ADOPTION OF LIBRARY INFORMATION SYSTEMS USING THE TECHNOLOGY ACCEPTANCE MODEL: A SOUTH AFRICAN STUDY

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ABSTRACT

The rapid advancement of digital technologies has precipitated a pressing need for libraries in South Africa to transition from traditional operations to digital frameworks. However, numerous institutions encounter significant challenges in the adoption and effective utilization of Library Information Systems (LIS). This study aims to elucidate the factors influencing the adoption of LIS within South African academic libraries, employing the Technology Acceptance Model (TAM) as a foundational theoretical framework.Through an empirical investigation involving a sample of 170 students from the University of the Western Cape and Cape Peninsula University, this research employs a quantitative methodology, utilizing a structured questionnaire to collect data. Key findings indicate that critical determinants influencing the adoption of online library systems in the South African higher education sector encompass both task and individual characteristics. Notable factors include perceived usefulness, perceived ease of use, users' attitudes towards the technology, overall user satisfaction, and the capacity for adoption. The implications of this study are profound, underscoring the necessity of addressing both technological and organizational factors to promote the successful integration of LIS in academic libraries. By fostering an environment that supports the perceived utility and accessibility of these systems, academic institutions can enhance their services and better meet the evolving needs of their users. This research contributes to the discourse surrounding digital transformation in libraries and provides actionable insights for practitioners aiming to facilitate effective LIS adoption in the academic context.

KEYWORDS

higher education, adoption, library information systems, information system habits, information system usefulness Information quality, IS usefulness

1. INTRODUCTION

Library Information Systems (LIS) encompass the application of Information and Communication Technologies (ICT) aimed at enhancing the operational efficiencies of libraries, particularly in tracking document inventories, managing loans, and overseeing member subscriptions and profiles across multiple physical locations [1][2][3][4]. Over the past decade, there has been a notable increase in the popularity of LIS, which is demonstrated not only by the rapid expansion of product and service offerings within this domain [2][3][4] but also by the extensive body of literature that has emerged from ongoing research efforts [3][4][5].

LIS serves as a crucial source of competitive advantage for higher education institutions, providing a cost-effective mechanism for the dissemination of knowledge and information [6]. Consequently, governments around the globe have a pivotal role in fostering the growth and

development of their respective higher education systems by implementing policies and programs designed to enhance effective and efficient teaching and learning [5][8]. In South Africa, for instance, a range of policies and initiatives have been instituted to advance LIS, thereby improving access to information and knowledge. These measures seek to enhance library services, promote digital inclusion, and support educational and research endeavors [7][8].

A significant proportion of LIS functionalities are insufficiently utilized, with a noteworthy prevalence of students operating at only the entry-level of adoption [9][10]. Furthermore, the inadequate research on individual-level factors influencing users' acceptance of LIS is a significant gap that needs to be addressed. Insufficient research on LIS adoption dynamics, specifically in Africa, raises pertinent questions, mainly when evidence indicates that information systems in developing countries have experienced high rates of failure [1][10][11].

Digital libraries within South African higher education present unique technological adoption characteristics, (a) lack of technical expertise among the users [12], (b) Lack of ICT infrastructure [9][12], and (c) significant inequalities among higher education students [6] [14]. These distinctive attributes of digital libraries in South Africa necessitate the development of a comprehensive framework for understanding the adoption of technology in LIS South African higher education.

The motivation to undertake this research is due to two main reasons. Firstly, there needs to be a more rigorous assessment of LIS adoption in South Africa, although much literature discusses LIS usage in developing countries [1][14]. As the implementation of digital libraries in South African higher education is mature, understanding the critical factors influencing users to adopt these LIS would benefit South African higher education institutions, government, and citizens[7]. Secondly, more research is needed to evaluate the adoption of LIS from the perspective of the South African context. However, such a study would greatly benefit the South African community's development and utilisation of LIS. Existing frameworks for evaluating the adoption of LIS are designed to be used in countries where social inequalities are minimal, and service delivery is much better, including Internet access and access to electricity are advanced [15]. Such frameworks are, therefore, inappropriate for developing countries like South Africa, where most of the citizens are living in poverty. This creates the necessity of developing new frameworks for evaluating the adoption of LIS specifically for South Africa. Developing new frameworks capable of considering the uniqueness of LIS adoption in developing countries can contribute to a better understanding of digital libraries and, therefore, justify the need for this research.

This study aims to provide a comprehensive framework for examining the determinants influencing the adoption of Library Information Systems (LIS) within selected universities in the Western Cape, South Africa. Specifically, it aims to (a) investigate the current patterns of the adoption of LIS in South African higher education, (b) identify the critical determinants for the adoption of LIS in South Africa, and (c) develop an effective framework for assisting digital libraries in better understanding utilisation trends of their LIS. The study seeks to delineate guidelines that will enhance the adoption of library information systems tailored to the specificities of the South African university environment. The insights derived from this study are anticipated to augment the perceived value of LIS and address existing challenges associated with their adoption. Ultimately, this research contributes to the discourse surrounding the enhancement of LIS adoption and elucidates the critical factors shaping the implementation of these systems in South African universities.

2. RELATED LITERATURE

Electronic learning (e-learning) has become increasingly popular in recent times [9]. This is exemplified by a significant increase in e-learning's projected annual growth rate of 19% from 2022 to 2030 due to the market size that is expected to reach USD 32.38 billion by 2030 [17]. The popularity of e-learning is attributable to the potential benefits that it can provide to teaching and learning, especially in higher education, including improving student performance, increasing student satisfaction, and lowering costs of accessing learning resources [1]. More recently, the growth of e-learning has been accelerated by the COVID-19 pandemic national lockdowns, which forced many students to pursue their studies from the comfort of their homes [16]. This resulted in engaging in teaching and learning services and accessing learning resources from home, particularly through the library information systems (LIS) [18].

Libraries are a distinct group of establishments with exceptional attributes in adopting technology [17][19]. In higher education, library information systems (LIS) play a critical role in improving the effectiveness and efficiency of teaching and learning [20]. Several studies provide evidence of correlations between student performance and using LIS conducted a study in the United Kingdom at eight universities, which confirmed a statistically significant relationship between electronic resource access and student performance. In the United States of America, [21] conducted a study demonstrating a positive correlation between library use and undergraduate performance. Similarly, a study in South Africa by [20], showed a positive relationship between library use and student achievement. A study conducted in Ghana reveals a statistically significant relationship between the perceived usefulness of LIS and its adoption [5]. Adopting LIS offers higher education institutions numerous opportunities to compete in local, regional, and global markets.

The potential of LIS in South African higher education systems is underutilized [20]. The South African higher education system has 26 public Universities. All 26 universities implemented LIS. However, these resources are underutilised despite the large investments made during implementation and ongoing maintenance costs [12]. Some universities in South Africa do not have detailed information on their websites about the use of their LIS, which could be a contributing factor to the poor adoption. Most higher education students in South Africa are underprepared concerning the use of digital technology due to their social and economic background [20]. Such a low adoption rate of LIS in South African higher education is interesting in the presence of (a) the high internet and smartphone penetration rate in South Africa for enabling e-learning activities [12] and (b) the continuous support from the South African department of higher education and the individual universities to improve their competitiveness through the adoption of LIS [20]. As a result, a better understanding of the adoption of LIS in South African higher education is becoming critical.

It is important to first look at information systems in general to gain more understanding of these digital systems. There are several definitions of information systems (IS), and none has been agreed upon [22]. IS emerges from the usage of the IT delivery system by users (whose strengths are that they are human beings, not machines). This usage will be made up of two parts: (1) First, the formal processes, which are currently usually assumed to be pre-determinable concerning decisions about what IT to use. (2) Second, the informal processes, which are what the human beings who use the IT and the formal processes create or invent to ensure that useful work is done [22]. [23] states that library information systems are "organized collections of digital information." [24] views library information systems as a "managed collection of information, with associated services, where the information is stored in digital formats and accessible over a network." LIS can be seen as a useful support tool for the use, creation and search of digitized

information [25]. With the benefits known regarding traditional libraries, LIS is expected to provide additional benefits through new opportunities [26].

2.1. LIS in South Africa and their Development

Although global predictions of technology adoption in higher education were reported for 2007-2015 Horizon Report, South Africa would adopt LIS on a different trajectory. South African higher education system and policies were built on the unequal apartheid regime [27]. From 1994, those educational policies would be revisited for the new South Africa [28]. One of the challenges faced is access to information communication technologies (ICT) and networks in some areas of South Africa [28]. In early 2000, South Africa focused on building the ICT infrastructure, developing policies regarding ICT and researching practises in higher education [30]. South Africa had to restructure its higher education sector by merging today's 36 higher education institutions with the 26 current institutions based on the traditional universities of technology and comprehensive universities [31]. This was to achieve highly increased enrolments and graduation. University libraries would become more valuable with the use of the internet. In early 2004, several libraries started adopting library information systems. [32] observed that low adoption was attributed to a lack of guidance on use, slow connectivity, computer literacy skills, and using devices such as computers and smartphones. These factors were mainly faced by black communities and lower-income groups [33]

2.2. Benefits of Utilising LIS in South African Higher Education

[31] stated that one of the advantages of library information systems is that resources are easily accessible from any place at any time. Resources are never out of stock or out on loan as in traditional libraries. Library information systems do not require additional space; therefore, the additional need for space declines. Costs of technical services are also reduced. Communication and collaboration are strengthened between research communities and educational institutions. Library systems take leadership of being knowledge repositories. LIS contribute to access to lifelong learning for all users. These advantages can be seen for students, library users, librarians, and staff.

2.3. Strategies Employed by Universities to Promote the Adoption of LIS

Several obstacles in LIS adoption, Due to the lack of understanding of the importance of LIS students, computer literacy, internet connectivity and lack of librarians, were observed in a Pakistan university study by [30]. [34] supports the significant effects of library assistance on the usefulness and usability of library information systems. There is a positive relationship between library assistance and perceived usefulness and ease of use of library information systems [35]. [36] states that a strong indicator of perceived use is seen by library assistance.

2.4. Conceptual Framework and Hypothesis Development

This section presents the conceptual framework, for exploring the critical determinants for adopting digital libraries in South African higher education. In this study, TAM is recognised as a powerful model that considers technological and process adoption as being determined by the user's behavioural intention. TAM focuses on the causal connections between perceived usefulness, ease of use, system design features (design choices influence user acceptance), attitude towards using and actual usage behaviour. Perceived usefulness has been observed to be one of the factors noted for adoption and continued usage when looking at behavioural beliefs.

This study explores the critical determinants for adopting digital libraries in South African higher education from students' perspective. To achieve the aim of this study, a conceptual formwork is developed. TAM is used in this study for underpinning the proposed conceptual formwork. This is due to several reasons. Firstly, TAM can provide useful insights into technology adoption from the perspective of students who are the direct users of the digital libraries at their universities [37]. Secondly, TAM can be flexibly tailored and adjusted to suit the purposes of digital libraries [38]. Thirdly, TAM is reliable and robust in predicting the adoption of digital libraries in higher education. This shows that TAM enables significant progress in understanding the adoption of specific technologies in higher education [34].

2.5. Technology Characteristics

Technology characteristics refer to the factors that influence the adoption and diffusion of different technologies [39]. As a result, understanding the factors influencing technology adoption and diffusion for students will give insight into digital library adoption in higher education. In this study, the technology characteristics of students in South African higher education are measured in terms of e-library catalogue, e-library database and e-library circulation.

E-Library catalogue

E-Library catalogue refers to the online library catalogue or Online Public Library Catalogue (OPAC), which is an online database of various forms of library resources, such as audio, text, and video [40]. These are found at any institution, such as university libraries. A library catalogue allows users to search for items a specific library owns. A catalogue includes books, movies, journals, magazines, music scores, government documents, and more. Some of the benefits of E-library catalogues are the boarding knowledge sharing with other institutions compared to the physical resources in the library; they can be accessed anywhere through the institution and accessed by multiple students regularly [41]. The following hypothesis has been developed concerning e-library catalogues:

> H1: E-Library catalogues positively influence students' perceived usefulness to adopt digital library information systems.

E-Library Database

E-Library databases allow the efficient search for published information such as magazines, journals, and newspaper articles. Library databases can be general (all disciplines) or discipline-specific (e.g. a psychology database). Much like E-library catalogues, databases can be accessed anywhere and anytime via the institutions of which users are a part. There is data security, and they are collaborative. The following hypothesis has been developed concerning e-library databases:

> H2: E-Library databases positively influence students' perceived usefulness to adopt digital library information systems.

E-Library circulation

E-Library circulation refers to the resources located in the physical library. This process is done online and consists of library materials being checked in and out, renewal of borrowed materials, reserving, and checking in and out of damaged library materials [42]. This allows libraries to keep track of their library materials as their different methods are used for identification, such as

library cards. For university students, the student card is used as the identifier. E-Circulation allows easier checking in and out of materials and increases efficiency as students reserve material before collecting the materials in the library. E-Library circulation has increased reliability. The following hypothesis has been developed concerning e-library circulation:

H3: E-Library circulation has a perceived usefulness.

2.6. Individual Characteristics

Individual characteristics refer to the ability of individual students to utilise a digital library system in higher education. They play a significant role in their decision to accept and use digital library systems in higher education [37]. Higher education students with different personalities and backgrounds react differently to accepting and using digital library systems [38]. As a result, understanding the characteristics of individual students can provide a better understanding of the digital libraries adoption in higher education. In this study, individual characteristics of South African higher education students are measured in terms of computer social influence and self-efficacy.

Computer self-efficacy

Computer self-efficacy (CSE) refers to the extent to which students are confident in their ability to use the digital library system [43]. The magnitude of self-efficacy refers to the level of capability required to use public services through e-government [39]. The strength of self-efficacy is related to the degree of confidence that citizens have in using public services through e-government [44]. The following hypothesis has been developed concerning Computer Self-Efficacy:

H6: Computer Self-Efficacy has a perceived usefulness.
H7: Computer Self-Efficacy has a perceived ease of use.

Social Influence

Social Influence is defined as the behaviour or attitude of a person based on another person in their social circle that influences [45]. There is a form of dependency from the source of influence, which allows a person to inherit the beliefs or attitude the source has toward the dependent [45]. Social influence can be identified in various groups, such as lecturers and students, students amongst one another, people from one household and other users.

The following hypothesis has been developed concerning Social Influence:

H4: Social influence prompts perceived usefulness.
H5: Social influence prompts perceived ease of use.

From the above-discussed factors, the following proposed conceptual framework consists of 17 hypotheses.

H8: Perceived ease of use has a positive impact on perceived usefulness.
H9: Perceived usefulness attributes to satisfaction.
H10: Perceived usefulness influences attitude towards use.
H11: Perceived ease of use influences attitude towards use.
H12: Attitude towards use has a positive influence on satisfaction.
H13: Attitude towards use has a positive impact on adoption.

H14: Satisfaction is a contributing factor for adoption.
H15: Perceived ease of use positively influences the use of the e-library catalogue.
H16: Perceived ease of use positively influences the use of e-library databases.
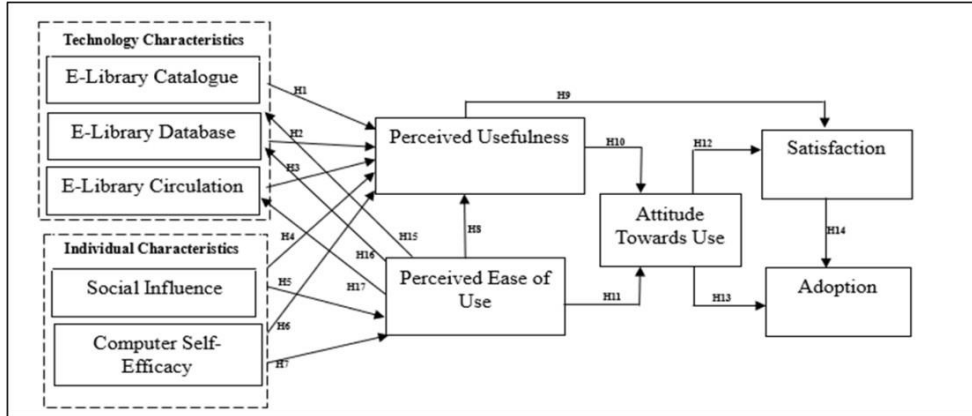H17: Perceived ease of use has a positive influence on the use of e-library circulation.

Figure 1. Proposed Conceptual Framework

3. METHODS

This study incorporates both primary data and secondary data. Primary data involves directly collecting data from respondents, while secondary data collection involves the review of pertinent literature sources. Empirical data collection refers to using primary research methods to find out things as opposed to using secondary data sources. The methodology for this research was designed to gather as much information as possible using quantitative data collection techniques. The researcher was interested in providing a multidimensional view of adopting library information systems in a university library. This research study was deductive, building a proposed framework influenced by guidelines from literature sources (secondary data) and empirically collected data (primary data). The study used the positivist approach as statistics and structured questionnaires were used to gain insight into student beliefs regarding adopting LIS [46]. This study used a quantitative research methods approach. Primary data collection was carried out using the selected research instrument of a questionnaire, which collected first-hand data. Secondary data was collected to identify the critical variables in the literature for adopting library information systems. The main research objective of this study was achieved via a structured questionnaire research method. In this study, the researcher asked for structured questionnaires using a Likert scale of one to seven. The initial sample size of 200 participants was selected, and, in this case, the statistical rule of randomness in choosing the respondents was applied, that quantitative research was intended to generalize the findings concerning the university student population. Therefore, the 200-sample size was adequate to interrogate the phenomenon under study.

3.1. Data Collection

The data was collected at two institutions, which were identified as the research sites. Paper questionnaires were handed out to students in the library and student accommodation. Two hundred questionnaires were initially printed, 20 for the pilot study completed on the first day. One hundred twenty questionnaires were handed out over two weeks to one institution; all returned; 50 were handed out to another university over one week, and only 40 of the papers were

returned. Some students opted to take the papers and return them to the designated person for the area, and others filled out their questionnaires on the spot and handed them back right away.

3.2. Data Analysis

Data coding "is a process of assigning codes, words, or phrases that identify to which topics or issues portions of the data refer, andorganising the data in a way that is useful for further analysis" [47]. In this study, the data exported from Excel and imported into Stata was coded and defined, including specifying the variables using the data editor. In this research, themes were used to identify the topics to address in the questionnaires, and these themes come from the literature review. The themes that emerged from the research are Adoption, Perceived Usefulness, Perceived Ease of Use, Attitude Towards Use, Satisfaction, Self-Efficacy, Social Influence, Online Library Databases and Online Library Catalogues. During the literature review process, when looking at the factors that influence adoption and the functionality that students use digital library information systems at South African universities.

In this study, descriptive statistics and inferential statistics were used. Descriptive statistics was used to understand the data set results from the data collected. The results of the data collected will make use of tables to visualize data. The tables have the 7-point Likert scale descriptions and the percentage of the selected point in the 7-point scale. Descriptive statistics was used to compute variables such as the mean, standard deviation, average and other variables. Inferential statistics was used on the proposed conceptual model with the 17 hypotheses to test the validity and reliability of the generalizations made.

4. FINDINGS

Table 1 refers to the correlation between constructs from this research study. The validity of this study can be seen by the square roots of AVE scoring greater than the correlation coefficients between the constructs. [48] states that the AVE measure higher for the convergent validity to score higher. Testing of equality of all correlation coefficients is achieved through the use of asymptotic chi-squared distribution [49].

Table 1. Constructs descriptive statistics and instrument reliability and validity

	PU5			0.875			
	PU6			0.916			
Perceived Ease of Use	PEOU1	6.93	1.991	0.798	0.796	0.893	0.800
	PEOU2			0.885			
	PEOU3			0.776			
	PEOU4			0.742			
	PEOU5			0.861			
	PEOU6			0.792			
	PEOU7			0.910			
Attitude Towards Use	ATU1	7.47	1.716	0.754	0.792	0.867	0.713
	ATU2			0.793			
	ATU3			0.862			
	ATU4			0.733			
Satisfaction	S1	6.85	1.128	0.936	0.794	0.758	0.728
	S2			0.899			
	S3			0.924			
	S4			0.876			
	S5			0.911			
	S6			0.877			
	S7			0.964			
Adoption	A1	5.84	1.619	0.798	0.713	0.813	0.777
	A2			0.833			
	A3			0.798			
	A4			0.752			

Constructs	Item	Mean	Standard Deviation	Factor Loading	Cronbach's alpha	Composite Reliability	AVE
Online Library Catalogues	OLC1	5.85	1.475	0.912	0.790	0.892	0.798
	OLC2			0.889			
	OLC3			0.922			
	OLC4			0.896			
	OLC5			0.932			
Online Library Database	OLD1	6.34	1.239	0.792	0.776	0.794	0.849
	OLD2			0.768			
	OLD3			0.852			
	OLD4			0.819			
Social Influence	SI1	5.95	1.382	0.771	0.895	0.883	0.776
	SI2			0.862			
	SI3			0.794			
	SI4			0.782			
	SI5			0.801			
Self-Efficacy	SE1	7.46	1.564	0.935	0.796	0.769	0.814
	SE2			0.961			
	SE3			0.895			
	SE4			0.887			
	SE4			0.911			
Perceived Usefulness	PU1	7.87	1.966	0.892	0.829	0.857	0.875
	PU2			0.889			
	PU3			0.896			
	PU4			0.901			
	PU6			0.916			
Perceived Ease of Use	PEOU1	6.93	1.991	0.798	0.796	0.893	0.800
	PEOU2			0.885			
	PEOU3			0.776			
	PEOU4			0.742			
	PEOU5			0.861			
	PEOU6			0.792			
	PEOU7			0.910			
Attitude Towards Use	ATU1	7.47	1.716	0.754	0.792	0.867	0.713
	ATU2			0.793			
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	S3			0.924			
	S4			0.876			
	S5			0.911			
	S6			0.877			
	S7			0.964			
Adoption	A1	5.84	1.619	0.798	0.713	0.813	0.777
	A2			0.833			
	A3			0.798			
	A4			0.752			

In Table 2, bold values show all the square roots of AVE, which are greater than the correlation coefficients between the construct and the other constructs. Model fit indices for the final measurement model, the data examined in the model fit evaluated by fit indices. Table 3 looks at various indices: the Chi-squared, the goodness of fit (GFI), the adjusted goodness of fit (AGFI) and the Tucker-Lewis index. There are two primary fit types: the Locale fit and the Overall fit. The Local fit examines specific parameters, and the overall fit examines the holistic view of the entire data analysis

Table 2. Latent construct correlation matrix

	OLC	OLD	SI	SE	PU	PEOU	ATU	S	A
OLC	**.746**								
OLD	.546	**.668**							
SI	.635	.534	**.721**						
SE	.712	.625	.672	**.610**					
PU	.634	.542	.634	.546	**.835**				
PEOU	.541	.529	.553	.432	.673	**.624**			
ATU	.547	.498	.655	.546	.722	.555	**.736**		
S	.652	.562	.599	.501	.610	.644	.721	**.711**	
A	.624	.596	.506	.576	.712	.598	.711	.666	**.676**

Using the various indices covers the shortcomings of the individual indices on their own [50]. The recommended fit value for Chi-squared is ≤3, while the values in the measurement model meet at 2.632. The recommended fit value for the goodness of fit is ≤0.85, which the values in the measurement model meet at 0.925.The recommended fit value for the adjusted goodness of fit is ≥0.8, while the values in the measurement model meet at 1.001.The recommended fit value for the Tucker-Lewis index is ≥0.9, while the values in the measurement model meet at 0.989.The recommended fit value for the comparative fit index is ≥0.9, while the values in the measurement model meet at 1.251.The recommended fit value for the root mean square error of approximation is ≤0.08, which means the values in the measurement model meet at 0.065.The recommended fit value for the root mean square error of approximation is ≤0.08, while the values in the measurement model meet at 0.065.

Table 3. Summary of the model fit indices for the final measurement model

Model indices	Fit Recommended values	Values in the Measurement model	Model fit indices	Recommended values	Values in the Measurement Model
x^2/df	≤ 3	2.632	CFI	≥ 0.9	1.251
GFI	≥ 0.85	0.925	RMSEA	≤ 0.08	0.065
AGFI	≥ 0.8	1.001	SRMR	≤ 0.08	0.051
TLI	≥ 0.9	0.989	PCLOSE	≥ 0.05	0.077

5. DISCUSSION OFFINDINGS

Literature indicates that the higher education libraries in South Africa encourage the utilisation of their LIS. Firstly, by providing insight to users, the LIS can be seen as a helpful support tool for using, creating, and searching digitised information [25]. Secondly, by highlighting the usefulness and ease of use of the Technology characteristics, perceived usefulness and ease of use positively influence the attitude towards use and satisfaction of the LIS. TRA's attitude measures with the two technology usage measures: ease of use and usefulness. According to [51], TAM an extension of TRA, assumes several factors influence users' decisions about how and when to use it. This literature supports the findings that perceived usefulness, perceived ease of use, attitude towards use, and satisfaction positively influence using e-library catalogues, e-library databases, and e-library circulations. The critical determinants for adopting the LIS in South Africa identified were technology characteristics, e-library catalogue, e-library database, and e-library circulation. Individual characteristics: social influence and computer self-efficacy. These determine positively influence perceived usefulness, perceived ease of use, satisfaction, adoption, and attitude towards use. The conceptual model included technology characteristics, the e-library catalogue, e-library database, and e-library circulation. Individual characteristics: social influence

and computer self-efficacy to extend the existing framework of adoption that used TAM and TTF. The literature review presented a conceptual framework which was based on TAM and TTF. Using TAM and TTF, an individual's behavioural intentions are analysed according to technology utilisation through perceived ease of use and usefulness.

Several outcomes and results emerge from this research. First, it provides a better understanding of the critical factors influencing library users to adopt LIS. Second, it shows that LIS would benefit South African higher education institutions, government, and citizens. Third, it provides insight into future development and potential utilisation of LIS. Fourth, university libraries adopting LIS would serve their users and staff by adopting LIS.

The findings showed that the benefits of e-library catalogue utilisation were many. Most students assessed the university LIS positively. They considered it useful for ease of use and welcomed the adoption of the LIS by both universities in the study.

5.1. Technology characteristics

The technology characteristics of this research study were e-library circulation, e-library databases, and e-library catalogues. Most students (81.26%) agreed that DLIS enabled them to exploit online library catalogues for quicker access to resources in the library. 73.13% knew the different learning resources they can access using online library catalogues. Furthermore, 88.13% agreed that DLIS enabled them to utilise online library databases to access online resources effectively. Students' perceived usefulness and ease of use of the university's library catalogue positively influenced their attitude towards using and satisfying the LIS. Also, it positively influenced the attitude towards using and satisfying the LIS. Most students (76.26%) were aware of online library databases that apply to their discipline. In summary, LIS positively influences attitudes towards using and satisfying the LIS.

5.2. Individual Characteristics

Students' ability to utilise a digital library system in higher education plays a significant role in their decision to accept and use it in higher education [37]. Computer self-efficacy and Social influence. According to [38], computer self-efficacy is the extent to which students are confident in their ability to use the digital library system. Students were asked about their confidence level in the LIS, and 76.88% agreed with the statement of confidence in accessing learning resources using the DLIS. Students, 76.26%, agreed with the statement that they were comfortable using LIS.

Social influence refers to [44] for students with a form of dependency from the source of influence, which allows a person to inherit the beliefs or attitude the source has toward the dependent. When asked about this, people who are essential to one (i.e., family members, friends, lecturers, and librarians) would recommend using the DLIS. 78.76% of students stated that those important to them would recommend using LIS. Social influence can play a role in 78.76% of students in this research study. From the findings of the constructs identified, the conceptual relationships were tested using empirical data better to understand the specific phenomenon [19].

6. RECOMMENDATIONS

The appropriate framework for evaluating the adoption of LIS in higher education includes the technology characteristics, e-library circulation, e-library databases, and e-library catalogues, as they play a vital role in the library. The technology characteristics of students in higher education

were measured in terms of e-library catalogue, e-library database and e-library circulation. The university library process comprises various processes. Three main functions are e-library circulation, e-library databases, and e-library catalogues. A framework consisting of Perceived usefulness, perceived ease of use, attitude towards use, satisfaction, individual characteristics, and adoption. In addition, the characteristics of technology, e-library circulation, e-library databases, and e-library catalogues would be appropriate for evaluating the adoption of LIS in South African higher education. The literature review discussed supports this suggestion with research studies from other contexts. In all cases, the values are within the recommended range for one to accept the reliability and validity of the conceptual framework.

There are three implications of the study to be addressed. Firstly, this research adds to information systems and will extend the knowledge of information system adoption and usage at a South African university library. Secondly, this study will raise awareness of the challenges tertiary institutions face in adopting and using information systems. Thirdly, this research adds to the existing conceptual framework for adopting technology in the context of a university library information system, technology characteristics; e-library catalogue, e-library database, and e-library circulation. Individual characteristics: social influence and computer self-efficacy. This research will contribute to the existing body of knowledge in the related field.

7. CONCLUSIONS

In conclusion, this study has provided a comprehensive analysis of the factors influencing the adoption of digital library information systems (LIS) at two South African universities. The data highlighted critical determinants that facilitate the integration of digital library frameworks, which could serve as a foundation for establishing a robust model for LIS adoption across South African higher education institutions. The research findings indicate a profound understanding of the pivotal elements that motivate library users to embrace LIS. Furthermore, the potential benefits of LIS adoption extend to the academic realm, governmental bodies, and the broader citizenry.

This investigation is significant in its methodological, practical, and theoretical contributions. It offers invaluable insights into the myriad factors affecting LIS adoption, thereby assisting university libraries and their personnel in developing tailored implementation strategies. Additionally, the study identifies gaps in the current LIS landscape that South African universities may need to address. A conceptual framework is proposed to enhance the comprehension of LIS technology adoption within higher education contexts.

The findings reveal that external variables, particularly technological characteristics such as e-library catalogues, e-library databases, and e-library circulation, play a crucial role in shaping user perceptions and attitudes towards LIS. Individual characteristics, including social influence and computer self-efficacy, positively impact perceived usefulness, ease of use, user attitude, and overall satisfaction, leading to a comprehensive conceptual model.

Moreover, the study integrates the Technology Acceptance Model (TAM) and Task-Technology Fit (TTF) frameworks, emphasising the necessity to evaluate LIS comprehensively. Future research endeavours could extend this conceptual framework by conducting qualitative assessments that may yield insights divergent from quantitative results. The concluding chapter also presents a literature review contextualising LIS adoption in South African universities and aligning with the study's research objectives. The findings underscore that LIS utilisation significantly enhances the operational effectiveness and efficiency of library services.

Ultimately, this paper emphasises the salient conclusions drawn from the research and includes an established conceptual framework model encompassing both technological and individual variables relevant to the context, alongside student feedback and research inquiries. The contributions and limitations of this study are delineated, paving the way for future scholarly investigations and encouraging continued discourse within the academic community regarding the adoption of digital library information systems.

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