

39. Managing information systems by integrating information

by Ismi Rajiani

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**MANAGING INFORMATION SYSTEMS BY INTEGRATING
INFORMATION SYSTEMS SUCCESS MODEL AND THE UNIFIED
THEORY OF ACCEPTANCE AND USAGE OF TECHNOLOGY**

1
Harlie M., Hairul, Rajjani I., Abbas E.W.*

Abstract: The Internet of things (IoT) has forced the mode of universities evaluating the performance of people and the way of disseminating the knowledge. Consequently, universities capitalize a substantial amount in sophisticated Higher Education Management Information Systems (HEMISs) technology to stay updated with the current trend. However, the implementation of the technology does not automatically inspire the modifications in working culture of the public universities in Indonesia as values and cultures remain outmoded and collusive. This indicates that most public universities are internally slow to adopt the technology making the application to be more beneficial for academia are still out of reach. This study aims at scrutinizing the organizational requirement that boosts technology implementation mainly in a higher education organization located in developing countries. The findings from the analysis of a structural equation model tested on end-users consisting of 150 (one hundred fifty) public university officers throughout Indonesia evidenced that implementation of the technology in terms of information, system, and service quality make significant, positive impacts on performance expectancy leading to the intention to adopt the technology. The research underpins the significance of system flexibility to organizations as one source for sustainable competitive advantage.

Key words: management, information technology, HEMISs, university

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Introduction

In the era Internet of things (IoT), IT's role is more crucial in reinforcing the university competitiveness. Universities are consequently growing their IT investments, and due to the continuous stakeholder demands, management requires IT not only to minimize costs but also mould business outcomes. Such pressure make various efforts have been designed to evaluate IT investment from a business point of view (Rajjani and Ismail, 2019).

In public sector, the tremendous growth of information systems has led public universities to amend their conventional technique by using information system as a tool to replace the old and the rigid systems (El-Haddadeh et al., 2019). Thus, the

* **Dr. Muhammad Harlie MM, Hairul SE, MM** Islamic University of Kalimantan Banjarmasin, Indonesia, **Dr. Ismi Rajjani**, Muhammadiyah University of Gresik, Indonesia **Prof. Dr. Ersis Warmansyah Abbas**, Lambung Mangkurat University, Indonesia

✉ corresponding author: ismi.rajjani@umg.ac.id

✉ harlie54mh@gmail.com; haerrul18@gmail.com; ersiswa@ulm.ac.id

9 current information systems have helped to overcome the problem of inefficient public service and information delivery in the public sector (Shin and Ahn, 2019). In the case of Indonesian public universities, the IS utilizations have been viewed as the determinant of competitive advantage (Darmalaksana et al., 2018). Ironically, although the IS advancement ventures have been performed since more than three decades ago in the respective country, the performance of the projects is less satisfying (van de Weerd et al., 2016; Aang Subiyakto et al., 2018). The fundamental challenge of Higher Education Management Information Systems (HEMISs) is the predicted gap between technology and human interaction. The employees' positive attitude and willingness to accept HEMISs is the key to reaching organizational goals efficaciously and efficiently mainly in the setting of Indonesian public sectors who tends to wait and see when being encouraged to innovate both in technology and management (Abbas et al., 2018). Therefore, this research aims at identifying determinants of employees' behavioral intention to undertake HEMISs in Indonesia via integrating information systems success model (DeLone and McLean, 2016) with the unified theory of acceptance and usage of technology (Venkatesh et al., 2011).

Literature Review

Research on information system success model, which become the starting point for many researchers is the seminal works of DeLone and McLean (2003). Initially, six categories of successful dimensions: system quality, information quality, user satisfaction, use, individual impact, and organizational impact were proposed. The most recent model additionally presents "intention to use" as an option to the "use" dimension. Besides, the effect on individual and organization level is combined, bringing about a single construct, namely "net benefits" (DeLone and McLean, 2016).

Usually, the system quality is often assessed under the dimensions of flexibility, reliability, functionality, ease of use, data importance, integration, and quality (DeLone and McLean, 2016). Vija (2016) confirmed that end-users pay attention to the details of system quality; compatibility and system quality can lead to satisfaction. Shin (2017) reported that system quality is positively related to both behavioral usage intentions and user satisfaction in the learning system.

Information quality alludes to the system's output yield, as viewed by the respective user of the system (Negash et al., 2003; Morańska, 2016; Rajiani et al., 2018). Usually, the quality of information is measured in terms of accuracy, timeliness, completeness, relevance, and consistency. Furthermore, information quality been demonstrated to be an essential achievement factor when discussing IS achievement, particularly in the context of web-based systems (Zhang and Deng, 2018). The IS literature reveals that information quality significantly affects information satisfaction (Al Samarraie et al., 2018).

Service quality is characterized as clients' emotional evaluation that the service they are accepting from the entrance is the service they wish (Rahi and Gani, 2019).

Since service quality was included by Delone and McLean (2002) to gauge the achievement of IS, much consideration has been dedicated to the refreshed model (Rouibah et al., 2015; Tam and Oliveira, 2016; Ojo, 2017). Further, in Asian setting research found a noteworthy connection of service quality with the affirmation of utilization of the system, for example, Phuong and Dai Trang (2018) and Jang et al., (2016). In this way, it is accepted that more elevated the level of service quality, the more elevated the level of clients' fulfillment.

User's satisfaction is viewed as one of the significant achievement measurements of IS achievement. As per Delone and McLean (2016), client satisfaction and utilization of the system are closely associated. Delone and McLean recommended an accurate characterization of six significant classes of IS achievement, where customers' satisfaction was the most broadly utilized unusual amount.

Despite the fact that DeLone and McLean (2016) recommended that system utilization is the most fitting variable for estimating the accomplishment of IS, intention to use is additionally a significant piece of system success since mentally a user won't utilize the system in the event that he/she doesn't have the desire to use the system.

The usage intention of the systems displays the way wherein the IT system will be utilized or how intensive the system is used by its users (Alzahrani et al., 2017). DeLone and McLean themselves conceded that intention to use as a variable is hard to quantify (DeLone and McLean, 2003). Accordingly, within the university setting, numerous scholars measure usage behavior by utilizing the unified theory of acceptance and use of technology (UTAUT) model as the deciding viewpoint with respect to the user's acceptance of technology (Garone et al. 2019; Ibrahim et al, 2018; Alkhasawneh and Alanazy, 2015).

Theoretically, UTAUT is an expansion of the Technology Acceptance Model (TAM). While TAM is assigned for general utilization of PC or innovation, UTAUT is assigned for obligatory use (Venkatesh et al., 2011). Innovation use in the obligatory condition is to support the users to perform in their work better. Performance expectation is a variable in UTAUT that intends to catch the degree to which an individual accepts that the technology will expand his/her activity execution. Another explanation behind picking UTAUT rather than TAM is because UTAUT has a superior forecast control toward behavior intention - approximately 70% (Venkatesh et al., 2011).

Under UTAUT, technology acceptance is determined with performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy is the degree to which an individual believes that using the system will help him or her attain gains in job performance. Effort expectancy is the degree of ease associated with the use of the system. Social influence is the degree to which an individual perceives that important others believe he or she

should use the new system. Facilitating conditions is the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system (Saleem et al., 2016).

Methodology

The target population of this study is 150 (one hundred fifty) End User Computing (EUCs) in authority to give approval for endorsing the promotion of lecturers to the higher level rank. The data was collected through on line questionnaires during the period of July 2018 until July 2019.

By using the Structural Equation Model (SEM), the standard rule is that the minimum number of observation is at least five times as many observations (Hair et al., 2006). The relationship among constructs is depicted in a theoretical framework. The seven-point Likert-type scales (1 – strongly disagree; 5 - strongly agree) were applied throughout the questionnaire.

Factors loading are employed to evaluate discriminant validity where only items with factors loading surpass 0.50 will stay in the model (Hair et al., 2006).

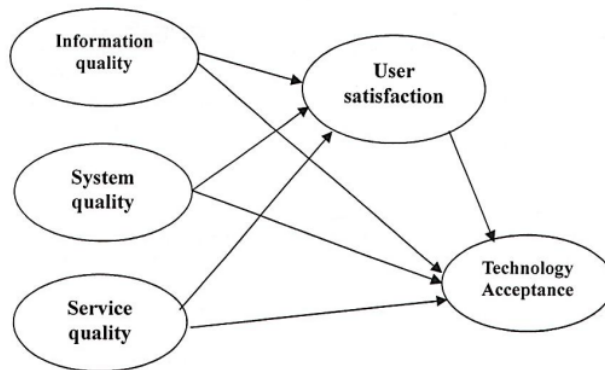


Figure 1: Theoretical Framework

The use of technology as an endogenous construct is measured with four dimensions: performance expectancy (IU1), effort expectancy, (IU2), social influence (IU3) and facilitating conditions (IU4) adapted from the work of van der Vaart et al. (2016). End-user satisfaction as an endogenous construct is measured with three dimensions: information satisfaction (US1), system satisfaction (US2) and overall satisfaction (US3) adapted from Ismail (2012). In the other hand, the exogenous variable of information quality is measured with accuracy (IQ1), relevance (IQ2), consistency (IQ3) and completeness (IQ4) adapted from Shaltoni et al. (2015). System quality is assessed with, reliability (SQ1), access (SQ2), efficiency (SQ3), and ease of use (SQ4) adapted from the work of Shin (2017).

Since DeLone and McLean (2016) claim that the classical service quality can be added to an IS context, this research instrument applies the dimensions of tangibles, reliability, responsiveness, assurance, and empathy to measure service quality. With the assistance of PLS software, seven hypotheses will be tested.

- *Information quality is positively related to the end user's satisfaction.*
- *System quality is positively related to the end user's satisfaction.*
- *Service quality is positively related to the end user's satisfaction.*
- *Information quality is positively related to technology acceptance.*
- *System quality is positively related to technology acceptance.*
- *Service quality is positively related to technology acceptance.*
- *End user's satisfaction is positively related to acceptance of Higher Education Management Information Systems (HEMISs).*

Results and Discussion

SEM requests reflective estimation models to assess validity by watching the Average Variance Extracted (AVE) rather than analyzing the traditional "Cronbach's Alpha". The AVE estimation of 0.50 and higher demonstrate a reasonable level of validity as this figure mirror that the latent variables are represented the more significant part of indicators' variance (Hair et al., 2006).

Estimation model in Table 1 shows that the Average Variance Extracted (AVE) produced all surpassed 0.50 signifying that the instrument had excellent convergent validity.

Table 1: Average Variance Extracted (AVE) for convergent validity

Latent Variables	Items	Outer Loadings	Average Variance Extracted
Information quality	- The information that HEMISs provides is accurate.	0.73	0.72
	- HEMISs provide relevant information for my job.	0.80	
	- The information content in HEMISs meets my needs.	0.71	
	- HEMISs provides me a complete set of information	0.63	
System quality	- The operation of HEMISs is reliable.	0.73	0.65
	- HEMISs allows information to be readily accessible to me	0.62	
	- It does not take too long for HEMISs to respond to my request.	0.68	
	- I find HEMISs easy to use.	0.56	
Service quality	- HEMISs have up-to-date hardware and software	0.61	0.66
	- HEMISs are dependable	0.71	
	- HEMISs employees give prompt service to users	0.74	
	- HEMISs employees have the knowledge to do their job	0.63	
	- HEMISs have users' best interests at heart."	0.61	

End user's satisfaction	- I am delighted with the experience of using HEMISs.	0.70	0.67
	- I am delighted with the information I received from HEMISs.	0.60	
	- Overall, my interaction with HEMISs is satisfying.	0.72	
Technology acceptance	- I expect/perceive that HEMISs technology will be effective for me as a lecturer.	0.82	0.81
	- I expect/perceive that HEMISs technology requires a minimum new skills.	0.80	
	- I expect/perceive that HEMISs technology will be used a lot by my colleagues.	0.84	
	- I expect/perceive that HEMISs technology match with the current state of technology in my practice.	0.78	

Table 1 denotes that the entire Average Variance Extracted (AVE) values are higher than the suggested threshold of 0.5 conforming high levels of convergent reliability among all reflective latent variables. Thus, convergent validity is established. The Structural Equation Modeling Results are displayed in Table 2.

Table 2: The Structural Equation Modeling results

Path	R	R ²	P-Value	Conclusion
Information Quality → Satisfaction	0.46	0.21	0.00	Significant
System Quality → Satisfaction	0.39	0.15	0.03	Significant
Service Quality → Satisfaction	0.25	0.06	0.03	Significant
Information Quality → Technology Acceptance	0.45	0.19	0.03	Significant
System Quality → Technology Acceptance	0.39	0.14	0.04	Significant
Service Quality → Technology Acceptance	0.22	0.02	0.02	Significant
Satisfaction → Technology Acceptance	-0.02	0.0004	0.02	Significant

All paths are significant, indicating the acceptance of all hypotheses. The result reveals that information quality as information output in terms of accuracy, relevance, consistency, and completeness is positively related to end-users' contentment toward Higher Education Management Information Systems (HEMISs). Also, system quality that meets management characteristics in decision making proved with reliability, access, efficiency, and ease of use is positively associated with end-users' satisfaction. Likewise, service quality with adequacy of information technology eluding clients' emotional evaluation that the service they are accepting from the entrance is the service they wish, is undoubtedly connected with end-users' satisfaction which is as measurable performance from performance measurement of the system. Further, these three paths also positively associated with the acceptance of Higher Education Management Information Systems

(HEMISs) technology. Thus, technology acceptance also appears as representativeness of the level of performance achievement within HEMISs.

The result indicates that within Indonesian higher education setting, although both the unified theory of acceptance and use of technology (UTAUT) and the Delone and McLean IS model is valid, the latter is still dominant supporting the previous research in Asian countries (El-Haddadeh et al., 2019; Al-Samarraie et al, 2018; Chae et al, 2014).

It has been continually contended that the way into Indonesia's government effectiveness including higher education is through the use of information technology. However, the advancement stays moderate though the spending of government in IT has been increasing. With the continual increase of IT spending in government, arranging should be directed to guarantee that wastage does not occur again by investigating the need of IT from the perspective of end clients, for this situation by applying information quality, system quality, and service quality. Regarding attributes, government association usually are unique to those of a private segment. In terms of characteristics, government organization are naturally different from those of a private sector. Despite the Delone and McLean IS model is legitimate in Indonesian business setting (Dewantoro et al., 2019), certain presumptions and practices in information system theories and research probably will not be relevant in Indonesian government offices condition (Mardiana et al., 2015). From a national point of view, it is hard to guarantee that there is the achievement of in both the arranging and usage of Higher Education Management Information Systems (HEMISs) in Indonesia.

The improvement of Higher Education Management Information Systems (HEMISs) is a piece of the endeavors to set up the structure, framework, and an organization which is efficient, effective, transparently, and responsible. For this, it is fundamental to be bolstered by capable human resources, sound management systems, processes, and control systems.


Conclusion

Although the unified theory of acceptance and use of technology (UTAUT) and the Delone and McLean IS model are validated within Indonesian public sector, the implementation of Higher Education Management Information Systems (HEMISs) is not as easy as arranged. It requires enormous and synchronous endeavors with the help of adequate financing and steady political will. Usage of HEMISs does not build the nature of public service quality. This is because of a long and rigid public service culture.

HEMISs in public universities cannot be executed without the help of bureaucratic reform overall. Numerous components must bolster the improvements of the governance management from conventional to become modern by using a technological approach.

Further study should be conducted to obtain a more profound comprehension of technology acceptance in the mandatory environment, particularly in government bodies.

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**ZARZĄDZANIE SYSTEMAMI INFORMACYJNYMI PRZEZ INTEGRACJĘ
SYSTEMÓW INFORMACYJNYCH MODEL SUKCESU I ZJEDNOCZONA
TEORIA PRZYJMOWANIA I STOSOWANIA TECHNOLOGII**

Streszczenie: Internet rzeczy (IoT) wymusił tryb oceniający wyniki ludzi i sposób rozpowszechniania wiedzy. W rezultacie uniwersytety wykorzystują znaczne kwoty w zaawansowanej technologii systemów informacji zarządzania szkolnictwem wyższym (HEMIS), aby być na bieżąco z aktualnym trendem. Jednak wdrożenie tej technologii nie inspirowało automatycznie zmian w kulturze pracy publicznych uniwersytetów w Indonezji, ponieważ wartości i kultura pozostają przestarzałe. Wskazuje to, że większość uniwersytetów publicznych jest wewnętrznie powolna w akceptacji technologii, co sprawia, że aplikacja jest bardziej korzystna dla środowisk akademickich. Badanie ma na celu określenie wymogu organizacyjnego, który przyspieszy wdrażanie technologii głównie w organizacji szkolnictwa wyższego w krajach rozwijających się. Wyniki analizy modelu równania strukturalnego przetestowanego na użytkownikach końcowych składających się ze 150 (stu pięćdziesięciu) urzędników uniwersytetów publicznych w całej Indonezji wykazały, że wdrożenie technologii pod względem informacji, systemu i jakości usług ma znaczący, pozytywny wpływ na oczekiwaną wydajność. Badania potwierdzają znaczenie elastyczności systemu dla organizacji jako jednego źródła trwałej przewagi konkurencyjnej.

Słowa kluczowe: zarządzanie, technologia informacyjna, HEMIS, uniwersytet

通过集成信息系统成功模型和技术接受与使用统一理论来管理信息系统

摘要: 物联网 (IoT) 迫使大学建立了评估人员绩效和知识传播方式的模式。因此, 大学利用大量先进的高等教育管理信息系统 (HEMISs) 技术来跟上当前趋势。但是, 由于价值观和文化仍然过时和相互勾结, 因此该技术的实施并不会自动激发印尼公立大学工作文化的改变。这表明大多数公立大学在内部采用该技术的步伐都很慢, 使得该应用对学术界更有利的应用仍然遥不可及。这项研究的目的是审查主要在发展中国家的高等教育机构中促进技术实施的组织要求。

对整个印度尼西亚150名(一百五十名)公立大学官员组成的最终用户进行的结构方程模型分析的结果表明, 该技术在信息, 系统和服务质量方面的实施对企业产生了重大的积极影响性能预期导致采用该技术的意图。该研究强调了系统灵活性对于组织作为可持续竞争优势的一种来源的重要性。

关键字: 管理, 信息技术, HEMIS, 大学

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