

## **ADOPTION AND IMPLEMENTATION OF SELF-DEVELOPMENT INFORMATION TECHNOLOGY APPLICATIONS: AN EMPIRICAL STUDY OF STATE ISLAMIC HIGHER EDUCATION INSTITUTIONS IN INDONESIA**

**Muhammad Qomarul Huda<sup>1\*</sup>, Nur Aeni Hidayah<sup>2</sup>, Eva Khudzaeve<sup>3</sup>, Noor Azura Zakaria<sup>4</sup>**

Department of Information Systems, Universitas Islam Negeri Syarif Hidayatullah Jakarta, Indonesia<sup>1 2 3</sup>

Department of Computer Science, Kulliyyah of Information and Communication Technology, International Islamic University Malaysia<sup>4</sup>

mqomarul@uinjkt.ac.id

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\*Corresponding Author

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### **ABSTRACT**

*Implementing IT innovation in organizations is a complex and challenging process that affects organizational problems. The process involves many interacting factors and actors; hence this situation is difficult to control. This problem demonstrates the need to understand researchers' perceptions of IT adoption and implementation. This study aims to explore in depth the adoption and implementation of self-development IT applications (SDIT) in Islamic-based Higher Education Institution (IHEI) in Indonesia. The IT Adoption and Implementation Framework (Irawan et al., 2018) was applied as a lens to investigate the case. We conducted in-depth interviews with key informants involved during the adoption and implementation process in the organization. Interviews were transcribed and analyzed using thematic analysis. Certain Focus Group Discussion (FGD) studies and specific interviews with key informants representing three levels of management explained that mediating factors such as post-implementation interventions, subjective norms, and facilitating conditions influence success in adopting and implementing IT innovations in such cases. This study concludes that managerial interventions play an important role in reducing resistance from authoritarian approaches to mandating use and serve as a determinant of its sustainability in the future. These findings have significant implications for understanding how to achieve success in IT adoption and implementation in the post-implementation phase by providing empirical evidence. Theoretically, this study contributes to IT adoption and implementation frameworks by identifying the active role of critical actors in the adoption and implementation of IT applications in higher education institutions.*

**Keywords:** *IT adoption, IT applications, Islamic higher education, state Islamic university*

### **1. Introduction**

Information Technology (IT) adoption and implementation in higher education institutions has increasingly been utilized in developing countries. However, there are typical problems like organizational and individual problems during the adoption process of its innovation (Ma & Lee, 2019), (Yakubu & Dasuki, 2019). Previous studies have used different traditional frameworks to address these challenges. Some of the main theories researchers use to examine the problem of adopting IT innovations are Diffusion of Innovation (DOI) theories (Rogers, 2003). This theory has been continuously adopted, and many researchers tested the adoption of IT innovations in various contexts and research designs (Baig et al., 2019); (Chen et al., 2021). Past studies on IT innovation implementation, such as (Akanji et al., 2020), and (Setiawan, 2012), reported that some of the problems observed in state higher education institutions owned and run by the government indicate bureaucratic practices and paternalistic culture or seniority. This study subsequently leads to several challenges impeding the adoption of IT in universities and its acceptance at all management levels.

State Islamic-based Higher Education Institutions (SIHEI), one of the groups of public universities coordinated by the Ministry of Religious Affairs in Indonesia, are now familiar with Information Technology (IT) innovation to streamline operations, enhance productivity, and improve decision-making (Nuryana, 2022), (Bashori et al., 2020) However, complicated bureaucracy makes it difficult to take appropriate strategic actions on specific internal conditions

such as organizational, individual, and social issues closely related to the IT adoption and implementation process. In addition, it is essential to note that due to its significant role in providing reliable and practical solutions to specific or common management problems that occurred in the IHEI. Naturally, several obstacles, challenges, and failures have been experienced in the process of adopting and implementing IT innovations that were developed by internal organizations, such as Academic Information Systems and personnel administration (Wilson et al., 2014); (Huda & Hussin, 2010); (Huda et al., 2021). Therefore, it is essential to carry out further studies to overcome these problems with various approaches to research frameworks.

The concept of IT implementation in this study is associated with Contingent Authority Innovation Decisions (Damanpour, 1991), meaning that the influence of individual factors on innovation depends on the institutional context. Therefore, further research on various institutional contexts must be carried out. Researchers who have tested and developed this concept include (Galuvan, 2001); (Irawan et al., 2018); (Fuentelsaz et al., 2018) and (Pinzón et al., 2021).

Gallivan 2001 stated that innovation adoption is divided into two phases: the primary-adoption phase by top management/managers and the secondary adoption by employees. Furthermore, the top-level management is authorized to make the initial decision at the pre-implementation stage and ensure the mandatory process of adopting IT innovations. Meanwhile, the adopters or users, such as the middle and low-level management, can adopt, reject, adjust, and include some inputs to the adoption process at the post-implementation stage. At the same time, various groups of employees (units) have different interpretations and strategies in following up on leadership initiatives, so this secondary adoption process occurs many conflicts between units and often causes problems that result in the innovation implementation process failing. At the pre-implementation stage, mandatory factors can impact the post-implementation activities of IT innovation. Additionally, mediating factors like post-implementation interventions, subjective norms, and facilitating conditions can also play a role in determining the success of IT innovation adoption and implementation.

The significance of this research is to explore in depth the adoption and implementation of self-development IT (SDIT) applications in Islamic-based higher education institutions (IHEI) in Indonesia. This study explores the actual implementation that focuses on the importance of managerial interventions. Therefore, some questions were reviewed to be answered in this study as follows:

1. What is the nature of adopting and implementing the Self-Development IT (SDIT) applications in IHEI?
2. How does the mediating factor influence the adoption and implementation of SDIT in IHEI?

Using the framework of Irawan et al. (2018), an investigation was conducted to explore the multilevel perspectives of the actors involved in the IT innovation adoption process, namely university executives, ICT managers, and administrative staff. This research contributes by examining the framework of Irawan et al., 2018 in the context of Islamic-based Higher education institutions in Indonesia. It provides insights for the university management level about the critical role of managerial intervention. Furthermore, this study is expected to assist decision-makers at the university in identifying problems and determining strategic steps to achieve the success of IT innovation adoption and implementation.

This paper is organized into six sections: the first is an introduction, followed by the second section of the literature review to explain previous studies used as references. The third section is research methods with a qualitative approach using Focus Group Discussion (FGD) study and special interviews. The fourth section is a result and discussion of the findings; the last section is conclusions and suggestions

## **2. Literature Review**

Innovation is defined as an idea, practice, or object considered to be new by an individual or organization (Rogers, 2003). It is not only limited to objects or goods but also includes attitudes to life, behavior, or movement toward the change process (Ahmed & Shepherd, 2010); (Chor et al., 2015). These changes can be in the form of Information Technology (IT) developed in different contexts or fields (Pfadenhauer et al., 2017; Sunday & Vera, 2018). However, Rogers (2003) stated that adopting and implementing innovations in an organizational context, especially

in the IT scope, has several complex challenges that cause frequent failures. This context is due to subjective variations in the adoption process, making accepting or rejecting an innovation difficult. This has led several studies to apply traditional frameworks, such as the Diffusion of Innovation (DOI), to remedy this situation (Rogers, 2003).

The DOI theory was observed from the beginning of its implementation to be entirely appropriate in investigating innovations associated with the Information Technology (IT) field at the individual and organizational level after their evolution and development. It was, however, discovered not to be able to explore problems from the perspectives of different actors involved, especially in the organizational context, such as universities (Huda et al., 2017). Therefore, a more comprehensive development framework is needed to review these perspectives and possible causative factors.

### **Innovation Adoption Theory**

In the field of information systems, leading theories that have been studying innovation such as the Technology Acceptance Model (TAM) initiated by (Davis, 1989) and the Information System Success Model (Delone & Mclean, 2004). TAM theory was extended to TAM2 (Venkatesh, 2008), considering social factors and facilitating construction conditions. Furthermore, this theory is extended again with TAM3 (Venkatesh, 2008) by including the determinants of perceived ease of use (Venkatesh, 2000). UTAUT (Venkatesh et al., 2003) integrates eight well-known models of information technology acceptance, including DOI and TAM. In 2012, UTAUT2 (Venkatesh et al., 2012) emerged by accommodating the context of the use of technology from the consumer side.

Although considered the dominant theory for decades, the legacy of TAM and UTAUT is also with criticism. Among these criticisms is that TAM focuses more on the decision to accept or reject an innovation made by an individual and ignores all aspects of group, social, and cultural decision-making involved (Bagozzi, 2007). Other criticisms highlight the difficulty of quantitative-based theories such as TAM and UTAUT in providing actionable advice to organizational managers. Rogers (2003) criticizes previous research, which claims to have investigated the determinants of innovation implementation in organizations but has only explored initial procurement.

Further research is needed on innovation adoption and implementation that explores actual implementation that focuses on the importance of managerial intervention (Venkatesh & Bala, 2008). A deeper understanding of this research topic can also be carried out by conducting investigations from various perspectives (multiple perspectives) of the actors involved during the innovation implementation process, such as (individuals, groups, and organizational levels) (Gallivan, 2001). Previous studies related to this research topic, such as those conducted by (Venkatesh & Bala, 2008), examined the multiple perspectives of the actors involved in the IT innovation implementation process and the critical role of managerial intervention. This research revealed that the role of managers in the intervention (intervention managerial) helps the successful implementation of IT innovation in organizations.

It is imperative to understand and raise as research material that the challenges for adopting and implementing IT innovations in institutions like this will be more exciting and challenging. Usually, the decision to adopt an IT innovation has been made by the leadership or university management (executives). The executives give a mandate (official order) to all members of the organization to adopt the IT innovation to users such as academic staff (lecturers), support staff (educational staff), and students, who have no choice but to adopt the innovation (Gallivan, 2001; Rogers, 2003). Such a scenario is described as a contingent authority innovation decision. In the opinion of the researchers, with the nature of adoption involving a diffusion process, managerial intervention is needed to ensure that the adoption of the innovation can run successfully. The managerial intervention actions in question include training adopters and providing facilities in the form of adequate infrastructure support for organizations (Gallivan, 2001).

Simultaneously, these stages and implementation processes are also influenced by other variables, such as subjective norms and facilitating conditions, which appear as mediating factors between the initial adoption decision by the executive and the post-adoption by staff and students. This causes the processes and stages of IT innovation implementation to become more complex

and more challenging to control. This is more interesting to study, especially in the context of Islamic Higher Education institutions (IHEI) in Indonesia.

In the context of IT implementation in higher education institutions, there is a potential gap in exploring the adoption of this innovation as a mandatory issue often taken for granted (Gallivan, 2001). Furthermore, research on the adoption of mandated IT innovations is still relatively rare because researchers generally focus more on identifying challenges and barriers to the use of IT (Al-Shboul et al., 2017); (Huda et al., 2022), (Huda & Hussin, 2010) and voluntary adoption of more straightforward innovations (e.g., PCs, laptops, internet) (Moolenaar et al., 2014). This research is essential to explore the implementation of IT innovation in the context of the education sector, such as IHEI in Indonesia. This group of university categories was selected as a sample that examines the adoption and implementation of self-development IT (SDIT) innovations like Academic Information Systems (AIS) and general IT infrastructure.

### **Framework for Adoption and Implementation of Innovation**

The framework used in this study was proposed by Irawan et al. 2018 is called the adoption and implementation framework of innovation. This study proposed a framework in line with Gallivan (2001) to test the attitudes and behaviour of users and actors at the IT adoption and innovation stage. It is described as an amalgamation framework since it unites several forms of traditional adoption frameworks, such as the Diffusion of Innovation (DOI), with its implementation support at the organizational level. However, the application of the framework developed by Gallivan (2001) in several previous studies was observed to experience difficulties, mainly when used in a broader context; this is because it needs to be explicitly designed for the type of innovation in higher education institutions. For example, it was initially focused only on insurance companies, while this study focuses more on higher education institutions. Moreover, its implementation was based on adopting commercially purchased client-server development software. At the same time, this study explores IT innovations such as IT in general and Management Information Systems (MIS), which are self-developed by the institution's internal IT division/unit or can be said to be made non-commercially.

Irawan et al. 2018 modified the Gallivan framework by incorporated mediating factors at each innovation adoption and implementation stage, namely at the pre and post-implementation stages. The mediating factor at the pre-implementation stage consists of 3 variables: pre-implementation intervention, subjective norm, and facilitating condition. Likewise, the mediating factors at the post-implementation stage consist of 3 variables: post-implementation intervention, subjective norm, and facilitating condition. This was to resolve the previously stated weaknesses and focus more on non-commercial organizations. The design used in this study is indicated in Figure 1.

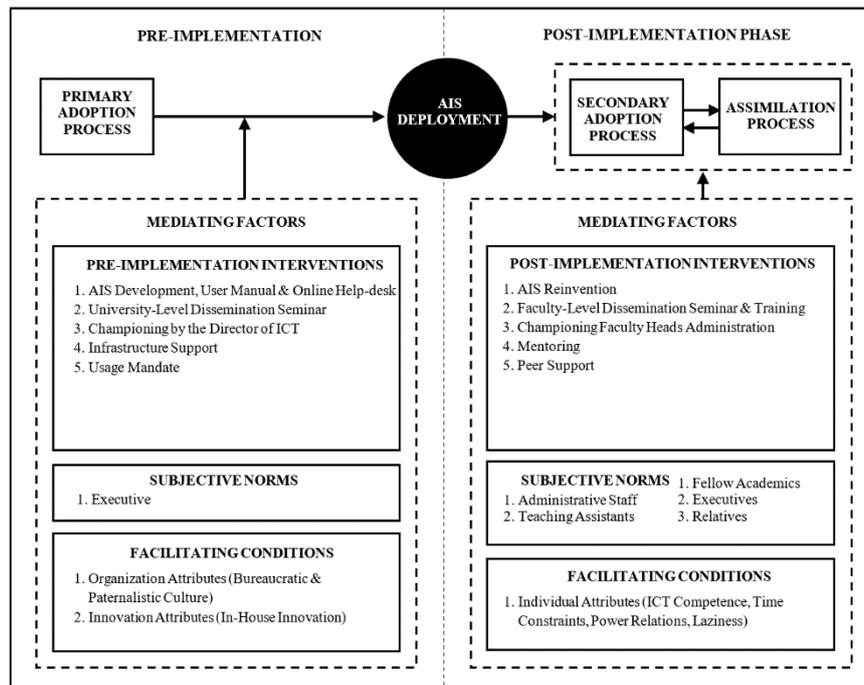


Fig. 1. IT Adoption and Implementation Framework (Irawan et al., 2018).

The framework was reviewed for two IT adoption and implementation stages, including pre-and post-implementation. The pre-implementation is the initial stage which focuses on the mandatory interventions combined with mediating factors such as pre-implementation interventions, subjective norms, and facilitating conditions required by the top-level management to promote adopting and implementing IT in universities. It is important to note that this initial review has been implemented by Huda et al. (2021).

This study, therefore, focuses on reviewing the post-implementation stage and determining the factors influencing the response of middle to low-level management to implementing IT innovation after the mandatory process. The situation where the top-level management is authorized to make initial decisions at the pre-implementation stage to adopt IT innovations through mandatory processes is known as the Contingent Authority Innovation Decisions process (Damanpour, 1991). It is, however, essential to note that the adopters, such as those at the middle and low-level management, can adopt or reject as well as adjust and provide input to the use of the innovation to ensure its future sustainability. The merger of the two stages in the proposed framework provides the opportunity to explore problems associated with all the actors involved comprehensively

### 3. Research Methods

#### Study Approach

Rogers (2003) explained that adopting and implementing IT innovations using the Diffusion of Innovation (DOI) theory can be related to the technology used and social processes, such as humans and the surrounding environment involved. Therefore, a qualitative approach was applied in this study through phenomenological studies to provide more profound observations of the IT innovation adoption and implementation, especially at State Islamic Higher Education institutions in Indonesia, based on the perspectives of all the main actors involved (Mansir, 2020), (Junaidah et al., 2020), (A'ang Subiyakto et al., 2018). Higher education in Indonesia has its characteristics, especially those related to history and its environment.

Based on a historical perspective, the development of higher education has been pioneered by students in political movements involved in nation-building. The student movement in the 1950s influenced government policies in every aspect of national life, including the nationalization of universities, the repatriation of academics in the Netherlands, and the adoption of the national language as the language of instruction. In addition, because Islam is the majority religion Indonesian population, Islam and Islamic education have influenced the formation of the

higher education system in Indonesia. The history of Indonesia's higher education system was initiated by Islamic boarding schools that provided Islamic education before the colonial period (Buchori & Malik, 2004). Considerable evidence suggests that many graduates from the advanced level of 'Islamic boarding schools' are admitted to the postgraduate level of Al-Azhar University in Cairo, one of the prestigious Islamic-based institutions in the Middle East.

**Study Location, Object, and Subject**

The study location was selected using the criterion-based method, which involves determining the location based on the background and events to ensure the completeness of the information (Bungin, 2012). Therefore, Sunan Kalijaga State Islamic University of Yogyakarta was selected for this study because it is currently one of the State Islamic Higher Education institutions (SIHEI) considered to have successfully implemented IT innovations as well as fulfill the criteria and requirements needed in this review (Hakiman et al., 2019), (Darmadji & Andriansyah, 2016). The object was, however, limited to IT innovations within the scope of the Sunan Kalijaga State Islamic University. At the same time, the subjects are the main actors or participants related to IT applications self-development, starting from the top, middle, and low-level management. The entire management was reviewed to have more in-depth findings.

**Study data source**

The participants include a Vice-Rector in the General Administration affairs, which was used to represent the top management level and a Vice Dean of academic affairs representing the faculty management, a Head of Information Technology and Data Center (PTIPD) for the middle-level management responsible for IT management, and senior staff or IT managers for the low-level management. Some parties, including two students involved in the adoption and implementation, were also reviewed, as indicated in Figure 2. The informants were selected using purposive sampling, with the criteria being the ability to provide in-depth information on the studied concept.

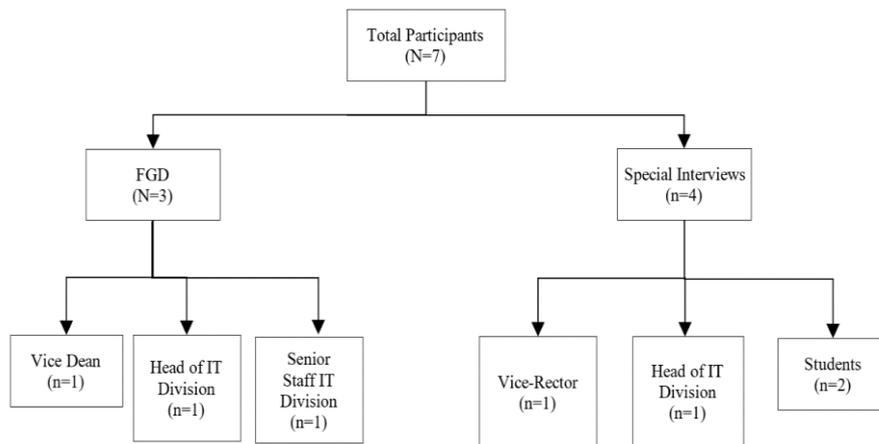


Fig. 2. Distribution of Participants

**Data Collection and Technique**

**Interviews**

Data were generally collected using semi-structured interviews, which promote two-way communication to have new perspectives and ideas. This involved the combination of Focus Group Discussion (FGD) activities with special interviews to explore the experiences of critical actors or informants concerning the use of IT innovations at the Sunan Kalijaga State, the Islamic University of Yogyakarta.

**Documentation**

A validity test was conducted before the interview, and this involved cross-checking the documentation data obtained from the university's official website concerning the long-term IT strategic planning documents, ICT training activities reports by the Information Technology and Data Center (PTIPD), and information system profiles at the university as well as some offline documents such as rule books on written policies and university statistical reports. The aim was to determine the contextual documentation on the case being studied to strengthen the information to be obtained during the interviews.

**Physical artifacts**

Data were also collected about the physical artifacts issued by the Information Technology and Data Center (PTIPD), such as the paper forms inputted and processed manually and other physical data. This was conducted to confirm that IT innovation has been implemented and running at the institution and to determine other valuable data needed in this study.

**Study Development**

Future studies usually have five development stages. These include the preliminary study, such as the required findings of documents and physical artifacts, followed by data collection through special interviews or FGDs, data analysis, result interpretation, and report writing, as indicated in Figure 3.

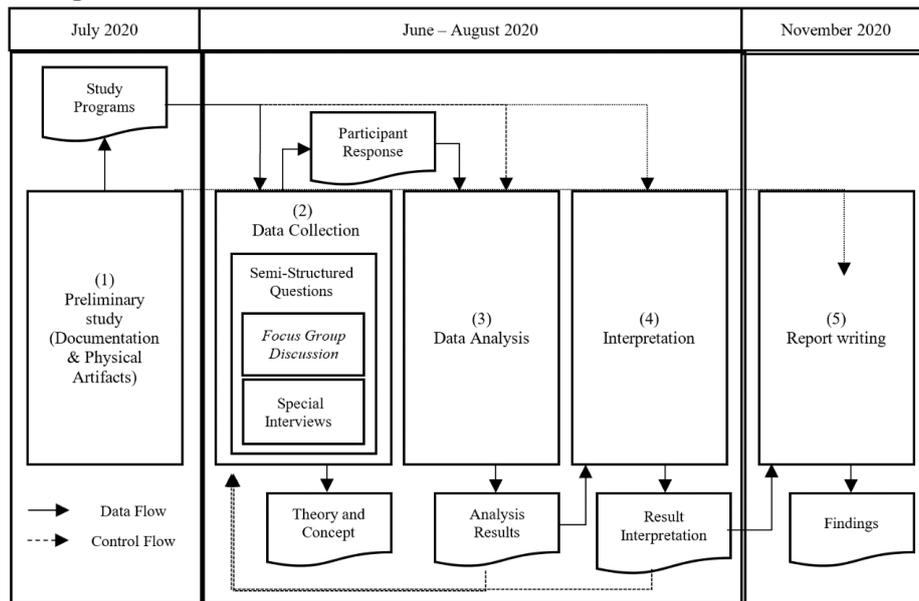


Fig. 3. Study Work Process Flow (A'ang Subiyakto et al., 2015)

**Stage 1: Preliminary Study**

The preliminary study was conducted in June 2020 to provide complete information needed to develop and guide the stages of future study programs (Rabiee, 2004); (Ritchie et al., 2013); (Turner III & Hagstrom-Schmidt, 2022). It involves documentation or physical artifacts observed from key informants.

### Stage 2: Data Collection

It has been previously stated that data were collected through semi-structured interviews combined with Focus Group Discussion (FGD) activities to understand the phenomena and determine the experiences of key informants. It was conducted from June to August 2020 with the focus on three types of participants covering three levels of organizational structure ranging from low, middle, to top-level management associated with the application of IT innovation services at the Sunan Kalijaga State Islamic University of Yogyakarta in their daily activities.

### Stage 3: Data Analysis

Data were analyzed through in-depth observation techniques based on the social interaction process with the main actors to understand the complexities in adopting and implementing IT innovations at the Sunan Kalijaga State, the Islamic University of Yogyakarta. The analysis process was conducted practically starting from August 2020.

### Stage 4: Interpretation

The data analyzed were interpreted at the end of August 2020 to determine the response and continued impact during the post-implementation stage and the input from middle and low-level management after the mandatory process of adopting and implementing IT innovations. It was also intended to review the mediating influence of post-implementation interventions, subjective norms, and facilitating conditions for the success and sustainability of the IT innovation adoption and implementation in the institution.

### Stage 5: Report

All the stages were concluded with the preparation of a report on the results obtained in November 2020, and this was the closing stage of the study.

## 4. Results and Discussions

The preliminary study analysis of the documentation data for the Master Development Plan showed that the Sunan Kalijaga State Islamic University of Yogyakarta has adopted and implemented eight IT innovations. These were focused on transiting from the academic and administrative processes previously conducted manually to the current automatic system through IT innovations. However, it was observed that only four website-based systems are actively used due to the COVID-19 pandemic, including the Academic Information System (AIS). Moreover, Lecturer Performance Load (BKD) system was designed as an integrated system for lecturers, while the administrative management facility and the lecture support or e-learning facility. It is also important to note that a different system designed for Android mobile, the Presence Information System, is currently being used as a remote attendance facility to respond to the pandemic.

These innovations were implemented to provide the best service to the users following the aspirations and vision of the Information Technology and Data Center (PTIPD), Sunan Kalijaga State Islamic University of Yogyakarta. They were also applied to improve and develop the quality of education for all users in the institution with the expectation that the IT innovations facilitate the management of the university's operational, managerial, and strategic activities in the future.

These IT innovations were comprehensively reviewed at the post-implementation stage through three main mediating themes: the post-implementation interventions, subjective norms, and facilitating conditions. This is in line with the proposed framework, and the detailed distribution of the themes and their sub-themes is indicated in the following Table 1.

Table 1 - Themes and sub-themes

Themes	Sub-Themes
Post-Implementation Interventions	AIS Reinvention
	Faculty-Level Dissemination Seminar & Training
	Championing by Faculty Heads of Administration

	Mentoring
	Peer Support
	Administrative Staff
	Teaching Assistants
Subjective Norms	Fellow Academics
	Executives
	Relatives
Facilitating Conditions	Individual Attributes (ICT Competence, Time Constraints, Power Relations, Laziness)

The themes were reviewed to determine the responses and input from users directly involved, as well as the factors influencing the success of the IT innovation adoption and implementation at the Sunan Kalijaga State, the Islamic University of Yogyakarta. This was obtained through Focus Group Discussion (FGD) sessions and individual interviews, and the findings are summarized in the following sections.

### Post-Implementation Interventions

The post-implementation intervention was the first mediating factor reviewed to determine the impact of the IT innovation adoption and implementation after the mandatory process. It was discovered that the interventions or supports provided by the top-level management include the discovery or development of the Management Information System, faculty-level seminars and training, mentoring, and peer support to promote the adoption and implementation of IT innovations in the institution.

The top-level management has also provided support for the application of IT innovations, such as the IT infrastructure and application of Information Systems, which involved mentoring developers and users to expedite the development and implementation process. This is important considering the high level of resistance observed during the implementation as well as the difficulty in assuring the users that the new system is different from the previous. The support and mentoring allow the gradual emergence of confidence in the use of IT innovations. This was directly explained by the Vice Dean of Academics in the Focus Group Discussion session on July 28, 2020.

"The first semester was the hardest to convince users that the new Academic Information System (AIS) differs from the previous. This is because they (users) already have bad memories from the previous system, a desktop-based technology that limits the possibility of conducting their work when exposed to a virus. They also find IT innovations to be very inconvenient, and this has made it difficult to regain their trust."

"Through mentoring, the trust has slowly begun to emerge. We are currently working together with the representatives of the users to discuss their needs, including the top-level management, such as the leaders, and the low-level management, such as study program operators, to ensure adequate support for the implementation of the IT innovations."

The Diploma Companion Information Certificate (SKPI) System was also supported by absorbing the aspirations of different user partners. This was explained at the same Focus Group Discussion session with the Vice Dean of Academics and a special interview with the Head of the Information Technology and Data Center (PTIPD) on August 11, 2020.

"We absorbed the aspirational support needed and reimplemented policy development externally and internally. The existing developments were assessed because new rules were introduced using SKPI, which led to the system's design, which was discussed with the academics for future monitoring and development."

The top-level management, such as executives, heads of divisions, and other teams involved, also continuously supports interventions to make the implementation process accessible. For example, the Information Technology and Data Center (PTIPD) held socialization and training for the lecturers using the Lecturer Performance Load (BKD) system. The use of the system was demonstrated, and they were asked to practice with the assistance of the PTIPD Team through general explanations of related technical terms.

The top-level management also supported the discovery and development of the Administrative Information System, as indicated by the recent development of the mobile-based Presence Information System (PIS) to avoid physical contact during the COVID-19 pandemic. The PIS was redeveloped to respond to the present situation and ensure the adoption and implementation of IT are sustained at the university. According to the Vice Dean of Academics Affairs, this is associated with the need for top-level management to support sustainable system development, especially in the IT innovation process.

"I believe continuous innovation is the most important thing for sustainable use. Therefore, when the needs on one side have been fulfilled, the development can be added to the needs of other systems".

### **Subjective Norms**

The subjective norms were also reviewed successfully in addition to the post-implementation interventions to determine the influence of subjective norms provided to promote the decisions to use IT innovations. This discussion was based on five sub-themes: the administrative staff, academics, executives, and other partners directly involved in adopting and implementing IT innovations. The encouragement received to use the innovations was evaluated in this section.

According to the Vice Dean of Academics of the Faculty of Science and Technology (FST), which represents the top-level management, subjective norms influence the implementation process through discussions with the users at the macro to micro level. This has motivated the continuous usage of the Academic Information System (AIS) from its initial launch in 2013 to now. The middle and lower-level users were encouraged to discuss and add input to the future system development implemented by the top-level management. This was confirmed directly during the Focus Group Discussion on July 28, 2020.

"Fortunately, the Academic Information System (AIS) has been useful from its implementation in 2013 until now. There is no pause in its use due to the discussion process regarding the development of the system."

"It is important to note that the system needs to be implemented based on the consideration that easy works are not to be increased to ensure its effectiveness."

The lecturers, academics, administration staff, and other parties currently feel that the support provided by the top-level management during the post-implementation process influenced their subjective norms to use the IT innovations. This reflects in their daily performance and several benefits associated with the innovations by the lecturers enjoying the Tri Dharma University Information System activities. The statement of the Head of Information Technology and Data Center (PTIPD) representatives at the Focus Group Discussion session held on July 28, 2020, further confirms these assertions.

"Tri Dharma is a system created to allow lecturers to upload their work such as research, service, and others to ensure the BKD System can synchronize and retrieve them. This practically assists the lecturers by ensuring they do not need to conduct repetitive data entry processes, thereby making their work easier."

These observations could motivate different stakeholders to continue using IT system innovations sustainably.

### **Facilitating Conditions**

The facilitating conditions associated with the users of IT innovations at the university were also reviewed to determine the level at which the technical and organizational infrastructures are perceived to be efficient in fulfilling their needs. This was based on four sub-themes: ICT skills or competencies, time constraints, power relations, and laziness. It was discovered that several people believed they had been assisted by the IT innovations, as indicated by the lecturers, and that they could save time after implementing the Lecturer Performance Load (BKD) Information System. This was further explained by the Vice Rector and the Head of the Information Technology and Data Center in a special interview on August 11 and 20, 2020, that there were differences before and after the introduction of the BKD Information System.

"In the past, the process was very long and difficult because it was too administrative, but applying the BKD Information System makes it more automatic by reducing the manual recapitulation. It is also straightforward and can be integrated directly, improving the lecturers' performance".

Several mechanisms have also been implemented to support the operation of IT innovation, such as the manual designed by the Information Technology and Data Center (PTIPD) as the head of the IT division and facilitated by the Dean of the Faculty to understand the working principle of the Management Information System. Another example is the provision of instructions on operating the system on the AIS website, thereby assisting the users in accessing information anytime and anywhere.

IT innovations also make it easy to explore the benefits of power relations as indicated by the direct connection of the management, administration, lecturers, students, and parents/guardians to academic and non-academic activities in the school. Moreover, technological facilities are continuously being developed, as indicated by their effects on attendance, teaching and learning activities, final project management, diplomas, lecturer performance, and others allowing the stakeholders to be integrated into the process. This facilitates power relations previously considered very complicated due to the complex bureaucracies.

The students using the e-learning system indicated the direct benefits of the innovation due to the significant assistance it provides in the teaching and learning process, especially during the COVID-19 pandemic. Two students stated this in a unique interview process on August 21, 2020.

IT innovations can facilitate all academic activities which are challenging to achieve, primarily due to the COVID-19 pandemic. The innovation implemented allowed us to conduct academic activities conveniently."

"Activities usually conducted in class can now be assessed online despite the COVID-19 pandemic. The Academic Information System (AIS) also eases the process of accessing data because it does not require a manual process."

Some obstacles were, however, identified, such as those observed about the ICT competencies of the users. It was discovered that some students using the SUKAstudia system had particular challenges, such as connection, device readiness, and less implementation compared to the previous face-to-face learning process.

"The drawback is that not all students have good connections, with some leaving in places with less stable signals discovered to have limited access. Student facilities such as gadgets need to be adequate for the implementation of the e-learning process, and their use is more challenging than the face-to-face learning method. This means the teaching process is less interactive because the circumstances differ for each student."

The lack of interactivity should receive more attention in the future, and the system also needs to be developed and improvised further to avoid laziness on the part of the users, especially the students engaged in online teaching and learning due to the COVID-19 outbreak. Therefore,

the developers and top-level management need to find concrete solutions to solve these problems to ensure the future implementation of these innovations.

The post-implementation stage was observed to significantly affect the adoption and application of IT innovations after the mandatory decisions by top-level management at the pre-implementation stage, especially in the Sunan Kalijaga State Islamic University of Yogyakarta. The support and role of the innovation users were discovered to be important in determining the success and problems with the implementation.

The results of the Focus Group Discussion (FGD) and special interviews showed that the post-implementation interventions and mediating factors introduced by top-level management could influence the acceptance of IT innovations. This was indicated in the support provided, such as the discovery and development of a Management Information System, seminars and training at the faculty level, mentoring, and peer support, which plays a crucial role in the process of implementing IT innovations.

The users at the middle and lower management levels also consider that the system can be trusted for widespread use after having doubts about its usability. It has the potential to positively influence their daily activities due to the significant role of top-level management in developing and providing support for IT innovation. Moreover, it was discovered that subjective norms could also promote and influence IT innovations because users have used similar systems, such as administrative staff, lecturers, academics, executives, and other partners. Other factors such as support, usability, and absorption of aspirations were also observed to have influenced their decision to trust the innovation adoption process. However, it is essential to note that future system development should be able to handle the previously easy process to avoid a reduction in the intention and motivation of users to apply these IT innovations.

The findings showed that the top-level management had created and applied several guides, technical operating instructions, and other facilitating conditions to support IT implementation. This assists in resolving possible future problems; for example, the power relations in using the system, which was previously considered difficult due to the highly bureaucratic process, is adjudged to have become accessible through the automation and integration of innovation.

The time constraints associated with work can also be reduced by applying a system that can be used anywhere and anytime. This was confirmed by the users that the IT innovations developed are accessible to all layers of diverse users. It was also discovered that the facilitating conditions are different for the users, and this needs to be considered in developing IT innovations in the future, especially for higher education institutions such as Sunan Kalijaga State Islamic University.

## 5. Conclusion

Focus Group Discussion (FGD) studies and special interviews conducted qualitatively to determine the influence of IT innovation adoption and implementation at the Sunan Kalijaga State, the Islamic University of Yogyakarta, led to some conclusions. First, the success of IT innovation adoption and implementation in an institution is strongly influenced by the support from all management levels, including those at the top, middle, and low levels.

Second, the initial mandatory factor in promoting the implementation of IT innovations in universities at the pre-implementation stage can accelerate the implementation process because the commitment to use the system can lead to its acceptance. However, the input and aspirations of the users need to be considered after the system has been implemented to influence the trust, success, and sustainability of the system and ensure its wide application. This is important among those directly interacting with innovation at different management levels of higher education institutions. Third, mediating factors such as the introduction of intervention at the post-implementation stage, increase in subjective norms, and provision of facilitating conditions by the top-level management are needed to ensure the successful implementation of IT innovations, especially for universities.

The support and input from users actively using IT innovations can contribute significantly to future implementation. The factor suggested being reviewed more comprehensively is the facilitating conditions owned and needed by users to bridge the gap among the users of IT innovations at the Sunan Kalijaga State Islamic University.

This study shows that reviewing the pre-and post-implementation phases and the mediating factors, such as post-implementation interventions, subjective norms, and facilitating conditions, can be a solid foundation to evaluate the success of IT implementation. It was also discovered that the post-implementation phase could support the trust, success, and sustainability of the implementation process after the users' technical, social, and input have been considered. This proves that applying the proposed framework in this study and its mediating factors can be used to analyze and review the success of IT innovation adoption and implementation in state universities.

The main contribution of this study is an empirical study that systematically identifies and prioritizes IT management units to be supported by top management levels in higher education institutions. The limitation of the study is that the results were based on a particular region's higher education context. A more in-depth review of possible influencing factors, such as those related to security and business, must be conducted. In contrast, the technical, social, security, and business aspects of using IT innovations in higher education institutions must also be analyzed..

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