for day-to-day work. (A10, 40s, male, Faculty C)*

*In my faculty, we have wifi facilities. We can also use it in the academic's office. There are also facilities such as laptops and PCs there, but I always use mine. In my faculty, we can borrow those facilities. (A8, 30s, female, Faculty B)*

On the contrary, other academics reported several barriers with regard to the infrastructure in the University. Academics from several faculties reported that they often had difficulties in accessing the AIS due to the limited and unstable wifi connection. Electricity was also a problem as the University was plagued with frequent power outages. The power outages commonly occurred without prior warning from the local electricity provider.

*The wifi is always on and off. There were times when it was not running well. Thank God the management could fix it and it went well. But it then broke*

*again, so it's on and off and probably still lacking in speed. (A11, 30s, female, Faculty C)*

*We have three labs, in here, there, and over there, but we cannot access the internet although the wifi is available. Sometimes we get wifi access from a building, but it's locked and we cannot get the password. That's the fact. And we are working here in the lab from morning to afternoon. (A19, 50s, female, Faculty D)*

*Yes, infrastructure is limited in our department. We often have power outages. (A3, 60s, male, Faculty A)*

However, the academics suggested that the biggest problem with the infrastructure that is relevant to the implementation of the AIS was the limited servers. The servers that were used for the AIS could not cater for the volume of requests as the academics accessed the AIS at the same time during the grade submission period.

*There was a congestion when all of the academics tried to input data at the same time. In the end, the server crashed. (A7, 30s, female, faculty B)*

*There are too many academics trying to access the AIS, but I think we don't have enough servers. That "josso" or "tomcat" sign appeared whenever the system is down. If that happens, I might as well go to sleep. (A19, 50s, female, Faculty D)*

With regard to the limited servers, the solution from Staff member S1, the Head of Administration at the ICT Centre, was to upgrade the servers and improve their management.

*The technical solution would be to upgrade the server's capacity and to do a load balancing of the database. We have not reached maximum effort during the last semester, although the web server was load balanced. The bottleneck still occurred. What we haven't tried is to load balance the database. (Staff S1)*

#### **6.3.4 Discussion of the Secondary Adoption Process**

Under the contingent authority innovation-decision, the university executives left the academics with no choice but to immediately adopt the AIS (Brown et al., 2002; Gallivan, 2001b). However, the mandated adoption of complex and radical systems such as the AIS may trigger resistance from the users (Rogers, 2003; Venkatesh & Bala, 2008).

A high level of resistance toward the adoption of the AIS was indeed demonstrated by the academics, especially during the grade submission session at the end of the semester. The resistance from the academics was expressed in the form of protests and complaints. Ram and Jung (1991) considered such resistance as a form of coping mechanism for the users in dealing with a mandated adoption. Brown et al. (2002) argued that it is possible for the innovation to be executed successfully although the employees have negative attitudes. However, at a certain point the impact of these negative attitudes can potentially be profound and may lead to sabotage of the implementation or resignations from the organisation (Brown et al., 2002).

Previous research suggested that the subjective norm is an important antecedent for innovation adoptions in a mandatory setting and can be translated through a mandate for the employees to use the innovation (Gallivan, 2001b; Hartwick & Barki, 1994). In the case of the AIS, the usage mandate was evident as the mandatoriness of the AIS was confirmed by all of the interviewed participants and was shown through the “whether-you-like-it-or-not” attitude. To add to the pressure to adopt the AIS, the cost of non-compliance was high due to the enforcement of warning mechanisms for delaying or rejecting its use. Alternative means were also unavailable as the previous system was completely abandoned following the deployment of the AIS.

Brown et al. (2002) argued that, due to the usage mandate, the employees tend to justify their actions based on the consequences associated with non-compliance, rather than their personal beliefs about the innovation itself. In line with this argument, the academics’ decision to adopt the AIS was associated more with their effort to avoid the warning mechanisms from the University rather than their desire to follow their personal beliefs regarding the AIS itself. Hence, although the academics resisted the AIS during its initial implementation, in the end it was adopted by all of them.

On the other hand, the absence of the participation and involvement of the academics in the primary adoption decision did not seem to contribute much towards the resistance. This is in line with Hartwick and Barki (1994), who found no relation between user participation and involvement and their attitude concerning the use of the innovation in the context of a mandated adoption. Rogers (2003) added that it is considered a common practice for managers in an organisation with a bureaucratic culture to impose decisions on the employees. Thus, the academics might have been used to such a decision-making process and therefore tended to tolerate the decision.

Another plausible explanation might be caused by the unique characteristic of the University, where the executives were not only acting as decision makers but also as users of the AIS as they were also active academics involved in the teaching and learning process. This may have influenced the academics into perceiving that they are 'in good hands' as the executives would not adopt a system that would bring negative implications for themselves.

The role of the usage mandate and the reasons for the resistance that were identified during the analysis are outlined in Figure 6.2.

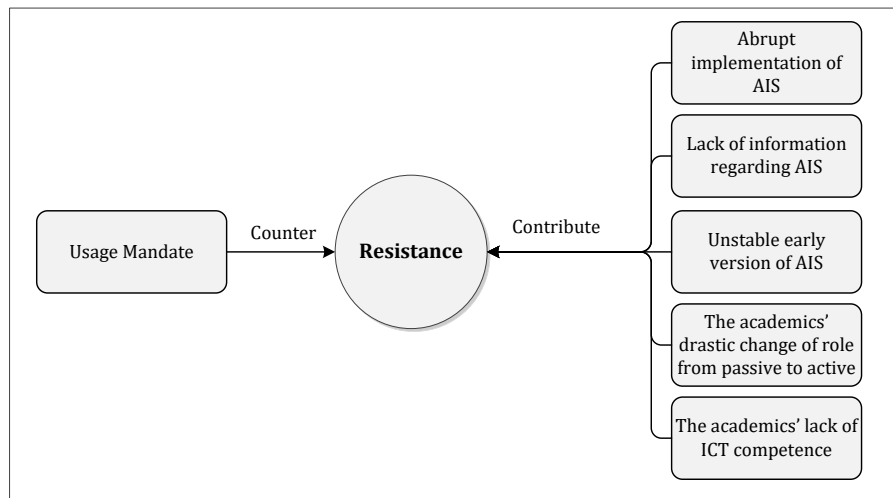


Figure 6.2 Role of the Usage Mandate and Reasons for the AIS Resistance

The findings of this research suggested that the main reasons for the resistance towards the AIS were the lack of information concerning its adoption and its abrupt implementation. Other reasons included the unstable early version of the AIS, the drastic change in the role of the academics, and their lack of ICT competence.

Although a dissemination seminar was held at the university level, it was found that the academics had insufficient information concerning the AIS and also lacked the skills needed to operate it as no formal training had been provided prior to its deployment. Previous research had suggested that aside from the commitment to provide sufficient resources, a clear and effective communication policy to inform employees regarding the initiative is needed to ensure a successful implementation (Gallivan, 2001b; Hunt et al., 2006; Venkatesh & Bala, 2008).

Based on the data analysis of the interviews and documentation, a timeline of the implementation of the AIS is illustrated in Figure 6.3

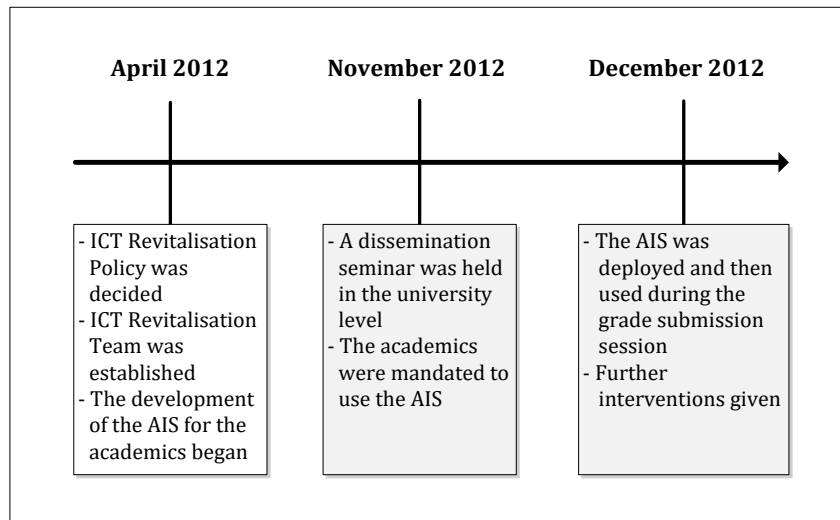


Figure 6.3 Implementation Timeline for the AIS

A critical point in the implementation of the AIS is shown in the shaded area of the figure. In just the two weeks following the dissemination seminar, the AIS was deployed and the academics were told to use it to submit the students' grades. This sudden deployment of the AIS following the seminar caused the academics to perceive that the implementation as being abrupt and thus contributed to the resistance.

Based on the analysis, the implementation strategy of the AIS can be associated with 'the big bang' strategy (Eason, 1988). Nonetheless, this strategy required the University to plan the implementation carefully as every entity involved must be ready when the innovation is executed at exactly the same time and the previous system must be completely abandoned (Agarwal et al., 1997; Eason, 1988).

The adoption of the AIS has changed the role of the academics from passive to active actors in the academic process. The role demands proactiveness and responsibility from the academics, as well as them having some ICT competency to operate the AIS. This change of roles was realised by the executives as they wanted to make the academics interact directly with the students concerning their grades and advisory issues.

With regard to the AIS, another finding showed that its early version was unstable, which resulted in the academics perceiving the grade submission function to be tedious, and this further contributed to the resistance. The user manual and online helpdesk in the AIS were only useful for academics who had a high ICT competence, but were mostly abandoned by academics with a limited ICT background. Infrastructure support has been found to be the main barriers to the ICT implementation in higher education institutions (Archibong & Effiom, 2009;



Chaputula, 2012; Indrayani, 2011; Shaikh, 2009). However, the infrastructure at the University was found to be supportive of the academics during the implementation of the AIS, although it was not equally distributed throughout the University.

The high amount of resistance indicated that the interventions carried out prior to the AIS deployment did not sufficiently accommodate the requirements for the 'big bang' strategy to be successfully implemented. The usage mandate and the warning mechanism managed to force all of the academics to adopt the AIS at the same time. However, prior studies (e.g., Gallivan, 2001b; Rogers, 2003) suggested that such an adoption scenario can negatively influence the later stages of the implementation. The analysis of the assimilation process, which follows the secondary adoption process, is presented in the next section.

## 6.4 Assimilation Process

The analysis of the assimilation process emphasises the individual perspectives and experience of the academics as they used the AIS during fieldwork for three years following its introduction. The exploration of the assimilation process was based on the two main features of the AIS, which are its grade submission function and the student advisory function.

### 6.4.1 Grade Submission Function

The grade submission function is one of the main functions of the AIS, which enables the academics to submit the students' grades online. Several themes that were identified with regard to the use of the grade submission function are described below.

#### 6.4.1.1 Benefits of the Grade Submission Function

The academics were asked about their use of the grade submission function in the AIS. The academics considered the AIS as beneficial, as its online nature allowed them to submit student grades and retrieve information concerning the grades from any place and at any time.

*I think the AIS is a great solution. Why? It's because the process is easy and we're no longer bothered by any delay. I can immediately input the grades after giving an exam. That's good because later I will have less burden. (A16, 50s, male, Faculty D)*

*I think the grade submission function is helpful. The access and the process for the submission are easier. For instance, I can use it online when I am not on campus and the deadline for the grade submission is approaching. I can use it*

*from everywhere. That's the first benefit. It's time efficient. The second one, we are no longer fussed with the hard copies. (A14, 60s, male, Faculty D)*

*There's a huge difference. First, we have control. We have the data. That's the function of the ICT. So, for instance, students would ask me: "Why did I get this grade?" I answered: "I can open your data. Here is your data." So the data really helps. (A16, 50s, male, Faculty D)*

In general, most of the academics showed a positive response concerning the grade submission function. It seems that they were already accustomed to using the AIS after three years of implementation in the University.

Nonetheless, several variations in usage were also captured, as the academics were asked about the details of how they used the grade submission function. These issues are explained in the following section.

#### **6.4.1.2 Variations in Usage of the Grade Submission Function**

During the interviews with the academics, cases of unanticipated usage of the grade submission function were found. These cases involved circumventing and indirectly using the AIS by delegating its use to surrogates.

The modified taxonomy of system usage (Based on Wilkin & Davern, 2012), as described in the literature review chapter of this thesis, was utilised to analyse the usage of the AIS by the academics. Using the taxonomy, the method of use and the usage type of the grade submission function were analysed. The case description and the statements of the academics concerning their usage were also incorporated. During the fieldwork, the researcher informed the executives of the usage of the AIS by the academics, along with several recommendations to follow up the issues. This is illustrated in Table 6.2.

Table 6.2 Variations in Usage of the Grade Submission Function

| No | Observed Case  | Method and Type of Usage  | Statement Example  | Recommendation   |
|----|--|---|--|--|
| 1  | <p>False Perception of the Online Nature of the AIS</p> <p>Case description: Contrary to its online nature, many academics falsely perceived that the AIS could only be accessed at the end of each semester during the short grade submission period. The schedule for the grade submission period in the University's academic calendar also made the academics think that grade submission could only be done during that period.</p> | <p>Method of use:<br/>Direct use</p> <p>Usage type:<br/>Circumvention by false perception</p> | <p><i>I started to submit the grades after the final exam. Is it even open throughout the semester? Really? I didn't know that until now. (A14, 60s, male, faculty D)</i></p> <p><i>That's our concern. If only the AIS was open all the time, we can submit whatever grades we have and not be bothered by the deadline. After the final exam, we have to do the marking and upload the grades. The time is so short and we are not only teaching one or two classes. The pressure is high, we asked for it to be opened at least after the mid-exam until the final exam so that we can upload whatever grades that we have. (A19, 50s, female, Faculty D)</i></p> <p><i>None of them submitted the grades before the grade submission period. Almost none. Most of them submit them at the end of the semester. (Staff S10)</i></p> | <p>A further dissemination regarding the procedure for grade submissions using the AIS is needed. This includes informing the academics that the grade submission period serves only as an indication that grade submissions are almost due.</p> |

| No | Observed Case   | Method and Type of Usage  | Statement Example   | Recommendation   |
|----|---|---|---|--|
| 2  | <p>False Perception of the Procedure for Resetting Grade Submissions</p> <p>Case Description: The grades that have been submitted are locked for editing. In a case where a grade's revision needs to be made, the academics can contact the ICT Centre by using either email, helpdesk, or by phone to reset the permission for editing the grades. Many of the academics falsely perceived the procedure and think that they are obligated to come to the ICT Centre every time a grade revision is needed.</p> | <p>Method of use:<br/>Direct use</p> <p>Usage type:<br/>Circumvention by false perception</p> | <p><i>We have to go there whenever we have problems with students. We have to report first and then it (the grade submission) can be reopened. (A19, 50s, female, Faculty D)</i></p> <p><i>We often have difficulties with the grades. We have to report there (The ICT Centre) so they could reset it. We have to go there directly. The grade submission process is cumbersome. This is more difficult and burdensome for us as it demands more concentration. (A3, 60s, male, Faculty A)</i></p> | <p>A further dissemination of information concerning the AIS is needed to inform the correct procedure to reset the grade submissions.</p> |

| No | Observed Case   | Method and Type of Usage  | Statement Example   | Recommendation   |
|----|---|---|---|--|
| 3  | <p>False Perception of the AIS Online Helpdesk</p> <p>Case description: An online helpdesk feature was provided in the AIS in case the academics encountered any difficulties. However, many academics were ignorant of the feature and falsely perceived that the only way to consult about their problems was by directly visiting the ICT Centre. Many academics complained about their frequent visits to the ICT Centre and the hectic situation in the ICT Centre during the grade submission period.</p> | <p>Method of use:<br/>Direct use</p> <p>Usage type:<br/>Circumvention by false perception</p> | <p><i>Because users have different comprehension levels, there should be a facility for those of us who still don't understand to ask questions. For instance, a helpdesk or an email that we can contact (A8, 30s, female, Faculty B)</i></p> <p><i>We have to ask here and there. The PIN has been sent to the cell phones, but it's not there. It was sent by email, which email? Finally, we have to go there (The ICT Centre), back and forth. And this is not only happening with one or two people (A18, 50s, female, Faculty D)</i></p> <p><i>I have to go there every time I wanted to submit the grades. First, my official email is not active, so I have to use my private email. I've repeatedly changed the default email but it's still the old email that was being used. The PIN can be requested either by email or cell phone. I've repeatedly asked them to set it up using my cell phone but they never fix it. (A18, 50s, female, Faculty D)</i></p> <p><i>All of us were flocking at the ICT Centre. (A19, 50s, female, Faculty D)</i></p> | <p>A further dissemination is needed to inform the academics regarding the correct procedure for directing queries and complaints.</p> |

| No | Observed Case   | Method and Type of Usage  | Statement Example   | Recommendation  |
|----|---|---|---|---|
| 4  | <p>Grade Conversion Problem</p> <p>Case description: The grade submission function used the new university scale to convert numeric to letter grades. However, one academic used the previous conversion scale and manipulated the numeric score to get the intended letter grades in the AIS, which can be unfair to the students.</p> | <p>Method of use:<br/>Direct use</p> <p>Usage type:<br/>Circumvention by misaction</p>    | <p><i>I am submitting the grades using the grade form, but there is a slight difference between A and A-, so I adjust the score based on the letter grades in the AIS (A4, 30s, male, Faculty B)</i></p>  | <p>It might be possible that many more academics used the AIS in the same manner as Academic A4. A further dissemination is needed to inform the academics regarding the use of the new grade conversion scale in the grade submission function of the AIS.</p>   |
| 5  | <p>The AIS server often Crashed during Peak Time</p> <p>Case description: The AIS server often crashed due to the heavy load at peak times. The academics reported an error message displaying the logo “josso” or “tomcat”. The academics could do nothing whenever such an incident occurred.</p>                                     | <p>Method of use:<br/>Direct use</p> <p>Usage type:<br/>System domination by inaction</p> | <p><i>There was congestion when all of the academics tried to input data at the same time. In the end, the server crashed. (A7, 30s, female, faculty B)</i></p> <p><i>But we have to submit it at the end of the semester together with all the academics. The server was down at night as the students were also filling out their study plan. The load was high. That really bugs me. (A9, 40s, male, faculty B)</i></p> <p><i>There are too many people trying to get in, but I think we don't have enough servers. That “josso” or “tomcat” logo appeared whenever the system is down. Whenever that happens, I chose to go to sleep. (A19, 50s, female, Faculty D)</i></p> <p><i>The server is often down at those times. The PIN that was sent by text or email was sometimes late. (Staff S10)</i></p> | <p>The Head of the ICT Centre was notified of the issue. He was considering an initiative to upgrade the server and to load balance the database. Alternatively, a further dissemination is needed to inform the academics that the grade submission is open throughout the semester to reduce the server load.</p> |

| No | Observed Case  | Method and Type of Usage   | Statement Example   | Recommendation  |
|----|--|--|---|---|
| 6  | <p>Use Delegation of the Grade Submission Function</p> <p>Case description: Several academics admitted to delegating the use of the AIS to surrogates. Security risks were identified as this may involve exposing the academics' AIS accounts for the surrogates to access the system and the academics' email accounts to check the PIN needed for the grade submission.</p> | <p>Method of use: Indirect use</p> <p>Usage type: Use delegation</p> | <p><i>Oh no. I didn't do it by myself. My teaching assistant was the one inputting the grades. I find it very difficult. (A2, 60s, female, Faculty A)</i></p> <p><i>Occasionally, there would be a delay for the PIN request (sent through SMS). My assistant would operate the AIS, but I was the one carrying the cell phone. And they would ask me: "How is it going, Sir? Have you got the PIN yet?" (A3, 60s, male, Faculty A)</i></p> | <p>The researcher recommended to the executives that mentoring needs to be facilitated in all the faculties to minimise the use delegation.</p> |

Based on the analysis, two methods of usage were captured: direct and indirect. The direct usage involved three cases of circumvention by false perception, one case of circumvention by misaction, and one case of system domination by inaction.

In the cases of circumvention by false perception, the academics falsely perceived a problem with the AIS and so introduced unnecessary workarounds that were unanticipated based on the design of the AIS (Wilkin & Davern, 2012). The case of circumvention by misaction was similar. However, the workaround was not only unanticipated but may also result in negative effects for the students.

The cases of circumvention indicate that the academics had received insufficient or misleading information concerning the AIS, most probably due to the ineffectiveness of the managerial interventions. In the case of system domination by inaction, the academic perceived a problem with the functionality of the AIS but was incapable of providing a remedy and thus was dominated by the system (Wilkin & Davern, 2012).

The indirect usage of the grade submission function by the academics led to the case of use delegation to surrogates. This is described in the following section.

#### **6.4.1.3 Indirect Use of the Grade Submission Function**

It was found that all of the academics interviewed were adopting the AIS. However, as shown in Table 6.3, there were variations in the actual methods of use, as there were some academics who used the grade submission function directly, while others used it indirectly.



Table 6.3 AIS Method of Use Based on the Demographic Information of the Academics

| Method of Use  | Academic Code | Base Faculty | Gender | Age Groups | Working Years | ICT Background |
|----------------|---------------|--------------|--------|------------|---------------|----------------|
| Direct Usage   | A1            | A            | M      | 50s        | 32            | Limited        |
|                | A4            | B            | M      | 30s        | 10            | Informal       |
|                | A5            | B            | M      | 50s        | 30            | Limited        |
|                | A6            | B            | M      | 40s        | 13            | Limited        |
|                | A7            | B            | F      | 30s        | 8             | Informal       |
|                | A8            | B            | F      | 30s        | 10            | Formal         |
|                | A9            | B            | M      | 40s        | 16            | Formal         |
|                | A10           | C            | M      | 40s        | 16            | Formal         |
|                | A11           | C            | F      | 30s        | 2             | Limited        |
|                | A12           | C            | F      | 60s        | 34            | Informal       |
|                | A13           | C            | M      | 60s        | 40            | Informal       |
|                | A14           | D            | M      | 60s        | 30            | Informal       |
|                | A15           | D            | F      | 30s        | 8             | Informal       |
|                | A16           | D            | M      | 50s        | 30            | Limited        |
|                | A17           | D            | M      | 30s        | 11            | Formal         |
|                | A18           | D            | F      | 50s        | 32            | Limited        |
|                | A19           | D            | F      | 50s        | 26            | Limited        |
| Indirect Usage | A2            | A            | F      | 60s        | 36            | Limited        |
|                | A3            | A            | M      | 60s        | 35            | Limited        |

Based on Table 6.3, 17 out of the 19 academics were found to directly use the AIS. Although dominated by younger academics who were below 60 years old, there were also three academics who were above 60 years old. However, based on the interviews, the three senior academics had an informal ICT background as they were either educated abroad (i.e., Academic A12) or had ICT-related experience (i.e., Academic A13 and Academic A14). On the other hand, two academics (i.e., Academic A2 and Academic A3) were indirectly using the AIS by way of delegating its use to surrogates. These two academics were senior academics who were above 60 years old and with limited ICT background.

The age factor and the ICT background seemed to have a strong influence on the ICT competence of the academics, while gender did not appear to have the same influence. As the academics were permanently tenured in the University, their working years tended to be consistent with their age and did not appear to have any influence on the way they used the AIS. The academics who were younger or had a formal or informal ICT background tended to have a higher ICT competence and used the AIS directly.

It was discovered that cases of indirect use were not only limited to the two academics who were interviewed (i.e., Academic A2 and Academic A3). The cases of indirect use involved many other academics in the University and were further explored based on the interviews with the participating academics and administrative staff. They were asked about the reasons for this practice and the surrogates that were involved in it. Their answers are presented in Table 6.4.

Table 6.4 Reasons for Delegating the Use of the AIS

| No | Reasons for Delegating Use              | Identified Surrogates | Statement Example   |
|----|---|-----------------------|---|
| 1  | ICT Competence (Age and ICT Background) | Peers                 | <i>Oh no. I didn't do it by myself. It's just the same as with any other systems. I am getting help from my friends. (A2, 60s, female, Faculty A)</i><br><br><i>IT is important. Technology is important. But for us, the seniors, those are irritating tasks. But because it is demanded, we still do it but through our friends. (A3, 60s, male, Faculty A)</i> |
|    |   | Staff                 | <i>They gave us the grades. We opened their AIS accounts but the PIN went to their phones. Then they informed the PIN to us and we submitted the grades. Sometimes they gave us all of their PINs for all of the offerings and then we opened the system from here because it's much faster that way. (Staff S10)</i>   |
|    |   | Teaching Assistants   | <i>For the grade submission, I rely on my teaching assistant. My assistant was the one doing it for me. That's a real burden for me. (A2, 60s, female, Faculty A).</i>  |
|    |   | Relatives             | <i>I also asked my nephew to do it for me at home. (A3, 60s, male, Faculty A)</i><br><br><i>They usually asked their children at home to do it for them. I am sure that they don't have any vested interest in it. (Staff A1)</i>   |
|    |   | Not Identified        | <i>Mr. M instructed someone else to do it. He doesn't want to know about it. He'll leave the grade submission to someone else. (A6, 40s, male, Faculty B)</i><br><br><i>They chose to pay other people to do it because they don't understand it. They don't even know how to operate a smartphone, let alone the AIS. (A18, 50s, female, Faculty D)</i>          |

| No | Reasons for Delegating Use | Identified Surrogates | Statement Example   |
|----|----------------------------|-----------------------|---|
| 2  | Time Constraints           | Peers                 | <i>I personally think it's not because she cannot operate computers. It's just that she didn't have the time. (A11, 30s, female, Faculty C)</i>   |
|    |                            | Staff                 | <i>In this department, they usually asked for assistance from the administration staff, who are trusted and work well. So there are no problems. So this is for the academics who are either busy or have low ICT competence. (A14, 60s, male, Faculty D)</i><br><br><i>Sometimes the academics would say that they're busy. They gave us the grades. (Staff S10)</i>   |
|    |                            | Teaching Assistants   | <i>Mrs. N is familiar with IT. She still tries to do it by herself, but sometimes would delegate it to her assistants if it's too much. (A9, 40s, male, Faculty B)</i>  |
|    |                            | Relatives             | <i>It's because my mother and I worked here as academics. So she knows the schedule for the grade submission period. She usually asks me to do it for her. It became a habit up until now. (A7, 30s, female, Faculty B)</i>   |
| 3  | Power Relations            | Staff                 | <i>When I was the head of a lab, the lab staff did it for me. I said: "I have to do this and this". He said, "That's okay. I'll help you". (A2, 60s, female, Faculty A)</i><br><br><i>They usually asked for assistance for the grade submission, but not for the student advisory function. They also asked for the students' attendance lists and then emailed the grades to me or sometimes their assistant would give the grades to me. (Staff S7)</i><br><br><i>The senior academics don't want to input the grades. They just handed them over to someone else. They said, "I am a senior. I don't want to learn the computer. I'll leave this you." And they gave us the PIN, the user, and the password. The PIN was even directed to our phone numbers. We cannot force them to do it as they are seniors. They said, "I don't want the hassle." (Staff S10)</i> |
|    |                            | Teaching Assistants   | <i>We think of the teaching assistants as our own children. We trust each other and they respect us. Nothing unusual ever happened. (A3, 60s, male, Faculty A)</i>  |
| 4  | Laziness                   | Not Identified        | <i>It's so typical for them because they are lazy, ICT illiterate, and don't want to learn. (A18, 50s, female, Faculty D)</i><br><br><i>Some of them wanted to learn to some extent, but others are simply lazy and prefer to pay someone to do it. It's not worth it to talk with the second group because they just don't want to do it. (A14, 60s, male, Faculty D)</i><br><br><i>But this is only for administration purposes, not to judge for performance. (A3, 60s, male, Faculty A)</i>   |

Based on Table 6.4, the reasons for delegating use were due to the low ICT competence (caused by the age factor and limited ICT background), time constraints, power relations, and laziness. They delegated the use of the AIS to four categories of surrogates: peers, administrative staff, teaching assistants, and relatives.

Based on the statements, several academics even went to the extent of paying surrogates to use the AIS on their behalf. The issue of power relations was evident as some of the surrogates may have had no other choice but to fulfil the request of the academics. There was also a high degree of respect shown by certain surrogates (i.e., administrative staff and the teaching assistants) towards the academics.

Other than the risks pertaining to the student grades, there were also risks with regard to the security of the login credentials for the AIS, the academics' emails and cell phones. These risks involved the security layers for the grade submission, which were also considered as one of the drawbacks of the AIS by the academics. An analysis of the security layers in the grade submission function is described in the next section.

### **Security Layers for the Grade Submission**

The multiple layers of security that were meant as safety precautions were taken for granted as the academics gave the surrogates the login accounts for the AIS and email, and access to their cell phones. An academic thought that as long as the physical copies of the grades were kept, any complaints being made by the students could later be addressed.

*The password that was supposed to be kept a secret is at risk. That's the weakness. But we did it because we wanted to get the job done. We don't have any suspicions about the surrogates and nothing unusual ever happened. (A3, 60s, male, Faculty A)*

*They are ignorant about the process. But the important thing is that they have the physical copy so that they can show it to the students if they receive any complaints. They're don't have any consideration of whether it's safe or not, they even gave away their passwords and cell phones. (A10, 40s, male, Faculty C)*

An academic who graduated from a foreign university stated that the level of security in the AIS is far more rigid, compared to the security in the system that he once used abroad. The AIS required the academics to log in with their account and enter their PIN information before they

could submit grades for each class offering. One coursework unit may consist of several class offerings, depending on the numbers of students enrolled and the capacity of the class.

*I think the security is better here as it has multiple layers and you have to input the PIN for every offering. That's good. We didn't have it there. We only use our email to log in. (A17, 30s, male, Faculty D)*

However, as stated by several academics, the requirement to submit PIN verification for submitting grades for each class offering was considered tedious. This was especially true for academics with many classes as they had to wait for each PIN to be sent out to their emails or texted to their cell phones. This also meant that the AIS exhibited high interdependencies with other systems such as the email system and the SMS gateway system.

*Its weakness is when we have to get the PIN sent out to our emails or cell phones. That's when we started to have problems. I don't know whether it is possible to remove that feature and use the username and the password only so that we don't have to repeatedly acquire PINs. I think that's a bit irritating. (A14, 60s, male, Faculty D)*

*Sometimes the AIS is annoying because we have to get PIN information to submit grades for each offering. But that's the way it is. There's nothing I can do about it. (A17, 30s, male, Faculty D)*

*So they were sent through SMS and email. Sometimes we requested the PIN, but then did not immediately get it. (A3, 60s, male, Faculty A)*

It was observed throughout the interviews that not all the academics had or were familiar with the use of emails. Therefore many of them would rather chose to have the PIN forwarded through an SMS to their cell phones. However, the process of sending the SMS was seen to be problematic as the ICT Centre used a prepaid card for their SMS gateway and must recharge the number manually. A problem arose when the quota was running out and they did not realise it.

### **Indirect Use as Perceived by the Executives**

The university executives were asked about the issue of use delegation and its risks to the security of the system during their interviews. Interestingly, none of the executives were surprised about the issue. This may be due to the fact that the executives are also active academics who were well aware of this practice among their colleagues. The executives tended

to tolerate the practice and to show good faith in the academics, who must have had no other option due to their limitations.

*The submission of the grades by the administrative staff must be accompanied by the relevant academics, so that the grades are kept as is. But they may not hand it over to them just like that without supervision. (Vice-Rector B)*

*I don't see that as something wrong as long as there is no violation. What I mean by not violating is that the surrogates, either it's their son or anyone else, are inputting the grades as is. It becomes a problem when that person has a vested interest in the process. (Head of Quality Assurance)*

*Some of them asked their children to input the grades or delegated the use to the staff. There are variations in usage but the point is that all of them adopt the AIS. Our expectation is for them to use it by themselves, but everyone is different. For instance, if I were to retire in two years, I will delegate its use to my staff while waiting for my retirement. We have these kinds of academics. However, several others think of the AIS as new and interesting and they are willing to learn. (The Head of the ICT Centre)*

*That's beyond the authority of the system, the authorities, and the policy. The principle is that we gave the account to those who have the right and the responsibility, which are the academics. If the use is delegated to others, that's their responsibility. But we have a system that can monitor the log, account security and so on. We have trust in them and because our academics have high integrity, I don't think anything out of the ordinary is going to happen. The principle is that an account login must be kept secret and is the responsibility of the account owner. (Director of ICT)*

The Director of ICT was stricter regarding the indirect use and thought that the login credentials and the student grades were the responsibility of each academic. Nonetheless, similar to the views from other executives, the principle was that trust became an important measure of the practice, either the trust from the executives toward the academics or the trust from the academics to their surrogates.

The following section analyses the use of another important feature in the AIS, which is the student advisory function.

### 6.4.2 Student Advisory Function

The student advisory function was an essential feature of the AIS as it was intended to facilitate the academics in providing academic advice to the students. The themes associated with the use of the student advisory function are described below.

#### 6.4.2.1 Benefits of the Student Advisory Function

Prior to the adoption of the AIS, the student advisory process was conducted traditionally with the students obligated to consult face-to-face with their advisors concerning their academic progress. The advisors' signature of approval was then given on an enrolment form as a sign that the students had undertaken the consultation. The academics had to record the academic information for each student themselves as there was no such tool provided by the University.

The student advisory function enabled the academics to access academic information on the students, such as their grades, GPA, performance chart, and statistics. Many of the academics confirmed the benefit of the AIS, such as its easy access to the academic information on their students.

*With the AIS, we can see more information regarding the students. I can see their progress and their GPA. That's convenient. (A6, 40s, male, Faculty B)*

*Yes, we can see all the information, per semester, per offering. (A10, 40s, male, Faculty C)*

However, similar to the grade submission function, there were also problems with regard to the student advisory function. Based on the interviews with the academics, the problems and the unanticipated usage were identified and are described in the following section.

#### 6.4.2.2 Problems with the Student Advisory Function

With the student advisory function, students were allowed to perform self-enrolment for their desired coursework units. One academic stated that based on the policy of the University, provided that their GPA was 2.0 and above (out of the 4.0), the students were not obligated to consult with their advisors prior to enrolling for coursework units. On the other hand, students with a GPA of under 2.0 were considered to have problems and therefore were obligated to consult to their academic advisors.

*The students can program their coursework units online from their home during the holiday. They don't need to meet their advisor. (A7, 30s, female, Faculty B)*

During the consultation, the academic advisor would then restore the students' privilege using the student advisory function in the AIS so that the students could perform self-enrolment for their coursework units. However, Academic A3 and Staff member S10 stated that many of the academics were still unaware of such a procedure, as there were not that many students with a GPA of under 2.0.

*The students with a low GPA must ask for the advisors to restore their access for the coursework's self-enrolment. But many of the academics don't know about this because they are not familiar with this feature in the AIS. (A3, 60s, male, Faculty A)*

*It's to enable students to perform self-enrolment, but most of the academics don't know about this. I don't think there has been any further dissemination about this feature. (Staff S10)*

Based on the interviews, all of the academics agreed that the policy of the University concerning the students' advisory function in the AIS was creating new problems, compared to the previous system. A list of the identified problems along with examples is presented in Table 6.5.

Table 6.5 Problems with the Student Advisory Function

| No | Identified Problems       | Statement Example   |
|----|---------------------------|---|
| 1  | Limited human interaction | <p><i>Online system and ICT are dehumanising. We used to meet the students. Now we rarely meet them. This is a weakness. (A3, 60s, male, Faculty A)</i></p> <p><i>We only knew the students that we are supposed to advise from our assignment letters, but then we were only confronted with the students' graphical information. Unlike the previous system, now we don't know who they really are. Something is missing and we need to get it right. (A9, 40s, male, Faculty B)</i></p> <p><i>Especially for the student advisory function, I don't think that it worked. Although we have their data, all we know is that we advise a certain number of students. But I think this should be executed conventionally, face to face, and then we make notes of the meeting. (A14, 60s, male, Faculty D)</i></p> <p><i>With the current advisory function, the human interaction is being limited. The students ask for advice only when they have problems. When they have no problem, especially with GPA, they would never communicate with us. (A6, 40s, male, Faculty B)</i></p> |



|   |                                |   |
|---|--------------------------------|---|
| 2 | Limited advisory function      | <p><i>Now with the computerisation, they never consult with us. Probably just, "I can't register for the coursework unit. Please, as my advisor, could you restore it so that I can register this course?" (A2, 60s, female, Faculty A)</i></p> <p><i>What has been going on is that they will come to us only when they have a low GPA. They will not consult with us otherwise. And that's not too effective. (A10, 40s, male, Faculty C)</i></p> <p><i>The weakness of the advisory system is that now they can take whatever coursework they want without consulting with us like it used to be. Now they never meet us and do not need us. (A12, 60s, female, Faculty C)</i></p> |
| 3 | Less control of the students   | <p><i>As advisors, we could not control the students' progress, what their problems are, and what issues they're having. (A18, 50s, female, Faculty D)</i></p> <p><i>Before, we have control as every student must consult the academics to program their coursework irrespective of their GPA. (A10, 40s, male, Faculty C)</i></p>   |
| 4 | Less respect for the academics | <p><i>The students liked the fact that ICT replaces us. This is the gap. We then forgot about the students and the students' level of respect for the academics is decreasing. (A6, 40s, male, Faculty B)</i></p>   |

Based on Table 6.5, the identified problems with the student advisory function are the limited human interactions, the limited advisory function, less control over the students, and less respect for the academics. As most of the students have a GPA of over 2.0, the common practice was that they would perform self-enrolment for their coursework units without first consulting with their advisor.

As stated by Academic A3, in a case where students acquire a GPA of above 2.0 during their entire study, there is a high chance that they will never meet their advisors, even up to when they graduate from the University.

*Many of the students don't know their advisors anymore and many of the advisors don't know their students. I just realised this when they're about to graduate and said to them, "It turns out that I'm your academic advisor." (A3, 60s, male, Faculty A)*

*ICT is helping us but the human side is not represented. Whatever it is, humans can never be replaced with machines. (A19, 50s, female, Faculty D)*

*The consultation was compulsory in the previous system, but there was no guarantee they will come to consult, let alone making it optional like what happens now. (A6, 40s, male, Faculty B)*

In the above statement, Academic A6 stated that the students in the University were typically known to avoid consultations with the advisors, even before AIS was adopted. This issue was

exacerbated by the policy for the student advisory function and posed many new problems concerning the student advisory process.

### **The Perspective of the Executives and the Administrative Staff**

The Director of ICT and Vice-Rector B stated that basically the student advisory function did not limit the students' rights to consult with their academic advisors. They expressed that the purpose of the student advisory function was to make it easier for students whose GPA is 2.0 and above to enrol in coursework units. Vice-Rector B added that another purpose included guiding the students not only with regard to their academic problems but also any non-academic problems.

*First, academically and substantially, consultation can be done at any time and the academic must provide the service. That's the principle. Secondly, we must not administratively delay students who want to enrol in a unit provided, that they are not problematic. We must not force them to travel interstate just to get an approval from their advisor as it may be a burden for them. By doing it this way, the access, the equality, and the ease are met. But they have to meet their adviser if their GPA is below 2.0 and the advisor must ask, "Why and how is this happening?" (Director of ICT)*

*The enrolment in coursework units is held during the holiday when the students can be located far away from campus. The system minimises the much-needed effort and cost for the student to physically come to campus. The students can choose to interact with the academics by email and other means. This is a form of efficiency. The purpose of the advisory function is to guide the students in resolving their difficulties. The role of the advisor is not simply to give approval for the students' coursework units. There are non-academic issues that must be acknowledged by the academics, for instance, a student who passed exams but is depressed due to a problem with friends. We need to know these kinds of things. (Vice-Rector B)*

During the interviews with Staff member S3, S6, and S10, they confirmed that the majority of the stakeholders in the University would prefer to obligate all of the students, without exception, to consult with their advisors. Staff member S2 even suggested that Faculty C came up with an initiative to obligate all students to have the consultation. He added that other faculties tried to resolve the matter with their own initiatives regardless of the University's policy.

*There are requests from all of the faculties that all the students, regardless of their GPA, must consult with their academic advisor. (Staff S3)*

*That's the complaints that we had, either from the executives, the students or the academics. They complained that there was no interaction and consultation for the student advisory function. They (the students) only asked for the signatures and then left. The real function of giving advice is non-existent. (Staff S6)*

*Back then the students had to consult with the academics when programming their coursework units. That is not the case with the online system as the students can now easily add and remove any coursework. There is no such thing as an advisory function. (Staff S10)*

*As far as I know, Faculty C had an initiative to obligate the students to consult with the academics prior to the mid-term exam. Other faculties also have different approaches for this. This is not the University's policy. (Staff S2)*

### **Future Plan for the Student Advisory Function**

Vice-Rector A was in charge of the academic issues at the University. During an interview, he provided information regarding a future plan to accommodate the stakeholders' demands regarding the advisory function. However, during the time the fieldwork was conducted, fresh information from Staff member S1 suggested that the proposal from Vice-Rector A was refused by the University Board.

*We will increase the role of the academic advisers. This is what we planned. So, whether the students' have problems or not, their GPA is below or above 2.0, they have to meet their advisors. (Vice-Rector A)*

*The executives were discussing the possibility of obligating the students to consult with their academic advisors, so that the advisors can monitor and approve their study plans. But the latest news is that the University Board does not approve of that initiative. (Staff S1)*

The student advisory function was identified as having numerous problems, some of which were still left unresolved when the fieldwork for this research was done. Among other antecedents, this issue led to cases of unanticipated usage, which are described in the following section.

#### **6.4.2.3 Variations in Usage of the Student Advisory Function**

The problems within the student advisory function have led to variations in its usage by the academics, the faculties and the departments in the University. The researcher informed the executives of these variations of usage, along with several recommendations to follow up the issues. Using the modified taxonomy of system usage (Based on Wilkin & Davern, 2012), an analysis of the usage of the student advisory function is presented in Table 6.6.

Table 6.6 Variations in Usage of the Student Advisory Function

| No | Observed Case   | Method of Use and Usage Type   | Statement Example   | Researcher Recommendation   |
|----|---|--|---|---|
| 1  | <p>Coursework Pre-requisite Problem</p> <p>Case description: A bug in the AIS had allowed students to program a coursework unit without completing its pre-requisite. To solve the problem, the academics had to check manually with the students at the beginning of the semester.</p>             | <p>Method of use:<br/>Direct use</p> <p>Usage type:<br/>User innovation by consent</p> | <p><i>The AIS is still not perfect. The filter for whether or not a student has taken a pre-requisite unit is not there. When students attend the class for the first time and the lecturer does not bother to ask each of them about it, they can get away with it (A7, 30s, female, Faculty B)</i></p> <p><i>Sometimes I found students who got away without having to take the prerequisite for the internship program. (A5, 50s, male, Faculty B)</i></p>   | A recommendation was given to the Head of the ICT Centre during the fieldwork and an effort was made to resolve the issue.  |
| 2  | <p>Initiatives to Provide Student Advisory Meetings</p> <p>Case description: Several academics, faculties, and departments that did not want to lose control of their students had come up with an initiative to obligate all students to attend consultation sessions regardless of their GPA.</p> | <p>Method of use:<br/>Direct use</p> <p>Usage type:<br/>User innovation by consent</p> | <p><i>We still meet the students to avoid losing contact. We held advisory meetings with the students and met them at least 4 times during the semester. (A3, 60s, male, Faculty A)</i></p> <p><i>We are obligated by the department to do so. The students still meet us based on a schedule. It's at least 3 to 4 times for each semester. The schedule is set by the academics. This is the instruction of the Head of the Department. (A11, 30s, female, Faculty C)</i></p> <p><i>We are obligated to conduct face-to-face meetings because their study plans must be signed by the advisor and stamped by the faculty. I gave all of them the same treatment. So in the first week of the semester, I have to know their programmed coursework units as verified by the system. I have to know what offerings they took and they have to consult one by one in one big class (A17, 30s, male, Faculty D)</i></p> | Information about the current condition was provided to the executives during the fieldwork. The executives expressed that they were in the process of reviewing the policy for the online advisory function. |

| No | Observed Case  | Method of Use and Usage Type  | Statement Example  | Researcher Recommendation  |
|----|--|---|--|--|
| 3  | <p>Reward-and-Fine System</p> <p>Case description: An academic felt that she was losing control of the students due to the online advisory function. She came up with an initiative to use a reward-and-fine system to motivate the students to increase their GPA.</p>  | <p>Method of use:<br/>Direct use</p> <p>Usage type:<br/>User innovation by consent</p>    | <p><i>This is to motivate them so that their GPA increases. I gave the students cash reward for those whose GPA increases and a fine for those whose GPA decreases. That's my own initiatives as their advisor. Oftentimes I came up short, but I said to them, "I am okay with it". (A19, 50s, female, Faculty D)</i></p>   | <p>Such an effort proved that the online student advisory function is problematic. This adds to the reason for the executives to review the policy for the student advisory function in the AIS.</p>   |
| 4  | <p>Absence of the Student Flagging Feature</p> <p>Case description: An academic stated that there is no feature to flag or to mark students with a GPA of under 2.0 in the students list in the AIS. As a consequence, it is time-consuming for the academics to open the details of the students to determine whether or not they qualify to skip academic consultation. The academics could do nothing with regard to the issue.</p> | <p>Method of use:<br/>Direct Use</p> <p>Usage type:<br/>System Domination by Inaction</p> | <p><i>I feel that there are things that need to be fixed, for instance with regard to students with the GPA of under 2.0. I hope that there will be a flag for them when we open the system rather than clicking the students one by one. If a student came to me and said, "I can't program my course, sir". I could only reply, "I thought that you have no problems with your study". (A17, 30s, male, Faculty D)</i></p> | <p>The absence of the flagging feature was discussed during an interview with the programmer of the AIS and he realised that it made sense for the flag to be added. He promised to add the feature to the student advisory function in the AIS.</p> |

The circumvention of the student advisory function was dominated by cases of user innovation by consent, where the academics perceived a problem in its functionality and so introduced innovative workarounds that had a positive effect on the academics and the University (Wilkin & Davern, 2012). Many of the academics, the faculties, and the departments saw problems in the student advisory function of the AIS and then tried to overcome them by providing innovative efforts that were generally accepted as solutions, such as obligating all of the students to consult regardless of their GPA.

Several recommendations were given by the researcher to the executives with regard to the circumvention of the AIS, which were accommodated by the University. The executives promised to take the recommendations into consideration at the University Board meetings. The actionable advice was also given to the Head of the ICT Centre and the programmer of the AIS based on the interviews. By taking into account the advice, reinventions in the form of upgrades were then made to the AIS.

### **6.4.3 Discussion of the Assimilation Process**

Following the secondary adoption process, the academics began to use the AIS to assist them in their day-to-day tasks. This usage by the academics signalled the beginning of the assimilation process (Gallivan, 2001b). The fieldwork for this research was conducted at the end of 2015, three years after the introduction of the AIS to the academics in the University.

In general, the data analysis showed that the implementation of the AIS had resulted in an increase in the effectiveness of the University. The benefits acquired from the AIS and the variations of its usage by the academics suggested that the AIS had been used extensively and to its full potential. This indicates that the implementation of the AIS had reached the final stage of implementation, which is the infusion stage (Cooper & Zmud, 1990).

Gallivan (2001b) argued that a strong top-down bureaucratic culture facilitates early stages of innovation implementation, but can potentially impede further assimilation. Hartwick and Barki (1994) made clear that in the later stages, the employees may respond by demonstrating a different extent of use of the innovation.

The findings showed that although the AIS was adopted by all of the academics, there were variations in its actual usage. The taxonomy of system usage (Wilkin & Davern, 2012) was particularly useful in analysing the variations in the usage of the AIS. Based on the analysis, two methods of use were captured: direct and indirect.

The direct use of the grade submission function was dominated by cases of circumvention by false perception, in which the academics falsely perceived that problems existed in the AIS and so introduced unnecessary workarounds. These cases indicated that the academics had received insufficient or misleading information concerning the AIS, most probably due to ineffectiveness of the interventions provided by the University.

The indirect use the grade submission function was the main issue in the implementation of the AIS as it jeopardised the security of the system and the validity of the student grades. The main reason for the indirect use was related to the age factor and the ICT background, as senior academics with low ICT competence delegated the use of the AIS to surrogates. This finding is consistent with previous studies (e.g., Gallivan, 1995; Gallivan, 2001b; Tong et al., 2008), which found that older generations tend to have limited cognitive abilities in using new technology if compared to younger generations.

The issue of power relations was also found to be an influence as the surrogates (i.e., younger academics, administrative staff, students, and younger family members) tended to have a lower rank than the senior academics. As observed in the culture of the University, senior academics were highly respected and had the social power to instruct the surrogates in using the AIS on their behalf.

Other reasons were also identified as the antecedents for such a practice, including time constraints and laziness. Interestingly, the executives tolerated the practice of indirect use, as they acknowledged the low ICT competence of the senior academics. Trust became the main principle in such a practice; either the trust that the executives had in the academics or the trust the academics had in their surrogates.

For the student advisory function, the direct use was dominated by cases of user innovation by consent, as the faculties and the academics were forced to perform innovative workarounds to address problems with the usage policy. Ram and Jung (1991) referred to innovations such as AIS as an 'impersonal medium' that enabled the user to bypass face-to-face contact with other related individuals. While this may be feasible for the grade submission process, its use for the student advisory function, however, does needs to be reconsidered, particularly in the context where students tended to avoid consultation and were highly dependent on their advisors. In the cases of user innovation by consent, the innovative workarounds resulted in a positive effect and became accepted ways to resolve the problems and to perform the tasks.



## 6.5 Post-implementation Mediating Factors

This section describes the post-implementation mediating factors that emerged following the deployment of the AIS and which influenced the secondary adoption and assimilation processes. The mediating factors, which included post-implementation interventions, subjective norms, and facilitating conditions, are discussed in the following sections.

### 6.5.1 Post-implementation Interventions

The post-implementation interventions were made available by the executives to enhance the acceptance of the AIS by the academics (Venkatesh & Bala, 2008). The post-implementation interventions consisted of mentoring, peer support, training, championing the AIS, reinvention of the AIS, user manual and online helpdesk, and infrastructure support.

#### 6.5.1.1 Mentoring<sup>3</sup>

A considerable amount of research has been conducted to study the practice of mentoring (Aubrey & Cohen, 1995; Bozeman & Feeney, 2007; Ragins & Kram, 2007; Swap et al., 2001). However, only a few research studies were conducted into the role of mentoring in the adoption of complex innovations (Chebbi et al., 2007; Gallivan, 1995; Hsieh & Hsu, 2013).

In this research, mentoring is defined as “a system of propagating knowledge from employees who have a sophisticated knowledge, referred to as mentors, to less knowledgeable employees, termed mentees, with personal guidance and assistance” (Hsieh & Hsu, 2013, p. 165). The mentoring program involved the administrative staff, who had more knowledge and experience of ICT, as the mentors, and the academics, who experienced ICT difficulties, as the mentees. The mentoring program is described based on the themes that emerged from the collected data.

#### Mentoring as Envisaged by Top-level Executives

The executives envisaged the mentoring program to be centralised in the faculty, with the purpose of assisting the academics with ICT difficulties, and avoiding too much physical contact between the academics and the ICT Centre. The program was not limited to mentoring the academics regarding the use of the AIS, but was also for more general ICT-related matters.

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<sup>3</sup> The Indonesian term that was provided during the interviews was ‘pendampingan’, which directly translates to ‘accompaniment’. The term ‘mentoring’ was considered appropriate to refer to this concept.

*Ideally, each faculty, not department, has someone responsible so that not everyone contacts the ICT Centre directly. With the online system, it won't be a problem even if you are located in the department or faculty. The system from the ICT Centre can be opened anywhere and anytime. (Vice-Rector A)*

*It (the mentoring program) was organised by the faculty. The faculty was organising a team to assist anyone having difficulties in the department. (Vice-Rector B)*

*We have provided a mentoring program for the AIS. Centralised in the faculty, but divided per department. When the use of the AIS becomes a habit, they will not have any difficulties in using it. That's the concept. (Director of ICT)*

The Director of ICT saw that the mentoring program was more relevant to the senior academics as it was seen as an effective approach for them. He observed that the number of senior academics who joined the mentoring program was decreasing each semester.

*For the generation who are in their 60s, we need a mentoring program, there is no other way. Mentoring and assistance are a must. Whether they use it or not, by trying to find assistance elsewhere, is another story. But this organisation is obligated to provide such assistance. The fact is that with the mentoring program, the academics who came to ask for mentorship have become fewer each semester. Judging from the rate, it is very effective.*

### **The Practice of Mentoring**

Based on the interviews with the academics, mentoring was not practised in all of the faculties. Academics from Faculties A and B stated that their faculties provided a formal mentoring program. However, such an initiative was not conducted in Faculties C and D.

*When it comes to submitting grades, we are supported by the faculty because it has something to do with the security and passwords. We were given a chance to be mentored by the staff. (A1, 50s, male, Faculty A)*

*No, we cannot rely on their assistance (administrative staff) because they also have jobs to do. (A19, 50s, female, Faculty D)*

The mentoring strategy was also different for Faculties A and B. In Faculty A, Staff member S5, as the Head of Administration, held the key role at the faculty level, while several staff members in the department provided mentoring for the academics. Any unsolved problem at the

department level would be reported to Staff member S5 and then could be escalated to the ICT Centre.

*For the operational problems, we have administrative staff in each department. Their duty is to help the administration of the department, including mentoring the academics who have problems. (Staff S5)*

In Faculty B, several administrative staff were also assigned to provide mentoring for the academics but were centrally positioned at the faculty. Each of the staff was in charge of academics from a certain department and the academics could come to the faculty office whenever they had problems.

*This faculty provides mentoring for the academics based on their departments. The purpose is so that we don't have to go too far to the ICT Centre for assistance. (A5, 50s, male, Faculty B)*

The following vignette illustrates an example of how mentoring was practised in Faculty B.

#### **Vignette: The Mentoring Practice in Faculty B**

The Head of Administration in Faculty B, Staff member S6, stated that her faculty provided several administrative staff to mentor the academics with regard to the AIS and other ICT-related matters. In the absence of training, she proposed the mentoring program as a solution to assist the AIS's implementation by providing ICT-savvy administrative staff to guide the academics. The mentors were staff from the administration office, who were assigned to stand by in the office and to allocate their time whenever they were needed by the academics.

During the grade submission period, the academics would be busy marking and submitting the students' grades. Staff S6 ensured that the mentoring program was well facilitated by providing sufficient supporting infrastructure, such as the use of halls with internet access and mentors readily available for the academics.

*We didn't provide training, but a mentoring program was given. We also provide access to halls or rooms that have a strong wifi signal during the grade submission period. Two or three administrative staff will be standing by to mentor the academics. (Staff S6)*

The statement of the Head of Administration was verified by Academic A7 from Faculty B, who praised the mentoring program in her faculty. Staff member S7, one of the staff members who acted as a mentor, added that all of the academics already knew which mentor to look for when they needed assistance.

*There is a good mentoring program in this faculty. When the grade submission period starts, they will schedule a time slot for us to fill in the grades together and there's someone in charge for the session. (A7, 30s, female, Faculty B)*

*The academics already knew who to contact in this faculty, for example Mrs. N is in charge off Department P. The academics from Departments Q and R can consult to me or Mrs. S. An ICT staff member was also assigned for Departments S and T.*

### 6.5.1.2 Peer Support

Peer support is defined as “different activities and /or functions performed by coworkers that may help an employee effectively use a new system” (Venkatesh & Bala, 2008, p. 300). Although peer support is considered as an important form of intervention, little research has been done with regard to its role within the context of innovation adoption and implementation (Jasperson et al., 2005; Venkatesh & Bala, 2008).

The interviews with the academics suggested that they felt more comfortable seeking support from their peers, instead of consulting the ICT Centre over their difficulties with the AIS. The peer support that commonly occurred was in the form of a peer tutorial.

*Our friends taught us or sometimes we are taught or guided by a certain team.  
(A1, 50s, male, Faculty A)*

*In this faculty, if we have trouble, we come to Mr. A. We used to have Mr. S to assist us. (A5, 50s, male, Faculty B)*

Academics from Faculties A and B (such as in the above) still had the alternatives of whether to seek support from their peers, or to consult with the staff mentors about their problems. However, peer support more commonly occurred in faculties that did not provide a mentoring program, such as in Faculties C and D.

*I usually ask my friends as I am reluctant to ask a higher level. (A13, 60s, male, Faculty C)*

*I studied it at first. I then asked my colleagues in case I bump into difficulties. We have 58 academics here. If any of us has figured out a solution, we will ask him. So it's collegial learning. (A16, 50s, male, Faculty D)*

As Faculties C and D did not provide any formal mentoring program, peer support was therefore considered as the main alternative to solve their problems with the AIS. Whenever a solution for the problem was not found among the peers, they had to go to contact the ICT Centre directly.

*In a case where collegial consultation has reached a dead end due to problems such as forgotten passwords, we will usually seek assistance from the ICT Centre. We discussed it with our friends first and then if it is unresolved, we will march together to the ICT Centre. (A19, 50s, female, Faculty D)*

*We usually try to find certain academics if we have problems, such as Mr. H. He is still young. Mrs. F and her gang are also familiar with IT. We, the senior*

*academics, usually ask for their assistance. If they can't help us, then we will go to the ICT Centre. (A14, 60s, male, Faculty D)*

### **Influence from Younger and Senior Academics**

The role of the younger academics was important because they became the first resource sought after by senior academics who were having difficulties in using the AIS.

*With the senior academics, every time a new system was introduced, we will assist them until they can use it by themselves. So there's always a momentum where we use the AIS together. (A17, 30s, male, Faculty D)*

*Because I have an ICT background, I was involved in helping several friends (A9, 40s, male, Faculty B)*

Seniority was prevalent among the academics as the younger academics have a lot of respect for the senior academics, who were mostly their lecturers when they were still students. In one interview, a senior academic addressed himself as one of the 'actors' who can always rely on the assistance of younger academics and administrative staff.

*We now have this line up of new academics. Beforehand, the younger academics and administrative staff weren't here, so we had difficulties. Yesterday we had to use the system and they were the ones doing the action because seniors like us are actors. We don't do much of that. Or maybe we have gone past that, this is not for us. In the end, what's important is that we get the job done, so we usually ask for their assistance. There's no problem now because our friends have got it covered for us. (A3, 60s, male, Faculty A)*

As pointed out by a young academic in Faculty D, many of the senior academics in his faculty still thought highly of their seniority and demanded respect from younger academics. To avoid any offence, he described how he would approach a senior academic in a subtle way before offering assistance to guide the senior academic, so that he could use the AIS autonomously in the future.

*I would pretend to operate the AIS and sit next to them to avoid them being offended. Sometimes they feel that they are more senior and so would feel reluctant to ask. So I offer to work on it together and just say: "Can I help you with anything?" (A17, 30s, male, Faculty D)*

Younger academics were willing to help fill in online student grade forms in the AIS for the senior academics. As senior academics commonly have difficulties in understanding ICT terms,

younger academics can even go so far as to call the ICT Centre as intermediaries to solve their problem.

*Peer support is very influential. We support and help each other. We help academics who don't have an ICT background. They dictated the grades to us and we helped them to fill in the online form. We always do this together with other friends. Not all of us are young, but it's not hard to get us moving. The whole department is solid. We consult each other whenever a new issue arises. (A7, 30s, female, Faculty B)*

During the interviews, the influence from younger peers was dominant among the academics. Several academics mentioned that younger peers had positively influenced them with regard to their behaviour in using the AIS.

*Every academic has his or her own technique in using the AIS. Some of them submit the grades at the end of the semester and I think that is difficult because it will pile up. From all of those approaches, I try to find the right technique that is easy for me. So in this case, I've looked at the examples from several friends. (A8, 30s, female, Faculty B)*

*I had a discussion with a friend. She said, "I haven't submitted the grades". And I said, "Me too". And she said again, "It turns out that you can use that attachment." I only knew about that information from her. So I downloaded it and used it. That made it easier for me. (A11, 30s, female, Faculty C)*

Nevertheless, during the interviews with several senior academics, they indicated that they had received negative influences from peers of the same generation with regard to how they delegate the use of the AIS to surrogates.

*Professor S came from the same generation as me. When giving a lecture, he had his assistant help him with the equipment. It's always like that when I observe him. But I don't know whether he can use the system at home or not. But he always had a helping hand from his assistant here. So in here, me and Mr. Y, we can't use the AIS at all. I always bring my assistant. In Faculty C, Professor D also did the same thing. (A2, 60s, female, Faculty A)*

*Mr. W also asked for help from the students. So the seniors, such as me, Mrs. A, Mr. S, Mr. Y, Mr. W, Mr. P, we are all ICT illiterate. The point being is that we are committed to get this done, but not by ourselves. (A3, 60s, male, Faculty A)*

### Peer Support – An Informal Intervention

In spite of the fact that many academics opted for peer support as the preferred means of support, it was never established as a formal intervention by the University. As an example, Academic A1 from Faculty A stated that peer support was only encouraged by the executives. Staff member S5, who was from the same faculty, confirmed that peer support was merely an initiative from the academics rather than a formalised intervention from the executives. Based on the observation of Academic A15 from Faculty D, he suggested that peer support should be institutionalised by the executives to guarantee full support for the initiative.

*It's not formal, but it's encouraged for a group of academics in each department to assist each other. (A1, 50s, male, Faculty A)*

*They have to use it whether they wanted to or not. They usually manage it through peer support, assisted by fellow academics. It's their own initiative. (Staff S5)*

*This is a suggestion from me. The basic idea is that the faculty must initiate a certain time where all of the academics are gathered in the faculty's ICT room to operate the AIS. We can operate the AIS together there so that the academics with difficulties will have no choice but to attend. Computers are provided so that they don't have any reason for not bringing their laptop and getting assistance. (A15, 30s, female, Faculty D)*

As many of the academics considered peer support a preferred alternative for their ICT-related problems, the suggestion to institutionalise the initiative seems to be promising for the university's future intervention efforts.

#### 6.5.1.3 Training

The academics stated that there was no training held following the dissemination seminar at the university level. However, training was conducted at the faculty and department levels based on the initiative of each faculty and department. Although training was found to be beneficial for the academics, not all faculties and departments held training.

*The faculty organised training following the dissemination seminar from the University. The faculty held it first and then continued by the departments. It's based on the initiative of the faculty. (A10, 40s, male, Faculty C)*

*We have the AIS training each semester. The academics were gathered in their own departments. The faculty facilitated this by sending invitations to the academics. (A9, 40s, male, Faculty B)*

There were different training approaches for different faculties, such as formal and informal training and general/specialised training. The different approaches in the four faculties confirmed that the training sessions were indeed initiated by the faculties without any direct coordination with the University.

Staff member S1 was the Head of Administration at the ICT Centre and he said that his staff members were often invited to provide internal training for the AIS in several of the faculties and departments. He stated that not all the faculties and departments had such an initiative and suggested the possibility that not all faculties and departments held training for their academics.

*The training for the AIS was usually held internally in the faculties by inviting the staff from the ICT Centre as trainers. But not all faculties held the training.*

The Head of the ICT Centre stated that the AIS training would be given at the university level only if needed, such as in the cases when new academics are recruited or a major feature was added to the system.

*For the basic features of the AIS, we held training if needed or if we have new academics. Sometimes we have it, sometimes we don't. But if we have added features, such as PPL and then KKN, there is a special training for these. There will be training when a new feature is implemented, for instance the e-learning that will be integrated with the AIS. (The Head of the ICT Centre)*

Surprisingly, training was not considered as the main intervention by the University. Aside from sending administrative staff from the ICT Centre to train the academics in the faculties and departments, it seems that there was not much coordination between the University and the faculties with regard to the effort.

#### **6.5.1.4 AIS Championing**

Innovation champions refer to managers who are committed to actively introducing and promoting the use of an innovation in an organisation (Beath, 1991; Jaspersion et al., 2005). Throughout the interviews, the executives and the academics recalled key personnel, who acted as champions during the adoption and implementation of the AIS. Among these champions were the Director of ICT and the Heads of Administration at the faculties.



## The Director of ICT

As stated by many academics during the interviews, the Director of ICT had an important role in the ICT revitalisation effort at the University. This included championing the adoption and implementation of the AIS for the academics. When the interviews took place, the Director of ICT had ended his tenure and the academics felt that ICT services were slowly declining.

*Pardon me, but back then when the Director of ICT was in charge, everything was great. But now the performance is decreasing. The Director of ICT had commitment. All of us were guided and served in using the AIS. His era was great. He tackled all problems by himself. (A3, 60s, male, Faculty A)*

*Yes, sometimes we coordinate with the Director of ICT. He often asked us: "What innovation do you want me to make?" It was when he was still handling IT. Now, it's up and down, but mostly going down after the Director of ICT ended his tenure and also after Mr. F (a middle manager) was moved to the head office. (A5, 50s, male, Faculty B)*

*No one is doing the monitoring nowadays. Who filled the Director of ICT's position? He was full of commitment. Well done. (A6, 40s, male, Faculty B)*

Staff member S6 mentioned that the Director of ICT was very close to employees of all levels in the University, allowing him to understand their needs with regard to the development of ICT in the University. Staff member S1, as the main programmer of the AIS, added that the Director of ICT had a strong influence during the early development of the AIS.

*There should be someone from the ICT revitalisation team who can grasp the situation at the operational level and simultaneously comprehend the needs of the top-level executives. We've found the right person, the Director of ICT. He came at the right time and was in the right position. I've worked here for 25 years, so I know the characteristics of a leader. Someone like him is very rare and very resourceful. (Staff S6)*

*The key role when the revitalisation team was formed back in 2012 was the Director of ICT. He was the one who had the idea to develop the features of the AIS. He's the pioneer that developed the web version of the AIS for the academics. (Staff S1)*

### Faculty Heads of Administration

The academics stated that several faculty Heads of Administration had a vital role in supporting them during the adoption of the AIS. Several academics reported that the infrastructure and support deteriorated when these key people were transferred to other departments.

*We have Mr. F. We always go to him whenever we face any difficulties. Now we also have Mr. B. Whenever we have a problem we can also go to Mr. B. (A7, 30s, female, Faculty B)*

*The head of my administration office is an expert in IT. It's one of his specialisations. So every time we have such activities, we can easily understand his explanation. (A11, 30s, female, Faculty C)*

The following vignette shows an example of the key role of the Head of Administration of Faculty A as a faculty champion with regard to ICT in general. The role of the heads of administration was pivotal and was associated with the role of a middle manager who has access to the faculty executives and also the staff in the field.

### **Vignette: The ICT Champion in Faculty A**

Staff member S5 was the Head of Administration in Faculty A and can be considered as the local IT champion in the faculty. Several academics mentioned that Staff S5 had the power to influence the deans and to control the ICT staff in each department of the Faculty.

*Structurally, we have someone special here. Staff S5 is our voice. It's great to have someone like him. (A3, 60s, male, Faculty A)*

*The deans and the middle manager and other technical staff are the key roles. So they work together and figure out how it is going to be done? Who will start first? So the leadership is collegial here and they don't distance themselves so that everything can be discussed. (A1, 50s, male, Faculty A)*

During an interview with Staff member S5, he described how he could influence the executives into accommodating ICT innovations and infrastructure in the Faculty.

*So we have a mechanism. The Dean would open a discussion about a problem that came from the University Board. We discussed solutions that are beneficial for the faculty and the stakeholders. We provide suggestions and then simulate some of them to the executives. The executives will then bring the solution to the University Board.*

*For the infrastructure, at first there were only three wifi routers and now we have 15, with the addition of another 12 extra wifi routers at the end of this year. Now we have wifi connections for every building. I persuaded my friend from the procurement team to put that into the working program.*

The academics who have difficulties commonly contact the ICT Centre directly for solution. However, in Faculty A, instead of letting the academic contact the ICT Centre directly, Staff member S5 localised their problems in the faculty and then acted as an intermediary between the academics and the ICT Centre.

*We don't want to cause an uproar. The Faculty can deal with the ICT Centre through me as much as possible. We localise the problems at the faculty so the academics don't have to go to the ICT Centre by themselves. I feel sorry for senior academics in other faculties who had to walk to the ICT Centre by themselves. I don't think such a thing is necessary.*

*Often the academics have problems with student grades and need to reset the permission at the ICT Centre. In other faculties, the academics must go to the ICT Centre by themselves. But here, that goes through me as I communicate that with to ICT Centre and the academics can wait for my confirmation. The policy from the dean is that the academics don't have to go there by themselves for whatever ICT problems they have.*

The concern of Staff member S5 is to initiate a procedure where the academics do not feel burdened by ICT innovations such as the AIS and to help reduce the load of the ICT Centre by filtering the queries coming from his faculty.

*At least if this faculty succeeds, others can follow its footsteps. This is the result if we work based on product knowledge and performance.*

Staff member S5 expected that other faculties can follow the example off his faculty as he felt that their efforts had proven to be successful.

#### 6.5.1.5 AIS Reinvention

Reinvention is an effort to adapt a certain innovation to fit the structure and the needs of an organisation (Rogers, 2003). The adaptation of an innovation may come in the form of an upgrade or a modification of its functions or features. The ICT Centre has initiated at least three reinventions of the AIS to suit the needs of the executives and the academics.

##### **First Reinvention - Grade Submission for Internship Program and Community Service Program**

The Head of the ICT Centre recalled a particular upgrade that involved the addition of a feature to submit grades for the internship program and the community service program.

*There was an upgrade or an expansion from the early version of the AIS. We have added the online evaluation mechanism for the internship program and the community service program. We did not plan this when we first developed the AIS. These were administration processes that were done manually beforehand and then needed to be digitalised.*

The grade submission for the two programs was previously done traditionally as the grading process was considered complex. For these two programs, the grades were not only given by the relevant academics, but also by individuals from other institutions where the programs were conducted. An additional feature was added to allow these individuals to access the AIS, submit the grades by themselves and then calculate the accumulative grades based on the multiple grade submissions.

##### **Second Reinvention - Grade Submission Mechanism for Academic Team Teaching**

The process of grade submission can become complicated when one coursework unit is taught by a team of academics. What frequently occurred during the grade submission was that the academics realised that they had made some mistakes in the grades and then were faced with difficulties when trying to revise the grades after they had been being submitted.

In the previous paper-based system, the academics had to write a recommendation letter in order for the grades to be altered. Using the AIS, a coordinator for the team can be selected to handle the grades and be given the flexibility to edit the grades submitted by other academics if needed.

*Sometimes we have a case of miscommunication in terms of the grades when we are doing a lecture with a team of academics. After we submit the grades, other academics said: "I have some changes for those grades". The coordinator*

*can edit this. That is good because the AIS has that flexibility. (A14, 60s, male, Faculty D)*

*The process of revising the grade is easy. For instance, if a student complained about their grades, I can call the ICT Centre to have it reset, and then I can change it. With the previous system, the process was tedious since I had to write a recommendation letter and everything. Now the academics can change the grade themselves. That's practical. (A17, 30s, male, Faculty D)*

### **Third Reinvention - Grade Submission using Microsoft Excel Template**

The early version of the AIS required the academics to input at least five raw score components of the students for each class offering in the online grade submission form. The combination of this tedious process and the academics who lacked ICT skills often resulted in a timed-out session by the system before all the grades could be inputted. Such an incident would result in the academics having to repeat the process from the beginning.

*Before using the Excel template, I constantly worried that the grades that I've typed in the online grade form will be gone. It's because of the session problem. (A8, 30s, female, Faculty B)*

The Director of ICT stated that since 2013, an important reinvention of the AIS involved the option of using an Excel template as an alternative method for the grade submission. As the main programmer of the AIS, Staff member S1 confirmed this reinvention. He asserted that the academics usually utilised an Excel spreadsheet to make a note of the grades. Therefore the addition of a downloadable Excel template preloaded with information about the coursework and the students would really assist with solving the problem. The academics can fill in the Excel spreadsheet offline and later upload it to the AIS without having to waste time filling in the online student form.

*The grade submission was previously done by filling in an online form. Later a request was made to accommodate grade submission using an Excel form. (The Director of ICT)*

*There was much feedback that wanted a feature for uploading Excel files as the academics usually use an Excel spreadsheet to record the student grades. Initially, they wanted to 'copy and paste' the grades from their Excel spreadsheets to the Excel template and make the grade submission easier. (Staff S1)*

The academics emphasised the importance of this feature as it allows them to work offline with the template before finally submitting it to the AIS. With this template, the academics no longer have to fill in the online grade forms, which can be tedious for academics with many classes.

*In the previous version of the AIS, we used to submit the grades using an online grade form. Now, we can download the Excel form and then upload it later. That is feasible and integrated. (A15, 30s, female, Faculty D)*

*The most helpful feature in the grade submission function is the Excel template because it's time efficient and flexible. We can fill in the grades on the worksheet whenever we want. (A8, 30s, female, Faculty B)*

### 6.5.2 Subjective Norms

The subjective norms construct describes the “individuals’ belief about the expectation of relevant others regarding their own secondary adoption behaviour” (Gallivan, 2001b, p. 61). Through previous data analysis, it was found that the norms for the adoption of the AIS by the academics was influenced by the executives, peers, administrative staff, teaching assistants, and family relatives.

The decision from the executives to mandate the adoption of the AIS and provide warning mechanisms for any usage delay or rejection was considered to be prominent in influencing the adoption behaviour of the academics towards the AIS. This issue of the usage mandate was analysed in the pre-implementation interventions section in Chapter 5.

The influence from peers was mostly embedded through peer support, while the influence from the administrative staff was captured through the mentoring program. These influences were already presented in the analysis of the post-implementation interventions. The influence from teaching assistants and family relatives was shown through the cases of indirect use as they became surrogates to assist the academics. A description of this influence was also provided in the analysis of the assimilation process.

### 6.5.3 Facilitating Conditions

The facilitating conditions construct represents “a broad category that captures other factors that can make implementation more- or less-likely to occur” (Gallivan, 2001b, p. 61). The facilitating conditions construct consists of innovation, organisational, and individual attributes.

Concerning the innovation attributes, as the AIS was developed and maintained in-house, it was not considered as an external influencing factor. The attributes of the AIS have already been described in the analysis of the interventions (i.e., the development and reinvention of the AIS) and the assimilation process of the AIS in the University. The organisation attributes construct is related to the bureaucratic and paternalistic culture of the University and was presented in the analysis of the primary and secondary adoption processes.

This section focuses on the individual attributes of the academics as the users of the AIS. Based on the findings, the individual attributes were related more to the age and ICT background of the academics.

### Age Factor

The perspectives of the academics regarding the AIS based on their age category are presented in Table 6.7.

Table 6.7 Perspectives of the Academics regarding the AIS based on Age Category

| Age Category      | Characteristics  | Statement Example  |
|-------------------|--|--|
| Younger Academics | <ul style="list-style-type: none"> <li>• Dominated by younger academics in their 30s, 40s, and 50s</li> <li>• Expressed their enthusiasm in adopting the AIS and showed support and tolerance towards the ICT initiative by the University.</li> </ul> | <p><i>I am happy with everything being online. The previous system was more cumbersome and required me to hand write so many things. It was manual labour. I enjoyed using the AIS as our data is stored and we cannot lose it. It's paperless. (A15, 30s, female, Faculty D)</i></p> <p><i>I am personally supportive since the AIS facilitates the academics in submitting the grades online. There was a barrier of time and place and it has now become easier to access as it is online. (A8, 30s, female, Faculty B)</i></p> <p><i>It has advantages as well as shortcomings as we are still progressing. There's room for improvement. (A7, 30s, female, Faculty B)</i></p> <p><i>I happen to be on my 50s, but I can still follow. Those who have problems are usually above 60. (A16, 50s, male, Faculty D)</i></p> |
| Senior Academics  | <ul style="list-style-type: none"> <li>• Dominated by senior academics who were in their 60s</li> <li>• Did not show a similar enthusiasm and motivation as the first group in adopting the AIS.</li> </ul>  | <p><i>We have to bother about many things. We are stressed. It's a torture. And it goes on repeatedly. (A12, 60s, female, Faculty C)</i></p> <p><i>So the seniors, such as me, Mrs. A, Mr. S, Mr. Y, Mr. W, Mr. P. We are all ICT illiterate. The point being is that we are committed to get this done, but not by ourselves (A3, 60s, male, Faculty A)</i></p> <p><i>Of course (it affected my motivation). And also, we have to go to the ICT Centre if there are mistakes in the grades (A2, 60s, female, Faculty A).</i></p>  |

Based on the table, the enthusiasm and motivation of the academics in adopting and using the AIS was significantly influenced by their age. Younger academics tended to support the changes associated with the AIS, while senior academics tended to resist it.

The Director of ICT had his own categorisation for the academics: the digital generation, the migrating generation, and the offline (hard copy) generation. He stated that different approaches should be made for each category of academics.

*The diversity of our academics is divided into three frames: the digital generation, the migrating generation, and the offline or hardcopy generation. For the digital generation, I figure there was no problem. They immediately understood once we made the introduction. Some individuals from the migrating generation have high acceleration, but the others are still slow. The last one is the third generation who are in their 60s. For the second or the third generation, there is no other way but providing them with mentoring. Mentoring is a must. It is up to them as to whether they use it or would like to get assistance from others. However, this institution must provide such assistance. (Director of ICT)*

In an interview, a young academic stated that although she has limited ICT background, she was used to experiencing ICT innovations such as the AIS.

*I don't have such background. It's maybe because I am used to it. I don't have much knowledge about ICT, but I can operate a computer. That's all. I don't have any knowledge about certain software or anything. But for the basic use, I think that's part of the demand when I was a student. (A11, 30s, female, Faculty C)*

On the other hand, senior academics, such as Academic A3, felt that the AIS was more complicated than the previous paper-based system and he would rely on others when using the AIS. Another academic described her effort to learn ICT by reading a computer handbook but then faced difficulties in grasping the basic concepts. Based on her experience, she has never considered ICT as something easy for her.

*Maybe we have gone past that. That is not for us. At the end the day, what's important is that we get the job done, so we usually ask others to help. (A3, 60s, male, Faculty A)*



*My son bought me a book on how to use a computer. He said, "Why are you so illiterate in ICT?" It's actually because my husband is also ICT illiterate. I've read the book but I still can't understand it. (A2, 60s, female, Faculty A)*

As senior academics often consult about their problems with younger academics through peer support and to administrative staff through mentoring, the younger academics and the staff can share descriptions of the difficulties faced by senior academics. They stated that the senior academics do have a tendency to avoid the AIS as they considered it cumbersome.

*People within those age ranges don't want to be annoyed with such technology. They're already happy with what they have and who they are. They don't want to complicate themselves. (A6, 40s, male, Faculty B)*

*It is because they don't want the hassle and tend to resist new technology. They are willing to be taught and to know something new to some extent. They don't want to improvise. They don't want training because they feel that they may retire in a year or two. They felt that the training will be of no use. (Staff S7)*

Vice-Rector A underlined the problem of the mindset of the senior academics that prevented them from grasping the concept of ICT at their age. The Director of ICT confirmed Vice-Rector A's statement that constant mentoring is the only effective solution for the senior academics.

*We already prepared training sessions for them, at least when I was a dean at my faculty, but they have a mindset that keeps them from understanding the system. I think mentoring is the key. Senior academics will soon retire and that leaves us with the younger ones, who I think have better motivation for using the AIS. (Vice-Rector A)*

*I think it is against their right if we forced them to learn. I think in five years they will retire, so we are being cruel if we forced them. And I think the numbers are decreasing now as they are being mentored by their students, their children, or the academics who were once their students. I feel that the human relationship is more important. (Director of ICT)*

The senior academics claimed to have a mental block towards ICT in general due to their generation. They felt that ICT had never been and would not be playing a part in their lives. They thought that the goal should not be to help them learn, understand and later use the system, but more to help them get the job done. The executives believed that the mentoring program from the University could minimise the difficulties of the senior academics.

## ICT Background

As expected, academics with formal and informal ICT backgrounds seemed to have no difficulties with the AIS. Interestingly, academics who graduated from foreign universities tended to have more confidence and experience with the AIS. One senior academic (Academic A12) was a foreign university graduate who excelled in ICT, compared to others in her generation.

*It's because I already have the background. In fact, I was involved by helping other friends. (A9, 40s, male, Faculty B)*

*Basically, I feel comfortable with it because I was using the same system in 2012 when I went to a foreign college. The grade submission was similar to the AIS, using a converted Excel file. It's similar. (A17, 30s, male, Faculty D)*

*We were given such knowledge in the United States. We were members of a research centre at an American University. We could get everything there, so it was a huge loss if you're not a member. We could get info on news and seminars. It really helped. I was the first one in this campus using 'ResearchGate' at the time. So I was way ahead compared to others. (A12, 60s, female, Faculty C)*

In contrast, other senior academics with limited ICT background expressed that they tended to experience difficulties with technologies in general.

*I have a high dependency. I feel that I cannot do anything. I am sorry for this. For example, to make a PowerPoint slide, I have to rely on my son or a staff member. I never came across IT. When I was a master's degree student, I got my friends to help me with the assignments and exams. I graduated with that degree in year 2000. (A2, 60s, female, Faculty A)*

Based on the interviews, the age and the ICT background of the academics were the major factors that determined their ICT competence. The ICT competence of the academics was considered to significantly influence the adoption and implementation of the AIS in the University.

### 6.5.4 Summary and Discussion of the Post-implementation Mediating Factors

This section provides a summary of the post-implementation mediating factors, which consist of the post-implementation interventions, the subjective norms, and the facilitating conditions.

### Post-implementation Interventions

The post-implementation interventions consisted of mentoring, peer support, training, the AIS championing, the AIS reinvention, and infrastructure support. From the analysis of the secondary adoption process, it was revealed that faculty level dissemination seminars were also provided in the post-implementation phase. Table 6.8 depicts how these interventions were executed in the University.

Table 6.8 List of Post-implementation Interventions

| No | Interventions          | Execution Level                        |
|----|------------------------|--|
| 1  | Dissemination Seminars | Faculty level only (C and D)           |
| 2  | Mentoring              | Faculty level only (A and B)           |
| 3  | Peer Support           | Faculty level only (All Faculties)     |
| 4  | Training               | University and Faculty Level (A and C) |
| 5  | AIS Championing        | University and Faculty Level (A and B) |
| 6  | AIS Reinvention        | University Only                        |

In general, the post-implementation interventions at the University were found to be lacking in coordination and consistency. Aside from the centralised efforts to provide dissemination seminars and the AIS reinvention, other interventions at the faculty level were lacking in coordination with the University as the strategy for mentoring, peer support, and training were inconsistent between faculties and were not implemented across all faculties.

**Faculty Level Dissemination Seminars:** During the interviews with the academics, it was revealed that further dissemination seminars were held at the faculty level to cope with the ineffectiveness of the university level dissemination seminar. This effort was held without much coordination with the University and was not initiated in all faculties.

**Mentoring:** The practice of mentoring was done by assigning academic staff as mentors, who provided personalised guidance concerning the AIS to the academics. The mentoring in this research was associated with the technique of ‘accompanying’, in which the mentors made a commitment to guide the mentee side-by-side during the learning process (Aubrey & Cohen, 1995). With such a technique, the practice of mentoring was found to be an effective approach in assisting senior academics in the University.

Prior research suggested that mentoring facilitates the transfer of tacit knowledge that cannot be done effectively through formal training (Hsieh & Hsu, 2013) and provides a flexible one-

to-one approach that allows a longer time to adapt to new innovations (Gallivan, 2004). As mentoring was proven to be an effective approach, the researcher suggests that mentoring can also be conducted in all faculties in the University by taking examples from Faculties A and B.

**Peer Support:** It was found that the academics felt more comfortable in seeking support from younger or ICT-savvy peers rather than forwarding their queries to the ICT Centre. The peer support in this research refers to a specific approach of conducting informal tutorials or peer mentoring to support peers in the same organisation (Jasperson et al., 2005). This is in line with a previous study which found that informal support from peers is more preferred by employees if compared to the formal support mechanism (Ram & Jung, 1991). In such a case, the effort to seek support from academics who are more ICT savvy can be seen as a form of 'help-seeking behaviour' (Ram & Jung, 1991).

Younger and ICT-savvy academics were also found to be positively influencing other academics in the use of the AIS. Previous studies found that such influence can enhance innovation implementation by forming favourable perceptions of an innovation and reduce anxiety towards it (Fiato, 2012; Venkatesh & Davis, 2000). In line with Ram and Jung (1991), the researcher recommends that the University encourage peer support and facilitate events that enhance social networking to learn about the innovation, especially during the early stages of implementation.

**Training:** The findings showed that the training for the AIS was not centralised in the University but instead was conducted in faculties and departments based on their own initiatives. Although previous studies suggested that training is one of the most important interventions (Archibong & Effiom, 2009; Gallivan et al., 2005; Gulbahar, 2008; Othman et al., 2013; Shaikh, 2009; Venkatesh & Bala, 2008; Wilson et al., 2014), interestingly it was not considered to be the main intervention as it was held with little or no coordination on the part of the University.

It seems that the dissemination seminar was expected to be a replacement for training as the academics were given a basic tutorial on how to use the AIS. However, in the end it was found to be insufficient and further training sessions were held in faculties and departments. In the future, the University could consider the efforts to provide sufficient training prior to the deployment of complex innovations with high interdependencies.

**AIS Championing:** Prior research has acknowledged the importance of using champions during the adoption and implementation of complex innovations (Beath, 1991; Chatterjee et al., 2002; Jasperson et al., 2005; Leonard-Barton, 1988b; Norris, 1999; Purvis et al., 2001;

Taylor & Todd, 1995). Not only have ICT championships proven important in the implementation of either simple or complex innovations (Chatterjee et al., 2002; Purvis et al., 2001; Taylor & Todd, 1995), the role of champions, such as the Director of ICT and the faculty Heads of Administration, was found to be pivotal in the context of a mandated innovation adoption.

Consistent with Beath (1991), the Director of ICT in particular, with his legitimacy and ICT competency, was exhibiting transformative leadership and played an influential role among the executives, the academics, and the staff. Based on the statements from the academics and administrative staff, the role of the Director of ICT was not limited only to the post-implementation phase, but was also present in the pre-implementation phase as he had a major involvement in developing the AIS and planning a strategy for its initial implementation. The assignment of project champions for the implementation of future innovations is recommended. As argued by Beath (1991), in so doing, the University could support the champions by providing them with full assistance, flexibility, and legitimacy during the implementation of the innovations.

**AIS Reinventions:** Complex innovations are more likely to be reinvented by organisations adopting them, in order to fit their structure and needs (Rogers, 2003). As an in-house innovation, the AIS reinvention efforts were recorded to meet the demand of the executives and academics. However, several technical problems were still found with regard to the functions of AIS during the interviews with the academics. It is recommended for the university executives to communicate with the academics regularly, as the users, to ensure that the AIS can cater their needs.

### **The Subjective Norms and Facilitating Conditions Constructs**

Gallivan (2001b) argued that together with the managerial interventions construct, the subjective norms and the facilitating conditions constructs will emerge to mediate between the initial adoption by the managers and the secondary adoption by the employees. In this research, the subjective norms and the facilitating conditions constructs were already captured in the primary and secondary adoption processes, the assimilation process, and the interventions.

The subjective norms construct was demonstrated through the analysis of the influence from the executives (e.g., usage mandate and warning mechanisms), peers (e.g., peer support), and administrative staff (e.g., mentoring), teaching assistants and relatives (e.g. indirect use). The

facilitating conditions construct involves attributes from the innovation, the organisation, and the individual.

With regard to the innovation attributes, the AIS was developed in-house and not purchased commercially. Therefore it is considered to be an embedded attribute of the University and was already explained through the analysis of the post-implementation reinvention and the assimilation process in the University in the previous sections. The organisation attributes construct was related to the bureaucratic and paternalistic culture of the University and was discussed in the analysis of the primary and secondary adoption processes.

Concerning the individual attributes, the ICT competence of the academics was found to be determined by their age and ICT background. The academics with low ICT competence were those who had a limited ICT background and who were above 60 years old and approaching retirement. These academics tended to have difficulties with the AIS as they claimed to experience mental blocks when dealing with ICT. Gallivan (2001b) argued that age and seniority have negative influence on the motivation to learn an innovation, especially in organisations with a bureaucratic culture.

Other individual attributes also came into play and influenced the behaviour of the academics in the cases of indirect usage of the AIS. These attributes include time constraints, laziness, power relations, and the belief that the AIS was merely for administration purposes and therefore could be delegated to others.

## **6.6 Conclusion**

This chapter explored the perspectives and experience of the academics during the secondary adoption and the assimilation processes of the AIS in the University. The result substantiated the findings in the previous chapter regarding the use of the scenario of contingent authority innovation-decisions during the adoption and implementation of the AIS in the University.

Although the nature of such a scenario has allowed for an immediate secondary adoption of the AIS by all of the academics, the following stages were plagued with various kinds of unanticipated usage. The post-implementation mediating factors were identified and were found to influence the usage of the AIS by the academics. Based on the findings, several recommendations have been made to assist the University in the current implementation of AIS and the future introduction of innovations.

The final refined framework is presented in the next chapter.

## 7 Final Refined Framework

This chapter discusses the final refined framework for the organisational adoption and implementation of innovations resulting from this study. The influences of the mediating factors towards the usage of the AIS are also described.

### 7.1 Final Refined Framework

In the early stages of this research, Gallivan's framework was modified by way of incorporating Venkatesh and Bala's (2008) concepts and classification of interventions. The modified framework became the preliminary conceptual framework that was used as a theoretical lens for the research. This framework is illustrated in Figure 7.1.

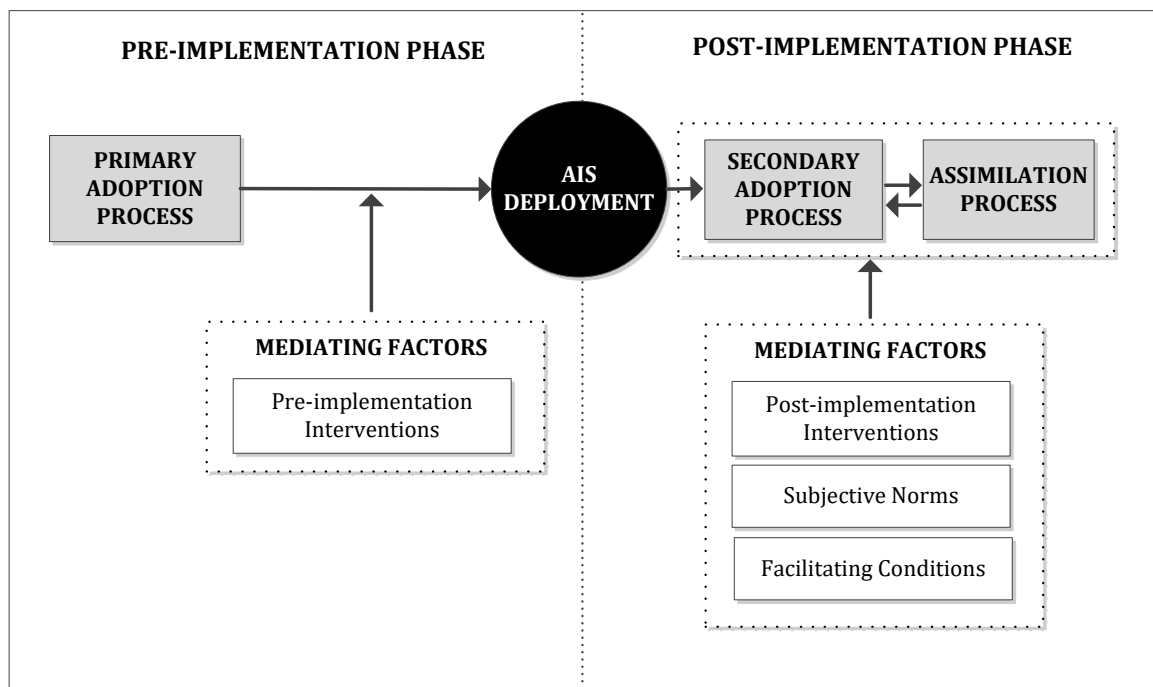


Figure 7.1 Preliminary Conceptual Framework  
(Modified from Gallivan, 2001b; Venkatesh & Bala, 2008)

Building upon the framework, an exploration of the mandated adoption and implementation of the AIS by the Indonesian University was conducted. Utilising the multilevel perspective of the actors involved, the research managed to capture the nature of the mandated adoption through the primary and secondary adoption processes and the usage of the AIS by the

academics through the assimilation process. The factors mediating between the organisational and individual adoption were also identified, as they influenced the adoption and use of the AIS by the academics.

Based on the findings of this research, changes were made to refine the preliminary conceptual framework. The refined framework for the organisational adoption and implementation of innovations is presented in Figure 7.2.

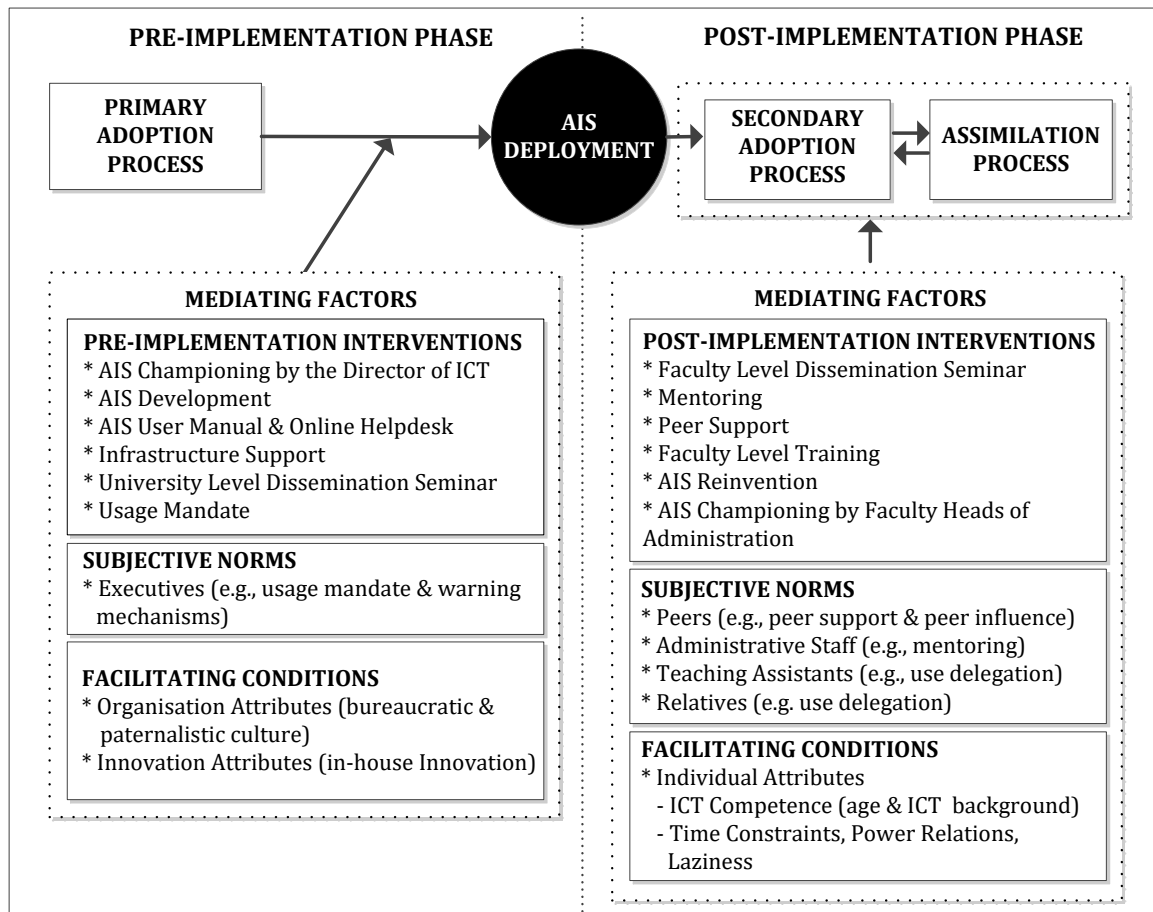


Figure 7.2 Refined Framework for Innovation Adoption and Implementation

The findings confirmed that the adoption of the AIS followed the scenario of contingent authority innovation-decisions, which involved a two-stage adoption process. The primary adoption of the AIS was decided by the university executives using a top-down initiative and the academics were mandated to adopt it. Following the adoption of the AIS by the academics, the assimilation process for the AIS began to take place in the University.

Based on the findings of this research, the factors that mediated between the primary and secondary adoption were identified. The mediating factors were consisted of interventions,



subjective norms, and facilitating conditions, which occurred during the pre-implementation and post-implementation phases.

In the pre-implementation phase, several interventions, such as the championing of the AIS by the Director of ICT, the user manual and online helpdesk for the AIS, and infrastructure support, continued to be practised or given up to the post-implementation phase. Other interventions, such as the development of the AIS and the university level dissemination seminar, were continued by similar interventions in the post-implementation phase, such as the reinvention of the AIS and the faculty level dissemination seminar.

In the post-implementation phase, several new interventions emerged, including mentoring, peer support, training, and the championing of the AIS by the heads of administration in faculties. These interventions were faculty-specific and were held without much coordination with the University.

Following Gallivan's (2001b) framework, the sources of influence during the adoption and use of the AIS by the academics are listed in the subjective norms construct. This includes the executives, peers, administrative staff, teaching assistants, and family relatives. The executives imposed the usage mandate and warning mechanisms to the academics prior to the deployment of the AIS, which ensured the adoption of the AIS by all the academics, as well as influencing its usage. Other influences from peers, administrative staff, teaching assistants, and family relatives occurred at the post-implementation phase following the secondary adoption of the AIS by the academics.

Several facilitating conditions, such as the organisation and innovation attributes started to provide influences since the pre-implementation phase. The bureaucratic and paternalistic culture of the University defined the organisation attributes and affected the decision-making process in the University, including in the provision of the usage mandate. The innovation attributes appeared in the pre-implementation phase, as the in-house nature of the AIS required it to be developed by the ICT Centre prior to its deployment. Another facilitating condition (i.e., individual attributes) only occurred in the post-implementation phase, as the AIS was adopted by the individual academics in the University.

Merely identifying the factors mediating between organisational and individual adoption is not enough to explain their significance. The next section describes the influence of the mediating factors towards the usage of the AIS.

## 7.2 Influences of the Mediating Factors

Recent studies suggested the importance of exploring managerial interventions as they have the potential to provide a better understanding of the phenomenon and assist managers in taking action (Venkatesh & Bala, 2008; Venkatesh et al., 2007). Through his framework, (Gallivan, 2001b) argued that along with these interventions, subjective norms and facilitating conditions can emerge and influence the adoption and use of the innovation by employees.

Under the contingent authority innovation-decision, the mediating factors, especially through the usage mandate, have managed to force all of the academics to adopt the AIS. However, the mediating factors also significantly influenced the later stages of the implementation, following the secondary adoption by the academics. A useful contribution can be made by informing the executives regarding the influence of these factors toward the use of the AIS by the academics as it assimilated in the University over time.

Utilising the taxonomy of system usage (Wilkin & Davern, 2012), inconsistencies between the intended usage and the actual usage of the AIS by the academics were found and resulted in the variations in the usage of the AIS. The influences of the mediating factors on these variations in the usage of the AIS were identified based on the common patterns found in the taxonomy.

### **Influences of the Mediating Factors in the Pre-implementation Phase**

As reflected in the refined framework, several factors were identified during the data analysis of the pre-implementation interventions. Figure 7.3 illustrates the influences of these factors on the usage of the AIS.

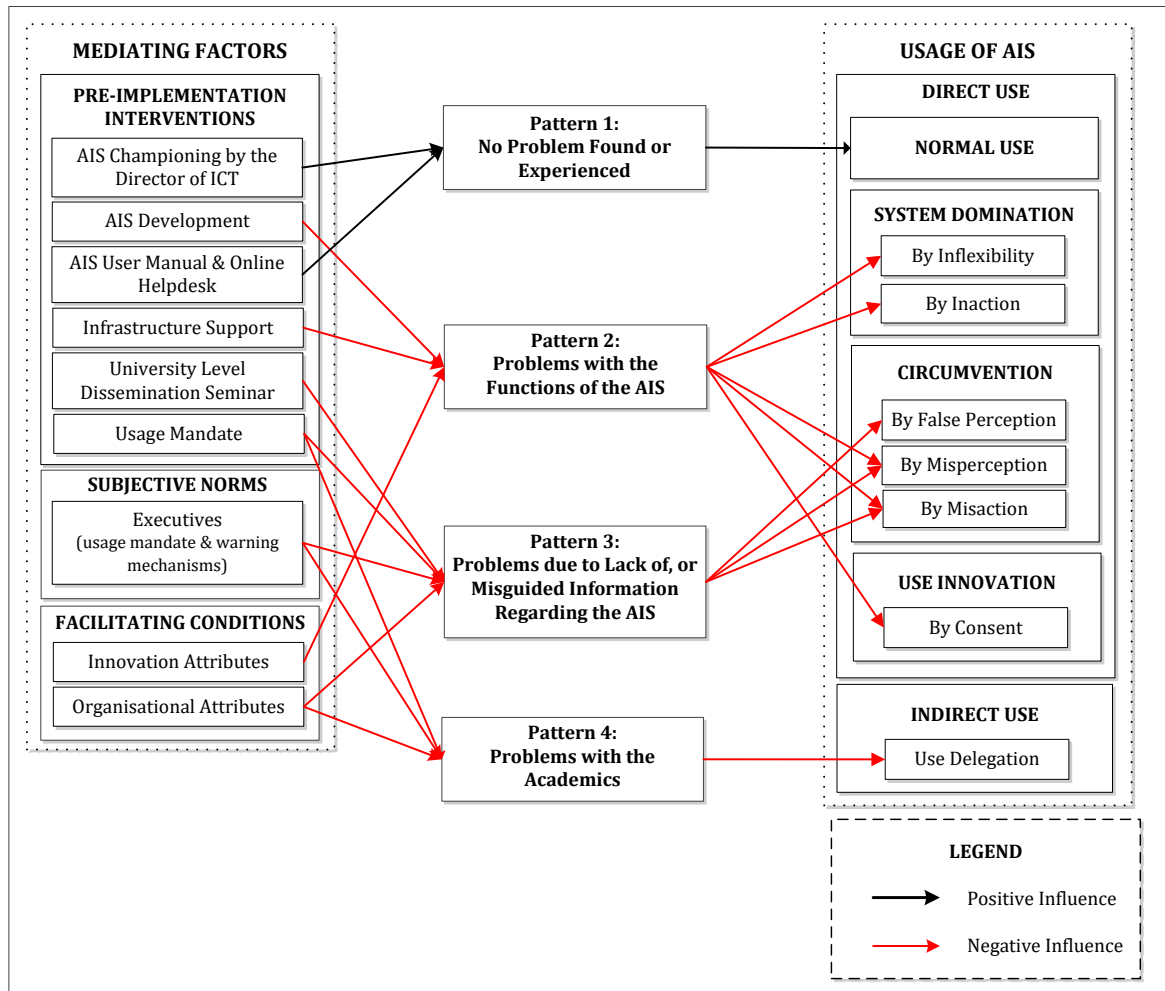


Figure 7.3 Influence of the Mediating Factors in the Pre-Implementation Phase

There were four patterns found in the taxonomy that linked to the variations in the usage of the AIS. These patterns related to whether or not problems were found or perceived by the academics with regard to the use of the AIS. The patterns include cases where problems were not found or experienced by the academics, problems were perceived with the functions of the AIS, problems were perceived due to the lack of, or misguided information regarding the use of the AIS, and problems were originated from the academics themselves.

In the pre-implementation phase, the mediating factors (i.e., interventions, subjective norms, and facilitating conditions) correlated with these four patterns and brought positive and negative influences. The patterns and influences from the mediating factors are described as follows:

- Pattern 1: No problem was found or experienced by the academics with regard to the use of the AIS and therefore led to its normal use. In this case, the academics may have received

sufficient information regarding the use of the AIS or had the ICT competence needed to use it as intended by the University. Pre-implementation interventions, such as the user manual, online helpdesk for the AIS, and the championing of AIS by the Director of ICT, were found to be useful to assist the academics in using the AIS.

- **Pattern 2:** The problems with the functions of the AIS occurred as the result of oversights during development of the AIS, which resulted in its unstable early version. A limitation on the infrastructure provided by the University also resulted in the servers for the AIS crashing during peak usage times. The problems in this pattern had resulted in the cases of system domination by inflexibility, system domination by inaction, circumvention by misperception, circumvention by misaction, and user innovation by consent.
- **Pattern 3:** The problems that occurred due to the lack of, or misguided information regarding the AIS had resulted in the academics falsely perceiving or misperceiving that problems existed in the functions of the AIS. These cases were caused by the ineffectiveness of the university level dissemination seminar. Other than this, the organisational attributes allowed the University to adopt the AIS using a top-down initiative without involving the academics. The lack of communication for this initiative caused the academics to perceive the implementation to be abrupt, and partially led to the academics having misperceptions of the system. The problems in this pattern led to the cases of circumvention by false perception, circumvention by misperception, and circumvention by misaction.
- **Pattern 4:** The usage mandate given by the university executives managed to make all of the academics adopt the AIS. Driven by the mandate, academics who were not prepared to adopt the AIS, predominantly due to their lack of ICT competence, were forced to delegate its use to the surrogates. Problems in this pattern led to indirect use of the AIS, which posed risks concerning its security or the quality of its output.

### **Influences of the Mediating Factors in the Pre-implementation Phase**

Several mediating factors were also found in the pre-implementation phase. The influences of these factors on the usage of the AIS are presented in Figure 7.4.

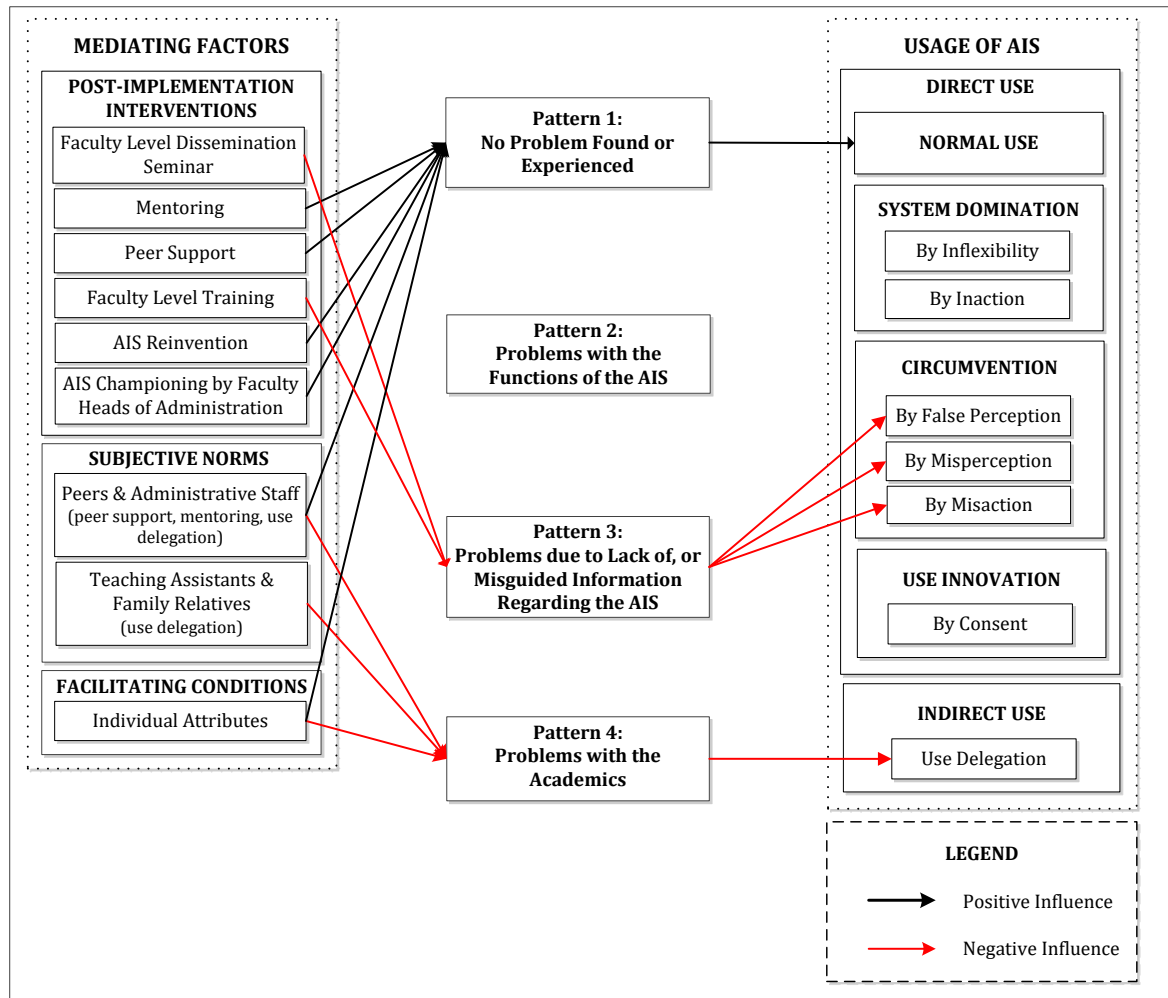


Figure 7.4 Influence of the Mediating Factors in the Post-Implementation Phase

Using the same patterns from the taxonomy of system usage, several mediating factors also influenced the usage of the AIS in the post-implementation phase. These patterns and influences are described as follows:

- **Pattern 1:** Post-implementation interventions, such as mentoring, peer support, AIS reinvention, and the championing of AIS by the heads of administration in faculties were seen to have positive influences in assisting the academics to use the AIS as intended by the University. With regard to the individual attributes, academics with high ICT competence could also adapt with the AIS despite of the problems associated with it.
- **Pattern 2:** In the post-implementation phase, no factor was found to cause problems with the functions of the AIS, as further reinvention efforts were undertaken to upgrade the its features. Nevertheless, problems with the functions of the AIS were still found during the

fieldwork, but were mainly caused by prior interventions in the pre-implementation phase, such as oversights during the development of the AIS and limitations on its infrastructure.

- Pattern 3: Post-implementation interventions, such as the faculty level dissemination seminars and training, were found to be ineffective, as many academics still had lack of, and misleading information concerning the use of the AIS.
- Pattern 4: The problems with the individual attributes, which were predominantly due to the lack of ICT competence among the senior academics, caused the cases of indirect use. These cases were exacerbated by the issue of power relations, in which peers, administrative staff, teaching assistants, and family relatives, who had lower rank, were left with few alternatives but to use the AIS on behalf of the senior academics.

Although the influences from the mediating factors were identified in this chapter, it should be noted that they only represent *prima facie* relations specific to the case of the mandated adoption and implementation of the AIS in the Indonesian University. It is possible that other influences may emerge or be treated differently in other cases of adoption or in other contexts of study.

### 7.3 Conclusion

This chapter has presented the refined framework for innovation adoption and implementation based on the findings of this research. A preliminary attempt to describe the influences of the mediating factors on the variations in the usage of the AIS was also presented.

The next section discusses the contributions of this research and the avenues for future research.

## 8 Research Contributions and Avenues for Future Research

### 8.1 Introduction

This chapter starts by reiterating the aim and questions of this research. A summary of the key findings is presented to address the research questions. In the following sections, the contributions of this research to theory and practice are drawn. Finally, avenues for future research are described by reflecting upon the result of this research.

### 8.2 Research Aim and Questions

The aim of this research was to carry out an in-depth exploration of the nature of the mandated adoption and implementation of the AIS by the Indonesian University. This research sought to address the following questions:

1. *What is the nature of the adoption and implementation of the AIS in the Indonesian University?*
2. *How do the academics use the AIS in the University?*
3. *How do the mediating factors influence the adoption and use of the AIS by the academics?*

Utilising an interpretive case study, a framework for the organisational adoption and implementation of innovations was used as a theoretical lens to explore the case. The findings of this research have provided answers to the above questions. A summary of the key findings is presented in the next section.

### 8.3 Summary of Key Findings

This section presents a summary of the key findings based on the analysis of the adoption and implementation of the AIS by the University.

First, the research has captured the nature of the adoption and implementation of the AIS based on the exploration of the primary and secondary adoption processes. A historical perspective

of the case showed that the initial adoption of the AIS was mainly driven by problems with the previous paper-based system. However, this adoption was also part of a larger initiative to revitalise ICT in the University.

The adoption of the AIS was associated with the scenario of contingent authority innovation-decisions as (1) the AIS was primarily adopted by the University prior to its secondary adoption by the academics (i.e., a contingent innovation-decision); and (2) the primary adoption was decided by the university executives using a top-down initiative, while a mandate was given for the academics to adopt it (i.e., an authority innovation-decision).

Based on such a scenario, two principal and distinct decisions were made by the executives: the decision to adopt the AIS and the decision to mandate its usage. With regard to the executives' decision to adopt the AIS, the absence of participation and involvement of the academics did not seem to influence their motivation to adopt the AIS, as the majority of the academics tolerated the decision. It was found that the bureaucratic culture allowed the executives to conduct such an authoritarian approach without having to fear the risk of the AIS being rejected by the academics.

Nevertheless, the decision to mandate the usage of the AIS had more complex implications that significantly influenced its secondary adoption and use by the academics. During the secondary adoption process, as a by-product of the usage mandate, warning mechanisms were enforced for non-compliance. The mandate managed to counter the high amount of resistance demonstrated by the academics and allowed the AIS to be 'successfully' adopted by all of them. Nonetheless, such an adoption scenario was found to cause negative implications in the following stages of implementation, as the AIS was further assimilated into the University.

Secondly, the research has explored the use of the AIS based on the perception and experience of the academics during the assimilation process. Following the usage mandate from the executives, the AIS was adopted by all of the academics, without exception. However, the non-voluntary nature of the adoption had partially impacted on its use by the academics. Aside from the normal usage of the AIS, other variations in usage were found during the fieldwork, which included cases of indirect use, circumvention and system domination.

As usage was mandated, several of the academics who were not ready to adopt the AIS had no choice but to use the AIS indirectly, by way of delegating their grade submissions to surrogates and jeopardising the security of the AIS. In another case, many academics and several of the faculties considered the student advisory function in the AIS as problematic and circumvented



its use by instating obligatory face-to-face consultations for all students regardless of their GPA, which was against the university's policy and inconsistent with the online nature of the AIS.

Other cases of unanticipated usages were not related to the usage mandate but rather were caused by the ineffectiveness in the managerial interventions, which led to the academics having limited information regarding the AIS and falsely perceiving that problems existed within its functions. Among the examples of these cases are the false perception of the online nature of the AIS, the procedure for grade submission resets, and the AIS online helpdesk. The cases of system domination were caused by technical problems in the functions of the AIS, which could not be resolved by the academics and thus the academics were said to be dominated by them. The crashed server during peak usage times and the missing feature in the student advisory function were examples of such cases.

Finally, this research has identified the factors that mediated between the primary and secondary adoption and their influence on the adoption and usage of the AIS by the academics. The mediating factors consisted of pre- and post-implementation interventions, as well as the individual differences of the academics.

The pre-implementation interventions were found to be ineffective as the academics were not given sufficient information and skills to operate the AIS prior to its deployment. Together with the abrupt implementation, the ineffective interventions contributed to the resistance from the academics and placed a larger burden on the following post-implementation interventions.

Regarding the post-implementation interventions, other than the centralised efforts such as the development and reinvention of the AIS, interventions that were held in faculties were lacking in terms of their consistency and coordination. Many of these interventions were random events and seemed to be held as separate initiatives, based on the needs of the faculties and departments, rather than as a coordinated effort by the University. The role of the champions, particularly those who had legitimacy, access, and ICT competency, was found to reduce the negative impacts from the lack of coordination between the faculty and university levels.

Interventions such as the user manual and online helpdesk for the AIS were found to be more effective in assisting the academics who had high ICT competency, as they were already familiar with such technology. On the other hand, informal peer support and mentoring were found to be effective in assisting academics with low ICT competency, as they required a longer time to adapt to the AIS. Other than providing informal training in operating the AIS, these two

interventions were also channelling positive influences by forming favourable perceptions and reducing anxiety towards the AIS.

At the individual level, the ICT competency of the academics, which was mainly determined by their age and ICT background, was found to be very influential for their use of the AIS. Academics with low ICT competency tended to have a mental block and a different mindset when dealing with ICT in general. Other individual traits which do not relate with ICT competency were also found to influence the use of the AIS, including laziness, power relations, and time constraints.

In general, the exploration of the multilevel perspectives of the participants has also revealed the different perceptions between the executives and the academics concerning the adoption and implementation of the AIS. The executives perceived the adoption of the AIS as part of a larger strategic plan to revitalise its ICT, which would produce long-term benefits for the University. The lack of communication and information led the academics to perceive the adoption as merely a radical switch from the previous system to a new system and thus influenced their motivation to use the AIS.

## **8.4 Research Contributions**

### **8.4.1 Contributions to Theory**

A contribution of this research to theory is by extending Gallivan's (2001b) framework for innovation adoption and implementation. The refined framework is as follows:

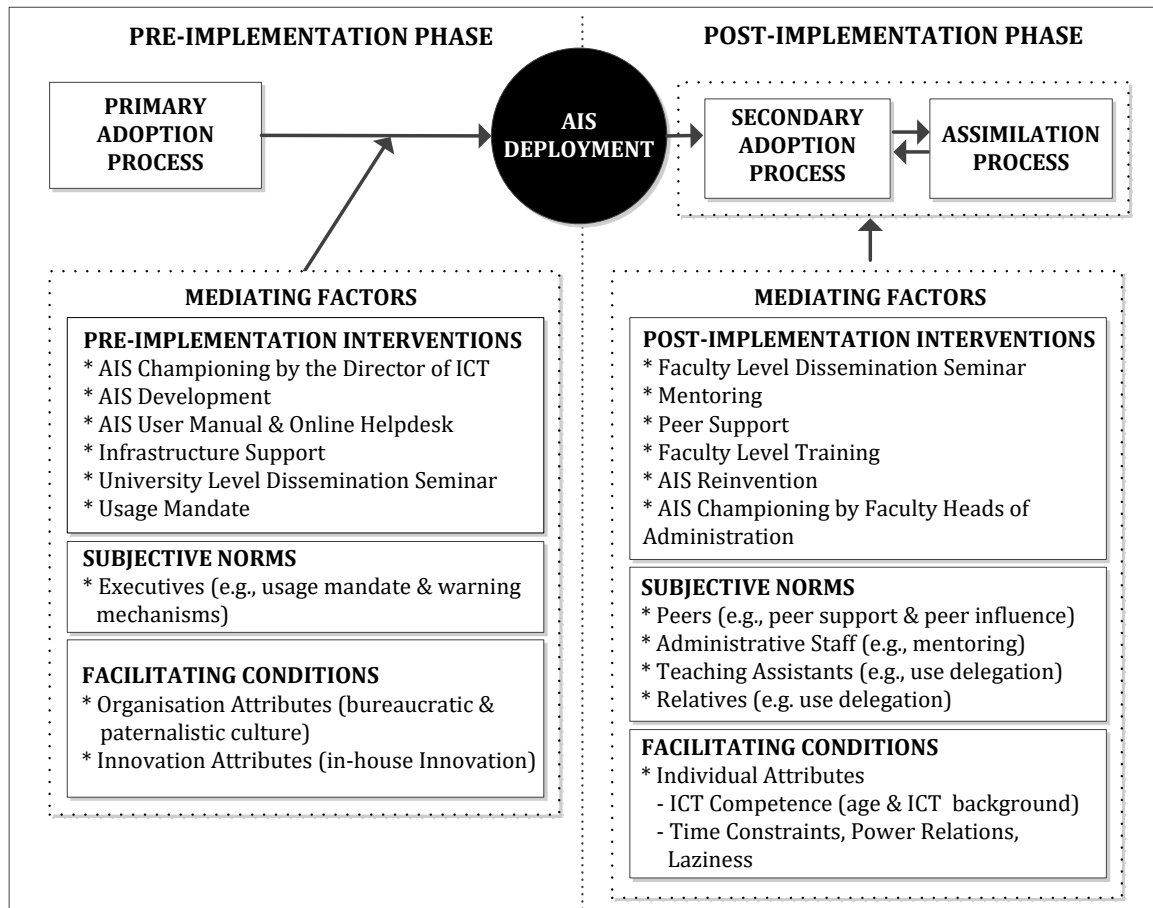


Figure 8.1 Refined Framework Based on the Case of the Indonesian University

The modification of the framework was made by way of incorporating Venkatesh and Bala's (2008) concepts and classification of interventions. Based on the modified framework, new empirical evidence from the case of the mandated adoption and implementation of AIS in an Indonesian University was explored. Several mediating factors specific to the setting and context of a university were identified in the framework, including their influence towards the usage of the AIS by the academics. Detailed information about the refined framework was provided in Chapter 7.

#### 8.4.2 Contributions to Practice

Consistent with the initial motivation for this research, it has been shown to have value by providing information to the university executives concerning the actual usage of the AIS by the academics. Direct recommendations were given during the fieldwork pertaining to the technical problems with the AIS that triggered cases of system domination and circumvention.

Several of these problems were given immediate solution, while others were forwarded to the University Board for further review.

Another contribution of this research is by providing an identification of the pre- and post-implementation managerial interventions that influenced the adoption and use of the AIS by the academics. The insights and recommendations regarding the characteristics of each intervention may assist the executives in evaluating their strategies for the current implementation of the AIS as well as in introducing future innovations into the University.

The research also offered insights on the individual attributes of the 19 interviewed academics and provided information on how these distinct attributes influenced the adoption and use of the AIS. Based on the information, the executives can make informed decisions for future innovation implementations, in consideration of the academics as the users.

Apart from the Indonesian University, the established framework can also be used by other executives or managers to plan or evaluate the adoption and implementation of innovations by their institutions. However, the applicability of the framework is limited to the extent that the adoption is associated with the scenario of contingent authority innovation-decisions and in the context of higher education institutions.

## 8.5 Avenues for Future Research

The result of this research highlighted several avenues for future research.

First, this research has provided a framework to understand the mandated adoption and implementation of innovations under the scenario of contingent authority innovation-decisions. A holistic understanding of the case was captured as it was analysed using the multilevel perspective of the actors involved.

Nonetheless as with any research, there are limitations to the study as it was based on data from just one higher education institution and focuses only on a single complex managerial innovation. Future research can build upon this framework by conducting a study that provides empirical evidence from multiple organisations, multiple innovations, or with distinct adoption settings (i.e., mandatory and voluntary).

Secondly, the mediating factors were shown to influence the innovation's usage of in several distinct patterns. However, the *prima facie* relations demanded more investigation as the exploration in this research was limited to the temporal dimension of the case. Further research can build upon the identified mediating factors by focusing on and measuring the

extent of their influence for each intervention or attribute, to get an in-depth understanding of its role. Further research can also explore other individual attributes that have not been addressed in this research, such as personal innovativeness, personal resilience, and the tolerance of ambiguity.

Finally, the usage mandate in this research was shown to be effective in ensuring that all of the academics adopt the AIS and in countering their resistance. However in other scenarios, the usage mandate may lead to other profound impacts, such as rejection and sabotage of the innovation, or even in staff resignations from the organisation. Other research opportunities exist in investigating and measuring the extent of the mandatoriness and the context in which these different scenarios may take place.

## **8.6 Conclusion**

In the context of higher education, previous innovation studies were driven by a general theme of investigating the barriers and challenges to implementing an innovation. However, research that focused on the adoption scenario and the issue of mandatoriness was lacking although it has the potential to provide a better understanding of the implementation of innovations.

This research investigated the perspectives of the executives, the academics, and the administrative staff in the mandated adoption and implementation of an AIS in an Indonesian University. As it explored the case from a multilevel perspective, the research can provide a rich understanding of the distinct and sometimes contrasting perspectives of the actors involved.

Research into the mandated adoption of innovations has the potential of providing more contributions to government institutions, which tend to have a strong bureaucratic culture. The scenario of contingent authority innovation-decisions is commonly practised in these institutions, such as in the case of the Indonesian University. This research has given an understanding of the nature of the mandated adoption under such a scenario and argued that implementation strategies must be planned carefully to minimise resistance, while proper interventions must be given to ensure the successful adoption and implementation of innovations.

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# Appendix A. Human Ethics Certificate of Approval



## Human Ethics Certificate of Approval

This is to certify that the project below was considered by the Monash University Human Research Ethics Committee. The Committee was satisfied that the proposal meets the requirements of the *National Statement on Ethical Conduct in Human Research* and has granted approval.

Project Number: CF15/3847 - 2015001684

Project Title: ICT Innovation Diffusion in a Developing Country: The Case of an Indonesian Public University

Chief Investigator: Dr Susan Foster

Approved: From: 29 October 2015 To: 29 October 2020

**Terms of approval - Failure to comply with the terms below is in breach of your approval and the Australian Code for the Responsible Conduct of Research.**

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, before any data collection can occur at the specified organisation.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must include your project number.
6. Amendments to the approved project (including changes in personnel): Require the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. Future correspondence: Please quote the project number and project title above in any further correspondence.
8. Annual reports: Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. Final report: A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. Monitoring: Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. Retention and storage of data: The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.



Professor Nip Thomson  
Chair, MUHREC

cc: Dr Kerry Tanner, Mr Sandra Irawan

Monash University, Room 111, Chancellery Building E  
24 Sports Walk, Clayton Campus, Wellington Rd  
Clayton VIC 3800, Australia  
Telephone: +61 3 9905 5490 Facsimile: +61 3 9905 3831  
Email: [muhrec@monash.edu](mailto:muhrec@monash.edu) <http://intranet.monash.edu.au/researchadmin/human/index.php>  
ABN 12 377 614 012 CRICOS Provider #00008C

# Appendix B. ICT Historical Context

| 2008  | 2009  | 2010  | 2011   |
|---|---|---|--|
| <p><b>January</b> → Intranet student re-enrolment is implemented</p> <p><b>18 February</b> → Status upgrade from "Computer Center" to "ICT Center"</p> <p><b>2 June</b> → Inauguration of Head of ICT Center, Chief Division of Infrastructure and Chief Division of Software</p> <p><b>November</b> → Internet bandwidth increases from 1Mbps to 3 Mbps, not shared through the University</p> <p><b>18 October</b> → The new dynamic website to replace the static website.</p> <p>❖ Procurement of one HP Gen 5 server</p> | <p><b>28 January</b> → E-Journal is implemented</p> <p><b>January</b> → Student re-enrolment can be accessed both online and from the intranet</p> <p><b>17 February</b> → ICT Center moves to new building, equipped with data center, conference room, and R&amp;D room</p> <p><b>May</b> → Bandwidth increases up to 8 Mbps</p> <p><b>8 June</b> → ICT Center starts to host domains to its own web servers and establishes public DNS servers</p> <p><b>July</b> → Bandwidth increases up to 10 Mbps.</p> <p>❖ Procurement of five HP Gen 5 servers</p> | <p><b>January</b> → Bandwidth increases up to 16 Mbps</p> <p><b>25 January</b> → Re-enrolment via internet only and intranet re-enrolment abolished</p> <p><b>April</b> → Online Fieldwork Registration is implemented</p> <p><b>1 July</b> → Bandwidth increases to 24 Mbps. Tuition electronic payment established using 3<sup>rd</sup> party switcher services.</p> <p><b>October</b> → Fiber Optical Channel installed in several faculties and e-Procurement implemented as a part of the national program</p> <p>❖ Procurement of six HP Gen 8 servers</p> <p>❖ Procurement of two File servers</p> | <p><b>February</b> → Internet re-enrolment also implemented for postgraduate students</p> <p><b>October</b> → Fiber Optical Channel is established to reach all faculties and units</p> <p><b>29 November</b> → Internet bandwidth increases up to 32 Mbps</p> <p>❖ Procurement of one HP Gen 8 server</p> |
| 2012  | 2013  | 2014  | 2016   |
| <p><b>January</b> → Internet bandwidth increases up to 110 Mbps</p> <p><b>15 April</b> → ICT Revitalization Team is established</p> <p><b>4 May</b> → Local DNS is applied. Local proxy is removed.</p>   | <p><b>January</b> → Internet bandwidth increases up to 200 Mbps</p> <p><b>August</b> → Partnership with Google (Google Apps for Education)</p> <p>❖ Procurement of six HP Gen 7 and two HP Gen 8 servers</p>  | <p><b>January</b> → Internet bandwidth increases up to 310 Mbps</p>   | <p><b>January</b> → Internet bandwidth increases up to 1250 Mbps</p>   |
|   |   | 2015  |  |
|   |   | <p><b>January</b> → Internet bandwidth increases up to 600 Mbps</p>   |  |

# Appendix C.1 Explanatory Statement and Interview Guide for the University Academics



## EXPLANATORY STATEMENT

(For The University Academics)

**Project: The Adoption and Implementation of an Academic Information System: The Case of an Indonesian University**

**Chief Investigator: Dr Susan Foster**  
Caulfield School of Information Technology

**Student Researcher: Mr Sandra Irawan**

Dear Sir or Madam,

I would like to invite you to take part in this study. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

### What does the research involve?

The aim of this research was to explore in depth the nature of the adoption and implementation of an AIS in an Indonesian University. This research seeks to explore your experience and any obstacles encountered as secondary adopters of the AIS in the university.

This research will use interviews as a primary method in gathering data. The interview will last from 30-60 minutes and will be conducted in a place and time which are convenient for you. Among the list of topics for the interview are: your background and experience in using AIS in general, when and how you adopt AIS in the first place, your role and experience as the secondary adopters of the AIS, the obstacles you face while implementing the AIS, your concerns regarding the adoption and implementation of the AIS, the training and workshops you have in related to the AIS and your learning process during the implementation of the AIS.

Asides from interviews, the researcher will also conduct a direct observation with your permission. The aim of the observation is to understand how you implement the AIS in a real-world setting and if there are any obstacles encountered during the implementation. The observation is conducted in an informal situation, preferably after the interview process has taken place or at other times which are convenient for you. The length of the observation will be around 15 minutes and will be made flexible depending on the obstacles encountered.

### Why were you chosen for this research?

You were selected to participate because you are a member of the university who has a role and experiences in the secondary adoption and organizational assimilation process of the AIS. The researcher already has your contact details as you are a friend or colleague of the researcher and hereby he would like to ask for your participation in this research.

### Consenting to participate in the project and withdrawing from the research

Before participating in this research, you will be asked to read and to fill a consent form. Should you agree to take part in this research, you can sign and return the consent form to the researcher. As a participant, you have the right to withdraw your participation from this research after the interview is conducted. If you choose not to participate in this research, your valuable input will still be valued for the improvement of this research.

### Possible benefits and risks to participants

This research may not have direct benefits for you. However, this project may benefit the university by providing a better understanding of the experience and obstacles encountered by the academics during the secondary adoption and assimilation processes of the AIS. This understanding may help the university in improving their strategy in

introducing new technologies. There are no foreseeable risks or harm in participating in this research other than discomfort in terms of the time being spent for the interview and observation.

**Confidentiality**

Evidence and data that are collected will be kept confidential and will be intended for the purpose of research only. In reporting the findings of this research, the researcher will not disclose your identity without your agreement and will include the use of pseudonyms or other similar coded identifier.

**Storage of data**

The data collected from this research will be kept securely and treated in a confidential manner in Monash University for a period of 5 (five) years after which it will be destroyed. The data collected during the field study in the designated location will also be kept secure and can only be accessed by the researcher.

**Use of data for other purposes**

Information collected from this research may be used by the researcher for the purpose of future research. Only aggregate de-identified data may be used for other projects where ethics approval has been granted.

**Results**

For further information on the progress and the result of this research, please contact Sandra Irawan on [REDACTED]

**Complaints**

Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the local contact person below:

Endang Widajati  
East Java Assessment Institute for Agricultural Technology  
Jl Raya Karangploso Km 4  
Malang 65152  
[REDACTED]

Thank you,

**Dr Susan Foster**  
Chief Investigator

| Interview Questions for the Academics   |   |
|---|---|
| <p>Thank you for your interest in this research. My name is Sandra Irawan and I am a researcher from Monash University Australia. I am interviewing university executives, academics, and administrative staff to acquire an understanding of the adoption and implementation of the Academic Information Systems in the University.</p> <p>Your names or other information that could identify yourself will not be exposed in any of the reports and will remain confidential. Let's start with some basic and demographic information:</p> <p>Name : ..... Gender: M / F</p> <p>Faculty : ..... Department: .....</p> <p>Age Group: 20s 30s 40s 50s 60s 70s Working Years: .....</p> |   |
| No  | Topic   |
| 1   | <p><b>The Contingent Adoption Scenario &amp; Individual Attribute (Tolerance of Ambiguity)</b></p> <p>First we are going to discuss the early period of when the AIS were first introduced</p> <p>a) Did you have any participation in the university's decision to adopt the AIS?</p> <p>b) Did the university or the faculty executives discuss or consult the adoption decision to you or any of your colleagues in the faculty?</p> <p>c) Did you have any concerns regarding this? Did this affect your motivation in adopting and using the AIS?</p>                    |
| 2   | <p><b>Secondary Adoption &amp; Subjective Norms</b></p> <p>a) After the AIS was introduced, did you immediately begin using them in the first semester? If yes, do you use it at the beginning, middle or end of the semester? If not, when do you actually begin to use it (i.e. the following semester/year)?</p> <p>b) Why did you decide to do that?</p> <p>c) Did your student, staff, colleagues &amp; the faculty/university executives play a role in your decision? What do you think of their own usage?</p>  |
| 3   | <p><b>Managerial Intervention</b></p> <p>a) Did the university / faculty provides enough support &amp; resources for the implementation of the innovations?</p> <p>b) Did the university / faculty provides dissemination and training? Did you find them helpful?</p>  |
| 4   | <p><b>Organizational Assimilation Process</b></p> <p>a) How did you use the AIS when it was first introduced?</p> <p>b) Was there any obstacle or problem encountered when you first tried to use it? How was the problem solved?</p> <p>c) How do you use it now? Do you encounter any problems now?</p> <p>d) Where and when do you usually access it?</p> <p>e) Do you feel obliged to use it?</p> <p>f) Do you feel the university should give you reward or incentives for implementing it?</p> <p>g) Do you have any concerns regarding the implementation process?</p> |
| 5   | <p><b>Individual Attributes (Personal Innovativeness &amp; Personal Resilience)</b></p> <p>a) Did you spare some time by yourself to learn how to use the AIS?</p> <p>b) Please tell me your background or experience in using ICT in general?</p> <p>c) Based on your role as an academic, do you feel that mastering ICT in general is a must?</p>  |
| 6   | <p><b>Innovation Attributes &amp; Outcomes</b></p> <p>a) Are there any interesting features that you like from the AIS?</p> <p>b) Do you find it helpful? What features do you frequently use?</p> <p>c) Do you feel any difference in your daily work activities after using it?</p>   |
| 7   | <p><b>IT Champion, Opinion Leader &amp; Subjective Norms</b></p> <p>a) Were there any key actors during the adoption and implementation?</p> <p>b) What were their role and actions?</p>  |
| <p><b>Final thoughts</b></p> <p>Those were all the questions I wanted to ask.</p> <p>Do you have any other comments/thoughts that you would like to share?</p> <p>Thank you for your time.</p>  |   |



## Appendix C.2 Explanatory Statement and Interview Guide for the University Executives



### EXPLANATORY STATEMENT

(For The University Executives)

**Project: The Adoption and Implementation of an Academic Information System: The Case of an Indonesian University**

**Chief Investigator: Dr Susan Foster**  
Caulfield School of Information Technology

**Student Researcher: Mr Sandra Irawan**

Dear Sir or Madam,

I would like to invite you to take part in this study. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

#### What does the research involve?

The aim of this research was to explore in depth the nature of the adoption and implementation of an AIS in an Indonesian University. This research will also use interviews to gather data from you as the university executives. Your participation is significant in understand the managerial efforts and the resources made available in facilitating the academics during the secondary adoption and assimilation processes of the AIS. The interview will last from 30-60 minutes and will be conducted in a place and time which are convenient for you. Among the list of topics for the interview are: the adoption history of the AIS in the university, the current progress of the organizational assimilation of the AIS, the strategy and planning for the secondary adoption and assimilation of the AIS, the obstacles and challenges of the secondary adoption and assimilation of the AIS, the level of resource and support provided by the university/faculties for the academics, the training and workshops provided by the university/faculties for the academics, the responsibility for future ongoing learning of the AIS and your own experience and obstacles in using the AIS.

#### Why were you chosen for this research?

You were selected to participate because you are a member of the university who has a role and experiences in the secondary adoption and organizational assimilation process of the AIS. The researcher already has your contact details as you are a friend or colleague of the researcher and hereby he would like to ask for your participation in this research.

#### Consenting to participate in the project and withdrawing from the research

Before participating in this research, you will be asked to read and to fill a consent form. Should you agree to take part in this research, you can sign and return the consent form to the researcher. As a participant, you have the right to withdraw your participation from this research after the interview is conducted. If you choose not to participate in this research, your valuable input will still be valued for the improvement of this research.

#### Possible benefits and risks to participants

This research may not have direct benefits for you. However, this project may benefit the university by providing a better understanding of the experience and obstacles encountered by the academics during the secondary adoption and assimilation processes of the AIS. This understanding may help the university in improving their strategy in introducing new technologies. There are no foreseeable risks or harm in participating in this research other than discomfort in terms of the time being spent for the interview and observation.

**Confidentiality**

Evidence and data that are collected will be kept confidential and will be intended for the purpose of research only. In reporting the findings of this research, the researcher will not disclose your identity without your agreement and will include the use of pseudonyms or other similar coded identifier.

**Storage of data**

The data collected from this research will be kept securely and treated in a confidential manner using the facilities provided by Monash University for a period of 5 (five) years after which it will be destroyed. The data collected during the field study in the designated location can only be accessed by the researcher and will be kept secure in an encrypted external hard drive for convenience and in a cloud facility equipped with password for the purpose of data backup.

**Use of data for other purposes**

Information collected from this research may be used by the researcher for the purpose of future research. Only aggregate de-identified data may be used for other projects where ethics approval has been granted.

**Results**

For further information on the progress and the result of this research, please contact Sandra Irawan on [REDACTED]

**Complaints**

Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the local contact person below:

Endang Widajati  
East Java Assessment Institute for Agricultural Technology  
Jl Raya Karangploso Km 4  
Malang 65152  
[REDACTED]

Thank you,

Dr Susan Foster  
Chief Investigator

| Interview Questions for the University Executives  |  |
|--|--|
| <p>Thank you for your interest in this research. My name is Sandra Irawan and I am a researcher from Monash University Australia. I am interviewing university executives, academics, and administrative staff to acquire an understanding of the adoption and implementation of the Academic Information Systems in the University.</p> <p>Your names or other information that could identify yourself will not be exposed in any of the reports and will remain confidential. Let's start of with some basic and demographic information:</p> <p>Name : ..... Gender: M / F</p> <p>Faculty : ..... Department: .....</p> <p>Age Group: 20s 30s 40s 50s 60s 70s Working Years: .....</p> |  |
| No   | Topic  |
| 1  | <b>Primary Adoption</b><br>a) To start off, could you tell me why the university decided to adopt the innovations in the first place?<br>b) Was there any special goal or objective?   |
| 2  | <b>Managerial Intervention &amp; Subjective Norms</b><br>a) Was the initiative to introduce the innovations a part of a larger strategy of the university?<br>b) What was the university commitment & support for this initiative? What are the resources being provided?<br>c) What was the university policy on the innovations? Were they mandatory or optional?<br>d) Was there any dissemination, training or workshop? Was there any follow up and evaluation afterwards?<br>e) Who is responsible for the future ongoing learning of the innovations?   |
| 3  | <b>Secondary Adoption</b><br>Regarding the role of the academics as the users of the innovations:<br>a) Was there any involvement of the academics (ie. discussion or consultation) before the ICT was adopted by the university?<br>b) Was there different treatment between academics with civil servant status and those who aren't?<br>d) Were the ICT innovations intended for all the academics regardless of age, position and seniority?<br>e) What about those who had absolutely no IT background or those who preferred traditional ways and are reluctant to use ICT? Was there any special treatment/training for them? Was there any sanction? |
| 4  | <b>Organizational Assimilation Process</b><br>a) What was the implementation strategy of the university?<br>b) Was there any obstacle or challenge during the implementation? How did the university tackle them?<br>c) What is the current progress of the implementation in the university?  |
| 5  | <b>Outcomes</b><br>a) What are the outcomes so far?<br>b) Are there any increase in the effectiveness of the organization?<br>c) Are there any changes in the work processes?<br>d) Are there any changes in the university working culture?   |
| 6  | <b>IT Champion &amp; Opinion Leader</b><br>a) Were there any key actors during the adoption and implementation?<br>b) What was their role and actions?   |
| 7  | <b>Centralized Planning</b><br>a) What was the role of the ICT Centre in this case?<br>b) Was their role vital?<br>c) Was the management of the ICT centralised?   |
| 8  | Could you tell me your own experience in using the ICT innovations? Were there any interesting things that you can share?  |
| <b>Final thoughts</b><br>Those were all the questions I wanted to ask.<br>Do you have any other comments/thoughts that you would like to share?<br>Thank you for your time.  |  |



## Appendix C.3 Explanatory Statement and Interview Guide for the Administrative Staff



MONASH University

### EXPLANATORY STATEMENT

(For The Administrative Staff)

**Project: The Adoption and Implementation of an Academic Information System: The Case of an Indonesian University**

**Chief Investigator: Dr Susan Foster**  
Caulfield School of Information Technology

**Student Researcher: Mr Sandra Irawan**

Dear Sir or Madam,

I would like to invite you to take part in this study. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

#### What does the research involve?

The aim of this research was to explore in depth the nature of the adoption and implementation of an AIS in an Indonesian University. This research will use interviews to gather data from you as the administrative staff. Your participation is significant in understanding the operational level and resources made available in facilitating the academics during the secondary adoption and assimilation processes of the AIS. The interview will last from 30-60 minutes and will be conducted in a place and time which are convenient for you. Among the list of topics for the interview are: the adoption history of the AIS in the university, the current progress of the organizational assimilation of the AIS, the obstacles and challenges of the secondary adoption and assimilation of the AIS, the level of resource and support provided by the university/faculties for the academics, the training and workshops provided by the university/faculties for the academics, and the responsibility for future ongoing learning of the AIS.

#### Why were you chosen for this research?

You were selected to participate because you are a member of the university who has a role and experiences in the secondary adoption and organizational assimilation process of the AIS. The researcher already has your contact details as you are a friend or colleague of the researcher and hereby he would like to ask for your participation in this research.

#### Consenting to participate in the project and withdrawing from the research

Before participating in this research, you will be asked to read and to fill a consent form. Should you agree to take part in this research, you can sign and return the consent form to the researcher. As a participant, you have the right to withdraw your participation from this research after the interview is conducted. If you choose not to participate in this research, your valuable input will still be valued for the improvement of this research.

#### Possible benefits and risks to participants

This research may not have direct benefits for you. However, this project may benefit the university by providing a better understanding of the experience and obstacles encountered by the academics during the secondary adoption and assimilation processes of the AIS. This understanding may help the university in improving their strategy in introducing new technologies. There are no foreseeable risks or harm in participating in this research other than discomfort in terms of the time being spent for the interview and observation.

#### Confidentiality

Evidence and data that are collected will be kept confidential and will be intended for the purpose of research only. In reporting the findings of this research, the researcher will not disclose your identity without your agreement and will include the use of pseudonyms or other similar coded identifier.

**Storage of data**

The data collected from this research will be kept securely and treated in a confidential manner in Monash University for a period of 5 (five) years after which it will be destroyed. The data collected during the field study in the designated location will also be kept secure and can only be accessed by the researcher.

**Use of data for other purposes**

Information collected from this research may be used by the researcher for the purpose of future research. Only aggregate de-identified data may be used for other projects where ethics approval has been granted.

**Results**

For further information on the progress and the result of this research, please contact Sandra Irawan on +62452611450 or Sandra.Irawan@monash.edu.

**Complaints**

Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the local contact person below:

Endang Widajati  
East Java Assessment Institute for Agricultural Technology  
Jl Raya Karangploso Km 4  
Malang 65152  
[REDACTED]

Thank you,

Dr Susan Foster  
Chief Investigator

| Interview Questions for the Administrative Staff   |   |
|--|---|
| <p>Thank you for your interest in this research. My name is Sandra Irawan and I am a researcher from Monash University Australia. I am interviewing university executives, academics, and administrative staff to acquire an understanding of the adoption and implementation of the Academic Information Systems in the University.</p> <p>Your names or other information that could identify yourself will not be exposed in any of the reports and will remain confidential. Let's start of with some basic and demographic information:</p> <p>Name : ..... Gender: M / F</p> <p>Faculty : ..... Department: .....</p> <p>Age Group: 20s 30s 40s 50s 60s 70s Working Years: .....</p> |   |
| No   | Topic   |
| 1  | <b>Organizational Assimilation Process</b><br>a) What was the implementation strategy of the university/faculty?<br>b) Was there any obstacle during the implementation? How did the university/faculty tackle them?<br>c) What is the current progress of the implementation in the university/faculty?  |
| 2  | <b>Managerial Intervention &amp; Subjective Norms</b><br>a) What was the resource provided by the university/faculty for the introduction and implementation of the innovations?<br>b) Was there any dissemination, training or workshop in the faculty for the innovations? Was there any follow up and evaluation afterwards?   |
| 3  | <b>Secondary Adoption</b><br>Regarding the role of the academics as the users of the innovations:<br>a) Was there any involvement of the academics and admin staff (ie. discussion or consultation) before the ICT was adopted by the university?<br>b) Was there different treatment between academics with civil servant status and those who aren't?<br>c) What about those academics who had absolutely no IT background or those who preferred traditional ways and are reluctant to use ICT? Was there any special treatment/training for them? Was there any sanction for not using the innovations? |
| 4  | <b>Outcomes</b><br>a) What are the outcomes so far?<br>b) Are there any increase in the effectiveness of the university/faculty?<br>c) Are there any changes in the work processes?   |
| 5  | <b>IT Champion &amp; Opinion Leader</b><br>a) Were there any key actors during the adoption and implementation?<br>b) What was their role and actions?  |
| 6  | <b>Centralized Planning</b><br>a) What was the role of the ICT Centre in this case?<br>b) Was their role vital?<br>c) Was the management of the ICT centralised?  |
| <b>Final thoughts</b><br>Those were all the questions I wanted to ask.<br>Do you have any other comments/thoughts that you would like to share?<br>Thank you for your time.  |   |