

User perceptions on the use of Academic Information Systems for decision making support in the context of Tanzanian Higher Education

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ABSTRACT

The adoption of Information and Communication Technology in Tanzanian higher education institutions has led to the implementation of different but equivalent Academic Information Systems to support the management of different activities of students. However, these systems are not well used to support decision-making in those institutions. This study applied the Unified Theory of Acceptance and Use of Technology model to study the perceptions of decision makers on the use of academic information systems in their daily activities, especially in decision-making. A mixed methods approach was followed, whereby questionnaires and interviews were used for data collection. Regression analysis was done to test the research hypotheses, and the qualitative data were thematically analyzed. The results showed that performance expectancy and facilitating conditions predicted the behavioral intention to use the systems ($p < 0.05$) while effort expectancy and social influence were statistically insignificant ($p > 0.05$). It was also found that users like to use the system, but undesirable functionalities, lack of necessary data, poor support, and inadequate training undermine their will to use the systems for decision-making. The results obtained cast new light on various issues that hinder the use of academic information systems by decision makers, and point toward new measures to improve them in order to increase their adoption.

Keywords: *Academic Information Systems; Higher Education; Decision Making; Tanzania.*

INTRODUCTION

The adoption of Information and Communication Technology (ICT) in Tanzanian higher education institutions (HEIs) has changed the way those institutions perform different operations (Mahenge & Sanga, 2016), such as manage their students' affairs, allocate facilities, and do a range of other administrative functions. The adaptation of ICT improves quality of management which thereafter increases quality of service (Khanam et al., 2013) and hence support on development (Coelho et al., 2015). On adapting ICT, different Academic Information Systems (AISs) have been implemented to support daily operations, which has been shown to increase the working efficiency (Mahenge & Sanga, 2016) in these higher education institutions.

Academic Information System refers to a set of systems and operations used in organizing, processing and using information in higher education institutions (Indrayani, 2013; Utomo et al., 2017; Bon et al., 2018). Since the implementation of these AISs, higher education institutions have experienced massive changes in the way they do their daily activities in supporting students (Duță, & Martínez-Rivera, 2015). There has been a sharp increase in the wealth of decision-support information available for decision makers within HEIs (Indrayani, 2013). Decision makers include teaching staff and administrative staff, who increasingly rely on AIS functions for

managing students' affairs and facilities. The use of AISs has proved beneficial for quality of service to both students and staff in terms of an improved learning environment, as well as in terms of increased profit to these higher education institutions (Dwivedi et al., 2015). In developing country contexts, AISs have shown significant support to the development of higher education institutions, as it has helped them to develop new ways of achieving and maintaining a competitive advantage (Indrayani, 2013).

Different but equivalent AISs have been adopted by different HEIs in Tanzania. Along with many other AISs used by the different HEIs in Tanzania, SARIS (Student Academic Register Information System) is one of these AISs. The HEIs use the system to support their students in different activities, including:

- i. Student registration process, where students make an online application, and the system processes the registration after confirmation of payment.
- ii. Examination process management, where the students register for their subjects each academic year. After lecturers enter examination results in the system, the system processes, records, and reports examination results.
- iii. Student payment monitoring, where students pay their tuition fees and other payments to the bank. Payment information is automatically fetched into the SARIS system, where students can view their payments and debts.
- iv. Accommodation allocation, where students who need to get on-campus accommodation are required to apply and are then allocated via the system.

Although the AISs are helpful to Tanzanian higher education institutions in different ways, these AISs often go underutilized in decision making activities. Many activities that AISs would support are still done manually, on a paper basis. In order to investigate the reasons for underutilization, this study used the Unified Theory of Acceptance and Use of Technology (UTAUT) model to understand the perception of decision makers about the use of AISs in their daily activities, especially regarding decision-making. Understanding their perceptions will help the HEIs in other similar contexts of underutilization to know how to take action on the design, development, deployment, training, and advocacy of AISs, as well as other relevant activities related to increased adoption of AISs. Specifically, this study concentrated on the following research questions:

1. *How do decision makers perceive the usefulness of academic information systems in their higher education institutions in the Tanzanian context?*
2. *How do academic decision makers in the Tanzanian context perceive the ease of use of the academic information systems in performing their daily activities?*

REVIEW OF THE LITERATURE ON AISs IN HIGHER EDUCATION INSTITUTIONS

ICT in the Higher Education Context

The growth of ICT for development (ICT4D) has been recently shown to support socio-economic development in different developing countries (Niebel, 2018; Ahmed et al., 2018). Studies by Irfan et al. (2018) and Naway et al. (2018) show that it is necessary for higher learning institutions to strive for increased ICT adoption to support their daily activities. Literature shows that there is a need to integrate ICT in education for enhanced learning (Papadakis et al., 2018; Aksal & Gazi, 2015). The use of ICT has shown positive results in HEIs: for example, Mtebe (2015) explained that the use of ICT in learning management improved students' performance and satisfaction with the courses offered.

AISs in Higher Education Institutions

Tanzanian higher education institutions have adopted and implemented different AISs to support their daily activities. The adoption is due to the many promises, such as automation of tasks, simplified work, and improved quality of service, which all are increasingly expected by students, who are the main customers of these higher education institutions (Indrayani, 2013; Irfan et al., 2018; Naway et al., 2018). Though there have been few studies on AISs in developing country contexts, the use of information systems in different learning activities—mostly e-learning—has shown success (Mtebe & Raphael, 2017; Muries & Masele, 2017), which is also promising for AISs. A study conducted in Tanzania by Lwoga and Komba (2015) highlighted different challenges in the adoption of information systems in HEIs, but still AISs are often considered necessary for development (Martins et al., 2019). Studies by Panday and Purba (2015) and Lwoga (2014) show that using information systems is crucial for processes in HEIs, like student grade calculations, which improve accuracy, thus improving user satisfaction. A study by Panday and Purba (2015) on lecturers' and students' readiness for using AIS showed that lecturers are ready to adopt AISs for their daily activities, which promises a better future in the use of AISs for decision making in HEIs in developing country contexts.

AISs for decision support in Higher Education Institutions

An effective and successful managerial decision-making needs accurate, timely, and relevant information (Al-Mamary et al., 2013) for ensuring sustainable development of any higher education institution. Tanzanian higher education institutions have been urged to adopt modern AISs for performing their daily activities (Pima et al., 2016), which has earlier been shown to lead to an improved performance in learning activities (Mtebe, 2015). Research literature has shown that the use of information systems has the potential to ease decision-making (Velasquez & Hester, 2013; Martins et al., 2019) by providing more meaningful reports from the data collected by those systems. Adoption of AIS enables decisions to be made with more information than without AISs, although not all the reports are created using AISs due to underutilization of these systems (Utomo et al., 2018; Islam et al., 2019). However, the reasons for underutilization of AISs especially in decision-making are not well studied in the literature.

The UTAUT Model

A number of different models have been used for determining the acceptance of technology in society and organizations. In studies of ICT in different organizations, the UTAUT model has shown good results (Venkatesh, Thong & Xu, 2016). The UTAUT model was formed by integrating eight models, which include the Technology Acceptance Model (TAM), Social Cognitive Theory (SCT), a combined TBP/TAM, the Theory of Reasoned Action (TRA), the Motivational Model, the Model of PC Utilization, the Theory of Planned Behaviour (TPB) and Innovation Diffusion Theory (IDT) (Venkatesh et al., 2003; Williams, Rana & Dwivedi, 2015). The model considered performance expectancy, effort expectancy, social influence, and facilitating conditions as four key determinants of the intention and behavior in the use of technology. Gender, age, experience, and voluntariness of use were considered as moderating variables of the four core relationships of the model. This model has been found to be more useful than the eight models it integrates (Mtebe & Raisamo, 2014). Although this model has been used successfully in a large number of projects, it has also been criticized. Research studies like that of Bagozzi (2007) have criticized the UTAUT model, but its popularity and prevalence speak for its usefulness for studying acceptance or rejection of technology.

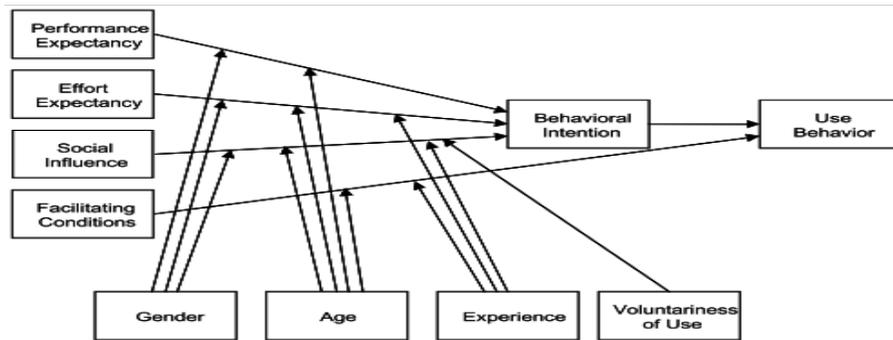


Figure 1: The UTAUT model (Source: Venkatesh et al., 2003)

RESEARCH MODEL AND THE STUDY HYPOTHESIS

This study used a modified UTAUT model for capturing decision makers’ perceptions on the use of AISs in the context of higher education institutions for decision support. The study did not consider age, gender, voluntariness of use, and experience variables and hence removed them in order to better fit the model with the objectives of the study. Therefore, the research model for this study considered only four key factors of the UTAUT model: performance expectancy, effort expectancy, social influence, and facilitating conditions.

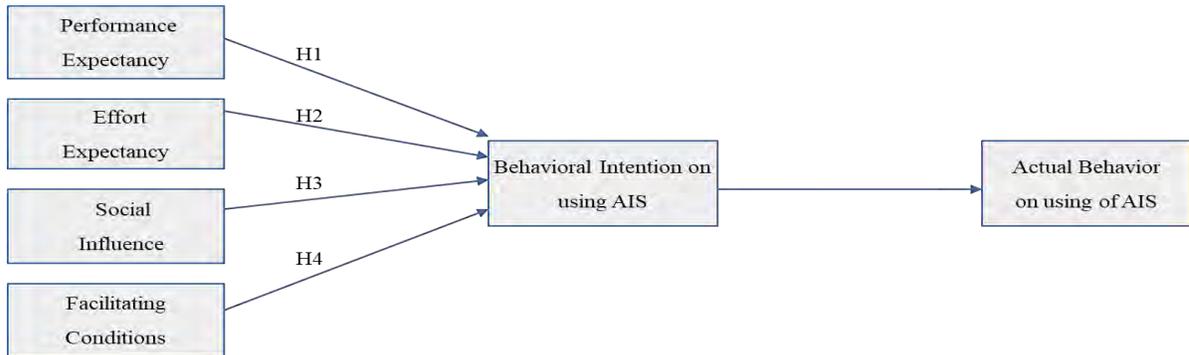


Figure 2: The Research Model

Performance Expectancy

Following the findings of Venkatesh et al. (2003), on the extent to which decision makers assume the AIS will help them in their daily activities will positively influence the success of the AISs in higher education institutions, performance expectancy has been found to be the strongest predictor of voluntary and also involuntary behavioral intention on the use of different technologies (Mtebe & Raisamo, 2014). It is expected that if the decision makers find the AIS useful for simplifying their tasks, they will likely use them in their daily activities.

Hypothesis 1 (H1): Performance expectancy has a positive effect on behavioral intention on using AIS.

Effort Expectancy

Effort expectancy explains the degree to which the decision makers find it easy to use the AISs for performing their tasks (Venkatesh et al., 2003). In this study it is expected that the easier it is to use the AIS, the more the decision makers are likely to use them for doing their daily activities.

Hypothesis 2 (H2): Effort expectancy positively affect the behavioral intention on using AIS.

Social Influence

Social influence represents the extent to which the decision makers perceive how important it is for persons to believe that using the AIS is of high value (Venkatesh et al., 2003). Considering social influence as a subjective norm, it is then expected that if each decision maker believes that it is important for everyone to use the AISs in their daily activities the rate of use of the AIS will increase.

Hypothesis 3 (H3): Social influence positively affect the behavioral intention on using AIS.

Facilitating Conditions

In the model of Venkatesh et al. (2003), the term 'facilitating conditions' refers to the degree to which each decision maker believes there is support from the management of these higher education institutions and there is supportive infrastructure for using the AIS. It is therefore expected that the use of AIS will increase if the decision makers believe that there is supportive infrastructure and also necessary technology and skills that will support the use of the AIS.

Hypothesis 4 (H4): Facilitating conditions positively affect the behavioral intention on using AIS.

METHODOLOGY

Data Collection

The study involved four campuses of a higher education institution in Tanzania - the College of Business Education, which were selected because of their recent adoption of SARIS. The four campuses are located in different regions in Tanzania: Dar es Salaam, Dodoma, Mwanza, and Mbeya. All these campuses use the same SARIS for student management activities.

The target population for this study was a comprehensive sample of all lecturers and all administrative staff whose jobs involve the use of AIS, such members of the examination office and registrar's office, who deal with tasks like processing exam results, graduation processes, and other student information processing in different ways.

The study employed a mixed method strategy involving questionnaires and interviews. It adopted a modified five-point Likert scale UTAUT questionnaire by Venkatesh et al. (2003) for collection of quantitative data. The questionnaire was first distributed across the Dar es Salaam campus in order to collect preliminary data for checking the reliability and validity of the research instrument. After ensuring reliability and validity of the questionnaire through calculating the Cronbach's Alpha (α) coefficients and factor loadings, 125 questionnaires were distributed across all four campuses. The questionnaires were distributed directly to all lecturers, registration officers, and examinations officers at Dar es Salaam campus, while the distribution to the other campuses was done by email to research assistants selected from each campus. The research assistants printed the

questionnaires and distributed them in their own campuses. Non-responses were followed up several times, over a period of three weeks, after which they were considered final.

Following an analysis of the questionnaire data, semi-structured interviews were conducted using a maximum variation sample (Creswell, 2013) of six lecturers, two staff members from the examination office, and two staff members from the registration office. The interviews were conducted using both local language (Kiswahili) and English so as to get enough information from the respondents. The interview times ranged from 15 to 30 minutes, providing a total of 196 minutes of interview data.

Different techniques were used to ensure trustworthiness of the interview data collection. At some point the same question was asked in different ways several times to ensure clarity of the information that was provided (Shenton, 2004). Also, after explanations some respondents were requested to show how they perform different operations so as to observe some activities to get more understanding of what the participants were saying (Shenton, 2004). Though the obtained results cannot be generalized to all the HEIs, they can be helpful to some HEIs which use or plan to use the same or equivalent AISs like SARIS (Shenton, 2004).

The participation in this study was completely voluntary, and no respondent was forced or rewarded by any means to participate in this study. All responses were confidentially collected and anonymized, and no identifying traits were collected during the data collection process.

Data Analysis

SPSS was used for quantitative analysis of the data obtained from the responses to the questionnaire. The validity and reliability of the modified UTAUT instrument were measured to establish the reliability and validity of the data collected (Attuquayefio & Addo, 2014). Regression analysis was done to test the research hypotheses.

The interviews were all translated, transcribed, and hand-coded to yield six themes which were used to explain and triangulate the results obtained from the quantitative data (Creswell, 2013). Different important statements were also extracted and used as quotations from the interviewees to provide authentic statements, in the respondents' own words, to provide further insight into the quantitative results (Creswell, 2013).

RESULTS

Out of the 125 questionnaires distributed to the four campuses, 42 were returned, yielding a response rate of 33.6%. The return rate was low due to the effect of the examination marking tasks, which the lecturers had during the time the questionnaires were distributed. Although much effort was made to remind them about their responses, most of them were busy with other work and could not respond to the questionnaires. The distribution of responses per each campus is shown on Table 1.

Table 1: Response rates of the four campuses

Campus	Distributed	Received	Response rate
Dar es Salaam	67	24	35.8
Dodoma	28	10	35.7
Mwanza	20	5	25.0
Mbeya	10	3	30.0

Reliability and Validity

The validity of the questionnaire was tested by calculating the factor loadings, which were all found to exceed 0.5, indicating high enough validity (Attuquayefio & Addo, 2014) as shown in Table 2. The reliability of the instrument was tested by calculating Cronbach's Alpha (α) coefficients; the results obtained ranged from 0.689 (approximately 0.70) to 0.914; which is roughly 0.70 and above as shown in Table 2 (Attuquayefio & Addo, 2014).

Table 2: Results of Validity and reliability analysis

SNo.	Construct	Item	Factor loadings	Cronbach's Alpha
1.	Performance expectancy	PE1	0.675	0.804
		PE2	0.889	
		PE3	0.856	
		PE4	0.808	
2.	Effort expectancy	EE1	0.580	0.689
		EE2	0.807	
		EE3	0.904	
3.	Social influence	SI1	0.537	0.707
		SI2	0.764	
		SI3	0.783	
		SI4	0.813	
4.	Facilitating conditions	FC1	0.907	0.808
		FC2	0.918	
		FC3	0.825	
5.	Behavioral intention	BI1	0.889	0.914
		BI2	0.965	
		BI3	0.920	

Hypothesis Testing

The research hypotheses were tested by using regression analysis for determining the relationship between the dependent and independent variables, and the results are presented in Table 3.

Table 3: Results from the regression analysis on the constructs in the model

Constructs	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Performance Expectancy	0.38	0.19	0.31	2.04	0.049
Effort expectancy	- 0.03	0.14	- 0.03	- 0.24	0.810
Social influence	- 0.10	0.13	- 0.11	- 0.72	0.477
Facilitating conditions	0.40	0.15	0.47	2.63	0.012

The results obtained from the hypothesis testing support two of the four hypotheses presented. The supported hypotheses are *H1* and *H4*: performance expectancy ($\beta = 0.31$, $p < 0.049$) and facilitating conditions ($\beta = 0.47$, $p < 0.012$) correlate positively with the behavioral intention on using AIS. The two other hypotheses *H2* and *H3* are not supported, so effort expectancy ($\beta = - 0.03$, $p < 0.810$) and social influence ($\beta = - 0.11$, $p < 0.477$) were found to have no influence on the behavioral intention on using AIS. The results show that performance expectancy and facilitating conditions have a significant effect ($p < 0.05$) on the behavioral intention on using the available AIS, while the effort expectancy and social influence do not have a significant effect ($p > 0.05$). Table 4 shows the summary of the conclusions drawn on the tested hypotheses.

Table 4: Summary of Hypotheses testing

Hypothesis	Results	Conclusion
Hypothesis 1: Performance expectancy has a positive effect on behavioral intention on using AIS	Significant ($\beta = 0.31$, $p < 0.05$)	Supported
Hypothesis 2: Effort expectancy positively affect the behavioral intention on using AIS	Not significant ($\beta = - 0.03$, $p < 0.810$)	Not supported
Hypothesis 3: Social influence positively affect the behavioral intention on using AIS	Not significant ($\beta = - 0.11$, $p < 0.477$)	Not supported
Hypothesis 4: Facilitating conditions positively affect the behavioral intention on using AIS	Significant ($\beta = 0.47$, $p < 0.05$)	Supported

Contextualization of the Results

In addition to findings obtained from the quantitative data, a second set of results were obtained from the interviews, which helped to contextualize and interpret the quantitative results. Firstly, the majority of users believe that using the system increases their working performance as shown by Hypothesis 1 ($p < 0.05$) in Table 4, although a number of them wished the system to be further improved as they have used it to perform only some of their daily activities. For example, a respondent said:

“... my work has become simple nowadays ... if the system is going to be improved, I think I will work more efficiently on supporting students ...”

Another one said, *“... students results are now easily processed but we still need more functionalities to be added to the system so we can use it in doing more tasks...”*

The users had more expectations that had been fulfilled by the system thus far—but they still believed in the positive influence of AIS on their daily activities.

Secondly, effort expectancy was undermined by glitches in the system that resulted in extra effort from the users ($p > 0.05$). Interviews showed instances where the system seemed to complicate users' work at some points, especially when they could not easily get some reports from the system due to system errors or poor usability design. For example, one lecturer said:

“... sometimes I upload the results and after some days the students report the results are not there or they have changed... I think it is not so easy to use this system without getting trained every time.”

Moreover, it was found that the system frustrates some users. When asked how, they said they did not have enough knowledge about using the system and hence it made their lives difficult. For example, another lecturer said:

“... I hate uploading results to the system. It was simple to submit using excel to the head of department ... I am not good on the system. May be frequent training may help...”

The UTAUT model expects that the more tedious, frustrating, or effortful users find the AIS, the lower their intention to use it.

Thirdly, albeit social influence was found to have no significant effect ($p > 0.05$) on the use of AISs, the interview revealed that some of the users use the system only because the management requires them to use it. One of the respondents said:

“... I think some of the lecturers use the system only because they are forced to use it ... they think using excel is easier since they have been using it before and I think they fear changes ...”

The interviews confirmed that in this case, there was no shared institutional or social feeling that using the AIS is important or beneficial to the organization.

Furthermore, it was found that facilitating conditions positively affect the use of AISs ($p < 0.05$), but the interviews showed that a number of users felt that there was not enough support staff, so when they get stuck, they do not get assistance on time. One said:

“... support on the use of the system is a problem here ... there is not enough experts on SARIS ... there should be more systems experts.”

Users also felt that the system lacks a lot of functionalities to make it useful for most of their daily activities. For example, one respondent said:

“... still we cannot rely on the system since some of our tasks cannot be done using the system... some reports need data from other systems and hence we must do some manual work...”

Table 5 below represents the summary of the themes that emerged from the interviews done.

Table 5: The emerged themes

Theme	Aspect	Statement
Simplification of work	How helpful is SARIS	<i>“The system makes my work simple”</i>
	How does SARIS impact performance on results processing	<i>“I complete my work easily and on time”</i>
	How easy is it to use SARIS to process results	<i>“I can complete my work fast only if I do not make mistakes”</i>
Quality of information	What is the quality of students' results processing with SARIS	<i>“Students results are nowadays more accurate than before”</i>
Data integrity	How secure is the system against unauthorized manipulation	<i>“It is not so easy to tamper with students results like before”</i>
System improvement and support	Availability of required system functionalities	<i>“The system should be improved to accommodate other things which cannot be done by the system to make things easier ... still the system cannot do a lot of things...”</i>
	What does not work well	<i>“It is boring when you have to download the list from the system to upload in the accounting package ... the systems should be integrated”</i>
	Availability of support	<i>“There are no enough experts on AISs... Something must be done on this”</i>
Training	How important is training on SARIS	<i>“Frequent trainings are very important to make us more familiar to the system especially when there are new features added”</i>
Management support	The influence of management on using SARIS	<i>“The management is really working so hard but if the system does not do what you want it's a problem”</i>

DISCUSSION

This study aimed at investigating how decision makers in a Tanzanian HEI perceived the use of available AISs in their institution. It explored their views of the usefulness and ease of use of the AISs available to them. The study concentrated only on the views from the lecturers and those administrative staff who participate in decision making activities, and management activities that involved the use of AIS. The UTAUT model was used to study the decision makers' behavioral intention on the use of AIS in their daily activities. Among the four determinants of the model, performance expectancy and facilitating conditions were found to be strong determinants of the behavioral intention on the use of AIS.

Performance expectancy showed a positive relationship with the behavioral intention on the use of AIS. The evidence suggests that users (decision makers) found the AIS useful for their daily activities, although it still does not accommodate all their needs. The findings concur with Muries and Masele (2017) who found that perceived importance has a significant effect on the behavioral intention to use a system. Similar to the literature (Lwoga & Komba, 2015), the findings also suggest that if the AIS performs well and fulfills the daily needs of users, it is likely that they will increasingly involve that system in their daily activities, leading to potential improvements in working performance. However, the results contradicted the results from a study by Bakar et al. (2013) which found that performance expectancy has no effect on intention to use an AIS system.

Facilitating conditions also predicted the behavioral intention on the use of AIS. This finding suggests that on working to have a better AIS, facilitating conditions should be well considered for an increased usage of the AIS. A study by Mtebe and Raisamo (2014) showed that poor facilitating conditions hinder the adoption of online educational resources in Tanzania, and that it is therefore necessary to ensure that, apart from having a system that accommodates all user needs, the facilitating conditions should be well considered. The interviewees of this study shed more light on change management problems, which may prevent users from using the system effectively. For example, they said sometimes they do not know if the reports could be downloaded from the system and they end up creating them manually. Unfamiliarity with whether a functionality exists indicates a problem with change management or support, which may lead to non-adoption of any information system (Dwivedi et al., 2015). This study confirmed Mtebe and Raisamo's (2014) results by showing a positive relationship between facilitating conditions and behavioral intention on using AISs by the decision makers. On the other hand, the results do not support those of Lwoga and Komba (2015) and Muries and Masele (2017) who found that facilitating conditions have no significant effect on the intention to use a system. The results also agree with those of Dwivedi et al. (2015), whose study on failure and success of information systems showed that "technical quality of systems does not guarantee their use". In this study, non-adoption of the system was not only a result of a poorly developed system or missing functionalities, but also a result of other issues like technophobia, insufficient training, and poor support when persons encounter problems with the system.

Effort expectancy was found to have no relationship with the behavioral intention of using AIS. This finding contradicts other studies (Lwoga & Komba, 2015; Muries & Masele, 2017; Bakar et al., 2013). The interviews revealed that some users do not consider the AIS in their institution to be easy to use. Some interviewees reported that the system does not have the necessary data for their needs and hence they have to create some reports manually or by downloading the data and then uploading it to another system to get the reports they want. Some interviewees suggested that the systems should be integrated since they are sometimes required to make other reports manually as the student information is found in different systems. The results also revealed a need to frequently train users on different issues concerning the system, especially when improvements have been made, because with insufficient training things will become difficult especially for those with technophobia.

Social influence could not also predict the behavioral intention in the use of AIS. The interviews showed that most lecturers use the system only because they are forced to do so by the management. This finding implies that users have been interfacing with the system not because they find it useful at some point in their daily activities nor because others are using it. This result corroborates the results reported by Mtebe and Raisamo (2014) but differ from those by Lwoga and Komba (2015).

In summary, based on the results presented in Table 4 and the interviews, the main factors that influence the use of the AIS (SARIS) are performance expectancy of the system and the facilitating conditions. Also, there have been challenges like lack of enough data in the AIS, lack of support, lack of knowledge for using the available functionalities, and lack of advanced functionalities to accomplish different tasks which make the decision makers fail to effectively use the AIS in their decision-making activities, and choose manual processing instead.

Practical implications and limitations

The results obtained from this study are potentially useful for higher education institutions in the process of academic information systems adoption. First, it has been shown that the decision makers expect the AIS to improve their working performance especially on decision making, and therefore the AISs implemented should aim at fulfilling the user needs so that they can continually use the system in their daily activities. Measures should be taken to ensure the AISs implemented are of high quality so as to provide meaningful reports for decision support.

Second, the facilitating conditions showed a positive effect on the intention to use the AIS in decision making activities. This implies that the higher education institutions need to invest sufficiently in ICT facilitating infrastructure for better AIS usage. All user satisfaction measures based on working environment with the AISs should be taken into account so as to encourage persons to use the AISs in their daily activities.

Third, the usability of the system should be ensured, as the interviews revealed that some decision makers found the system difficult to use. The AISs should be developed in consideration of user experience so as to make them easy to use.

Finally, the management of any higher education system has great influence on the use of the implemented AIS. Management should provide enough support in making sure that the AISs are being used in the daily operations of their higher education institution. Interviews showed that some users only use the system because they are ordered to, not because they want to. The management has power to make users include use the AIS in their daily activities through different applicable measures on leadership. However, apart from enforcing the use of the implemented system, the management should make sure that a quality AIS is in place and should ensure quality of the service provided by the AIS.

Generally, based on the results obtained; in the context of developing countries like Tanzania, the following measures are recommended to ensure a successful AIS implementation for decision support:

- i. Ensuring that the AIS is integrated with the other important systems to allow access to more students' data from the other systems like accounting, library, timetabling and others so as to have all necessary data for decision making support.
- ii. Having a system with functionalities which are intelligent enough so as to ensure proper management of the students and easy data processing for better compatibility with the

- decision makers' activities. This will facilitate a more satisfactory accomplishment of tasks through the AIS.
- iii. Having a sufficient number of information systems experts so as to provide enough support to the users and to ensure implementation of the frequently new user requirements for the system improvements.
 - iv. Frequent training for the users should be provided along with day to day expert support whenever they experience difficulty in using the systems.
 - v. The management should make sure that the ICT infrastructure and ICT policies are well implemented for better operation of the AIS.

The recommendations will help the decision makers to use the AIS effectively in their decision-making activities and hence improve decision making. Although these results have been obtained from a study in the Tanzanian context, they can be considered useful by any other higher education institution which has the same characteristics since most of the operations in HEIs are equivalent. The recommendations can therefore be applicable in different HEIs especially in developing countries for the improvement of their decision-making process.

This study calls for further research due to some limitations. This research was conducted in a single higher education institution, although across four campuses, involving only the decision makers to find out how they perceive the use of the AIS in their daily activities. The study concentrated only on a specific AIS (SARIS) used by the higher education institution involved. The study generally needed to find out why these decision makers still like to do their daily activities using manual ways while they have SARIS implemented for use. The results obtained are limited to higher education institutions in developing countries like Tanzania which have implemented the same AIS or its equivalent, and therefore further research is needed to generalize the findings globally.

CONCLUSION AND FUTURE RESEARCH

The findings of this study can be useful to management and ICT managers in different higher education institutions in Tanzania and other developing countries in setting different strategies for implementation and management of AISs in their institutions. More studies can be conducted to include more higher education institutions and a variety of AIS for the improvement of the generalizability of the findings. Moreover, observation on user activities with the AIS can improve the data collection process. Studies can investigate also how do the moderating factors like gender, experience, voluntariness of use and age affect the decision makers' intention to use AIS.

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