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Impact of Library Technology Innovation and Library Information Services on Users Academic Performance: A Study of ADUN

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Abstract

It is not gain say that the information technology innovation and information services (TIIS) have influenced all the components of a library system ranging from information sources, services, human resources and users. However, the extents to which TIIS practice in Admiralty University of Nigeria (ADUN) affect the library users' academic performance (UAP) is yet to be empirically examined. This study examines the impact of library technology innovation and library information services on users' academic performance in ADUN. This study employed survey research technique. The study population consists of sample of 70 respondents out of which 60 respondents participated in this study using purposively sampling technique. Thereafter, descriptive and inferential statistics with the aids of SPSS were used to analyze both qualitative and quantitative data sourced. Findings of th study reveal that introduction of TIIS statistically and significantly predict UAP, and that TIIS accounted for 93% of the explained variability in UAP. Therefore, it can be concluded that TIIS have positive and significant impact on the user's academic performance in ADUN. Based on the findings of this study, the following recommendations are made: That, government at all levels should formulate and implements policies that will continuously encourage technological innovation and information services across Nigerian libraries. More so, management of ADUN should ensure that all the challenges identified in this study should be given priority attention in addressing the aforementioned challenges.

Key Words: Technology Innovation, Information Services, User's Academic Performance; Admiralty University of Nigeria.

Introduction

Over the years acquiring knowledge in particular in academics has undergone tremendous changes, assuming new dimensions influenced by the innovations in technology driven applications. As a result of this trend all stakeholders in the education industry are catching up with this new wave in academic arena. The library as a component of education sector is no exception to this new trend. Libraries are principally entrusted with a host of predetermined tasks like acquiring organizing, preserving, retrieving ,accessing and disseminating information to the user. It implies, libraries are established to provide services and make available information resources that meet the exact information needs of their users. To meet up with this primary high demanding task, academic libraries globally, are developing and introducing series of innovations in information technology in their service delivery to match with users needs. This information technology has influenced the very nature of business and management in libraries.

The conventional set up of brick and mortar libraries that store information within a constrained physical space have given ways to data centers that integrate data sources around the globe by the means of networking (Satish & Kumbar, 2007; Atkinson, 2020). More explicitly, as academic libraries adapt to meet the evolving needs of users in the digital era, the emphasis has shifted away from physical book collections to a portfolio of services that incorporate advances in instruction, technologies, and social media. These services promote innovation, engagement, and the capacity to access materials and services at any time and from any location (Andrews, Downs, Morris-Knower, Pacion & Wright, 2016). However, it is worth to mention some of these notable information technology innovation and information services (TIIS) in library across the globe which include; the introduction of QR Codes, Radio Frequency Identification (RFID), Makerspaces, Integrated Library Management System, Online Public Access Catalogue (OPAC), Robots, Mobile Application, Social Media, Blogs/ Webpages, virtual/augmented reality, Closed-Circuit Television (CCTV), Bibliometrics, video sharing tools, video books, and other electronic resources to mention only but a few. However, as attainable elsewhere Admirality University of Nigeria (ADUN) is not left behind in catching up with the innovation in information technology and information services management. The ADUN Library has introduced QR Codes for swift access to their library holdings. Also, the library designed a library web page for current awareness on library resources, databases, and much more. library users can now access the library materials using major keywords like the author's name, title, publisher, date of publication,

and ISBN to mention only but a few. It is expected that with TIIS users academic performance will be enhanced. However, how this innovation has been contributing to academic performance is an empirical issue. It is against this backdrop that this study attempts to investigate the impact of library technology innovation and library information services on users academic performance in Admirality University of Nigeria (ADUN).

Statement of Problem

With the trending changing information environment, libraries are facing both opportunities and threats. Information technology has introduced many changes in the way information is identified, procured, processed and disseminated to library users. Furthermore, information technology has created a sense of urgency among library users. Subsequently, information centres are witnessing paradigm shifts which include transition of information sources and systems from paper to electronic media, complexity in information needs, high information demands from users and increase in the cost and quality of information. It is not gain say that the information technology innovation and information services have influenced all the components of a library system ranging from information sources, services, human resources and users with emphasis on the currency and timeliness of information flow.

The industry-oriented, case study methods and hands-on methods of imparting management education require libraries to be ever responsive to the changing information needs of their clientèle. The introduction of information technology services in ADUN is not without its challenges too. These challenges range from ability of the users to quickly comprehend and adapt to the new wave of technology. This in itself, constitute a huge task for the librarian and library work force whose responsibility it is to provide guide to library users. Nevertheless, both the University management and library staff are not relented in their efforts in ensuring that the foregoing challenges are surmounted. Despite, all these efforts, there is need to establish the correlation between TIIS and library users academic performance in lieu of the management concern about academic performance of the members of ADUN community. It is against this background that this attempt to investigate the impact of library technology innovation and library information services on users academic performance: a study of Adun.

Objectives

1. TO determine the complexity in navigating TIIS as newly introduced in ADUN library
2. To ascertain how effective is the introduction of TIIS as learning aids.

3. To examine the impact of library technology innovations and library information services on users' academic performance in ADUN

Literature Review

Conceptually, Dwyer (2022) described innovation as the act of producing value via the application of creative solutions to important issues. Atata et al. (2014) affirmed that Innovation entails creating a change in something. The library and information profession has witnessed a wide range of innovations and trends that have greatly influenced access to library information resources, the way services are rendered and the way routines are performed (Oxford University Press, 2021). Atkinson (2020) affirmed that academic libraries have demonstrated considerable ingenuity in embracing and implementing a variety of technologies to fulfil user demands, promote university aims and goals, and boost productivity and efficiency over the past few decades. Theoretically, this study adopts Innovation Diffusion Theory or Diffusion of Innovation , propagated by E.M. Rogers in 1962. It is one of the oldest social science theories which originated in communication to explain how, over time, an idea or product gains momentum and diffuses (or spreads) through a specific population or social system. The diffusion of innovations theory is a hypothesis that outlines how innovations and new technological advancements spread throughout societies and cultures, from introduction to widespread adoption (Rogers, 2003). The end result of this diffusion is that people, as part of a social system, adopt a new idea, behaviour, or product (LaMort, 2019).

Adoption means that a person does something differently from what they had previously (i.e.,imbibe or use a new product, acquire and exhibit a new behavioural trait etc.). The key to adoption is that the person must perceive the idea, behaviour, or product as new or innovative. It is through this that diffusion is possible. The acceptance and adoption of a new idea, behaviour, or product (i.e., "innovation") does not happen in one swoop in a social system; rather it is a process where some people are more apt to adopt the innovation faster than others. According to LaMort, (2019) studied have shown that people who adopt innovation early differ in characteristics from people who adopt innovation much later. When promoting an innovation to a target population, it is important to understand the characteristics of the target population that will help or hinder adoption of the innovation. Litafira and Apol, (2018) innovation diffusion theory explains that the characteristics of innovation are the nature of the diffusion of innovation, where the characteristics of innovation are those that determine the successful use of technology. All products do not have the same possibilities for consumer acceptance, some products can become popular in just one night while others require a very long time of acceptance or even suffer outright rejection by consumers. Diffusion of innovations is the process by which an innovation

is communicated through certain channels over time among the members of a social system (Singer, 2019; Gómez et al., 2013).

In addition, according to Singer (2019) an innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. Furthermore, a communication channel is the mean by which messages get from one individual to another; however, there are many kinds of channels of communication and each have different properties with regard to the acceptance of innovations. Two distinct classes of communication channels have been identified by Rogers, these are mass media and interpersonal channels. Furthermore, according to James and Jeffrey (2018) diffusion is a social process that occurs among people in response to learning about an innovation such as a new evidence-based approach for extending or improving financial services. In its classical formulation, diffusion involves an innovation that is communicated through certain channels over time among the members of a social system (Roger, 2003). From the ongoing, elements of innovation diffusion is complex. However, concisely, among the features or elements of innovation diffusion are idea, practice, or object that is perceived as new by an individual or other unit of adoption. According to Roger, there are five main factors that influence adoption of an innovation, and each of these factors is at play to a different extent in the five adopter categories. Relative Advantage - The degree to which an innovation is seen as better than the idea, program, or product it replaces. Compatibility - How consistent the innovation is with the values, experiences, and needs of the potential adopters. Complexity - How difficult the innovation is to understand and/or use. Reliability - The extent to which the innovation can be tested or experimented with before a commitment to adopt is made. Observability - The extent to which the innovation provides tangible results. The following are the limitations of Diffusion of Innovation theory. It works better with adoption of behaviours rather than cessation or prevention of behaviour; It doesn't take into account an individual's resources or social support to adopt the new behaviour (or innovation). However, this theory has been used successfully in many fields including communication, agriculture, public health, criminal justice, social work, and marketing.

Empirically, Rabatseta et al.(2021) investigate the acceptance and usage of social media innovations in South African university libraries. According to the findings, most libraries in South Africa have and use a range of social media platforms, the most prevalent of which are Facebook, Twitter, YouTube, and blogs. Social media platforms are used to promote library services, share library news, and improve service delivery. The information exchanged with users is about the client, library events, and new services. The majority of libraries lack rules and/or standards for managing social media usage.

Komolafe-Opadeji and Ojo (2019) examine the acceptance and execution of automation initiatives in some selected Federal University Libraries in Nigeria's South-West. The study employed survey research design which involves field work and observation. Findings revealed that the University of Ibadan uses the University of Ibadan Integrated Library System Software (UI-ILSS). Obafemi Awolowo University, Ile-Ife uses Virtua, which is proprietary software for automation of projects. University of Lagos uses Millennium, which is also a proprietary software for automation projects while Federal University of Agriculture, Abeokuta (FUNAAB). Federal University of Oye Ekiti (FUOEK) use Koha for their automation projects, and the Federal University of Technology, Akure (FUTA) uses SLAM for automation project. Findings of the studied libraries alluded to the fact that federal university libraries in Nigeria are fast embracing automation software.

Jharotia (2018) studied innovative technologies and services in libraries. The study highlighted that the major innovations in library and information practice include social media applications, mobile services, and Quick Response Codes. The studied emphasized that social media can be integrated into library promotion and outreach to get the desired visibility and effect. Smith and Bridle (2018) did a study on using virtual reality to create real-world collaborations. The findings revealed that the Radcliffe Science Library (RSL) which is an Oxford University science library provides easy access to digital tools to enhance teaching, learning, and research. More so, findings revealed that in 2017 the university library launched the Virtual Reality (VR) lending program. University members are allowed to borrow VR Headsets, 360º degree cameras, and supplementary equipment free of charge from the RSL. In the National Library of Nigeria (NLN), Akidi and Okezie (2018) conducted research on the use of ICT in cataloguing and classification for effective bibliographic control. According to the findings, the NLN uses a variety of cataloguing strategies such as quality, original, copy, and centralized cataloguing, but does not use on-line cataloguing or outsourcing. The study also demonstrated that the NLN's application of ICT to its cataloguing and classifying methods is ineffective.

Okpala (2016) examined maker spaces and their apparent benefits in Nigerian university libraries. The findings showed that people are drawn to libraries to stimulate creativity and ingenuity. Maker spaces provide students, instructors, and staff with extremely gratifying services that encourage them to learn new things, collaborate with their peers, examine new ideas, explore, create, and involve in nobilities.Though a lot of studies on libraries and technologies are ongoig, the review of literature suggests that there is gap in literature. This is because none of these studies have empirically examined the impact of library technology innovation and library information services on users academic performance in ADUN. This study is therefore aimed at filling this

gap using both primary and secondary data to analyse the impact of the independent on the dependent variable.

Background Information on Admiralty University of Nigeria(ADUN) and its Library

ADUN was founded as a Public-Private-Partnership (PPP) with the primary collaborators being Nigerian Navy Holdings (a subsidiary of the Nigerian Navy) and Hellenic Education Nigeria (a private consultancy with foreign educators). ADUN, which was established in 2017, began academic activities in January 2019 (ADUN, 2022). The University's is located at Ibusa – Ogwashi-Uku Expressway, Delta State, about 20 kilometres from Asaba, the state capital. Subsequently, ADUN Library resides in the University campus. library activities began on January 28th 2018 with a total of 1,527 volumes of books and journals, as well as other employees serving as the library nucleus (ADUN, 2022).

Current Innovations in ADUN Library

Between the spanning period of 18th December, 2021 to February 2022; ADUN Library has implemented Quick Response code (QR Code) technology, which represents a significant advancement in the technological modelling of library procedures. This innovation saves the user's search time and effort by allowing users to scan/ see all titles and volumes of books on every shelf using their phones. At the ADUN Library, QR Codes are placed on shelf Guides. By just scanning the codes, users can get the required information for decision-making. Instead of moving around the shelves, users can scan the QR Codes and get information about the collections on each shelf which would enable them to know the exact shelve to consult that house the information materials that meet their needs. Also by scanning the QR Code attached to the books, users at a glance decide if the book they are holding can meet their information needs or not.This technology complements the quick response the OPAC gives in the sense that the former would confirm the availability of a material in the library collection while the QRcode goes further to indicate the location of such material in split seconds. Among other benefit of QR code , ADUN Library has designed a library webpage in conjunction with the Information Communication Technology Department of the University. The main components of the ADUN Library webpage are the Online Public Access Catalogue (OPAC),library Resources, Research endevours, Databases, and Blog.

Library Information Innovations and Information Practice Challenges in ADUN

There are wide range of factors affecting the library information innovations and information practice in ADUN Library. This includes regular power supply, poor

internet access, limited staffing and slow capacity building of staff. To justify this claim, this study imbibed a survey research.

Methodology

This study employed survey research. It utilized a mixed method of data collection which include; historical analysis, literature review, questionnaires and personal interviews. Historical analysis and literature review were useful in collecting textual data from published and unpublished sources. The questionnaire method was quite useful in soliciting information from the library users of the university. Hence, the data collected for this study was a combination of primary as well as secondary data. The survey was undertaken with the help of questionnaires designed for the purpose. While designing the questionnaire, care was taken that it has the mix of closed and open-ended questions. To enhance the response rate, multiple-choice questions were included in sufficient numbers. Interviews were also held with some selected students, lecturers and staffs that constitute frequent users of library resources. A total of 50 students, 10 lecturers and 10 library staffs make up the population of the study, and were purposively sampled. Out of a total of 70 targeted populations, 60 responded to this survey, thus achieving a response rate of approximately, 86%. The Researcher and assistants carried out the administration of the research instruments in persons. Repeated checks and reviews were done on the questionnaire. Other Librarians, lecturers and statisticians were consulted to critically review questions and improve their reliability and validity. Data collected from the questionnaires was analyzed using simple regression technique with the aid of the Software Package for Social Sciences (SPSS).

Model Specification

Simple Regression Model UAP =
(TIIAS) ……..……..……..……. (1)
Mathematically in Explicitly Form;
$UAP = \beta 0 + \beta 1X1TIIS$ ……..……. (2)
Where UAP is abbreviation of users academic performance
TIIS is acronym for technology innovation and information services

Result and Discussion

This section presents the analysis of descriptive and inferential statistic of the data under study. The total observation was based on sixty (60) questionnaires correctly filled and returned.

Descriptive Statistic

Table 1: Gender Responses Frequency Percent Comments Male (1) 30 50.0

Responses	Frequency	Percent	Comments
Male (1)	30	50.0	The result shows that both males and females participated in this study with equal 50% rate. Thus, taken care of gender sensitivity
Female (2)	30	50.0	
Total	60	100.0	

Source: SPSS Statistics 23 Output from study data, 2022

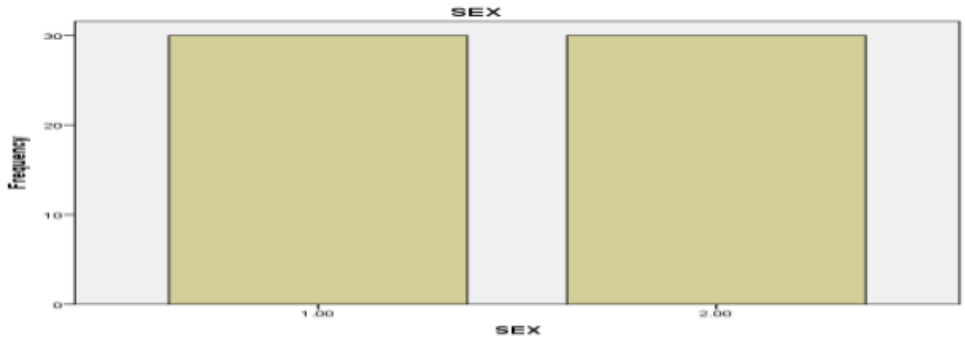


Figure1: bar graph representation of gender participant
Source: SPSS Statistics 23 Output from study data, 2022

Table 2: *Status*

Responses	Frequency	Percent	Comments
Students (1)	40	66	This result shows that three categories of respondents participated in this study; with students recorded highest percent of 66% while, lecturers and university staffs recorded same percent of 17%. The foregoing suggests that the participant are knowledgeable enough to provide useful information on the subject matter
Lecturers (2)	10	17	
Staffs (3)	10	17	
Total	60	100.0	

Source: SPSS Statistics 23 Output from study data, 2022

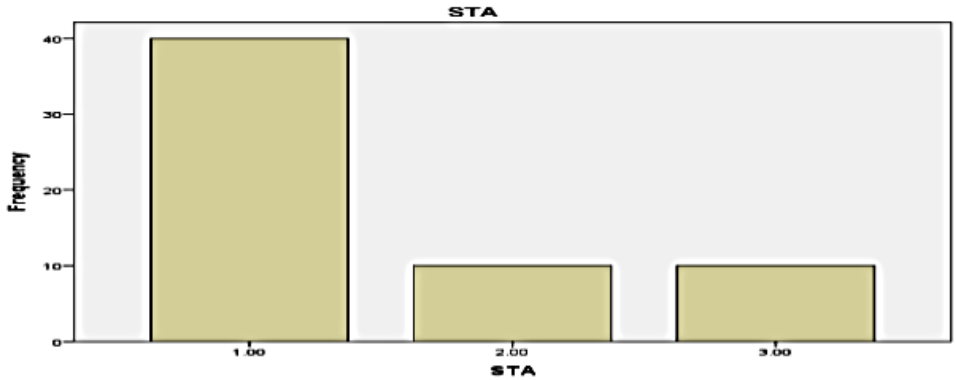


Figure2: bar graph representation of status participant
Source: SPSS Statistics 23 Output from study data, 2022

Table 3: *Complexity (CPX) of TIIS*

Responses	Frequency	Percent	Comments
Very Difficult (1)	7	12	The result in this table 3 was based on four point likert scale. The result show that 43% of the respondents posited that to navigate TIIS is easy, followed by 27% of the respondents that answer that to navigate TIIS is very easy. However, 18% of the respondents' response that to navigate TIIS is difficult while, 12% of the respondents' response that to navigate TIIS is very difficult. On the weighted average, the majority of the responses agreed that to navigate TIIS is easy
Difficult (2)	11	18	
Easy (3)	26	43	
Very Easy (4)	16	27	
Total	60	100.0	

Source: SPSS Statistics 23 Output from study data, 2022

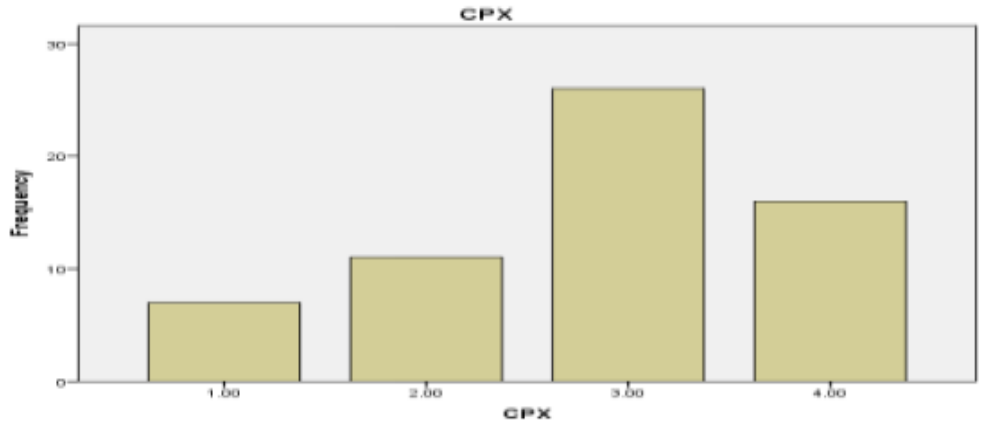


Figure 3: bar graph representation of complexity of TIIS
Source: SPSS Statistics 23 Output from study data, 2022

Table 4: *Effectiveness of TIIS*

Responses	Frequency	Percent	Comments
Very Little Effective (1)	2	3	The result in this table 4 was based on four point likert scale. The result shows that 47% respondents answer that the introduction of TIIS very effectively contributes to their learning skill. 37% answer that the introduction of TIIS effectively contributes to their learning skill, 8% answer that the introduction of TIIS has little effect on their learning skill and lastly, 3% answer that the introduction of TIIS contributes very little effect to their learning skill, On the weighted average, the majority of the responses agreed that TIIS contributes very much effect on their learning skill.
Little Effective (2)	8	13	
Effective (3)	22	37	
Very Effective (4)	28	47	
Total	60	100.0	

Source: SPSS Statistics 23 Output from study data, 2022

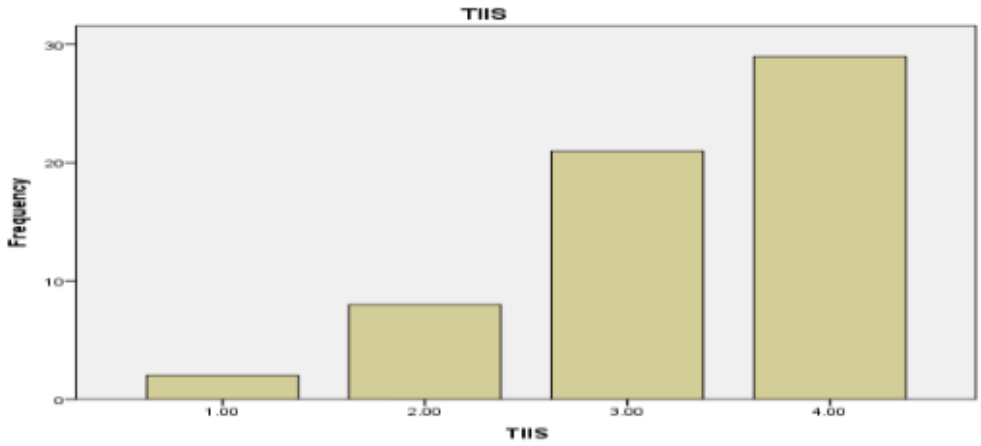


Figure 4: bar graph representation of Effectiveness of TIIS
Source: SPSS Statistics 23 Output from study data, 2022

Table 5: *Impact of TIIS on UAP*

Responses	Frequency	Percent	Comments
Very Little Impact (1)	1	2	The result in this table 4 was based on four point likert scale. The result shows that 45% of the respondents alluded to the fact that TIIS has very great impact in their academic performance. 40% posited that TIIS has great impact in their academic performance. 13% say that TIIS has little impact in their academic performance. Lastly, 2% asserted that TIIS has very little impact in their academic performance. On the weighted average, the majority of the responses agreed that TIIS has very great impact in their academic performance.
Little Impact (2)	8	13	
Great Impact (3)	24	40	
Very Great Impact (4)	27	45	
Total	60	100.0	

Source: SPSS Statistics 23 Output from study data, 2022

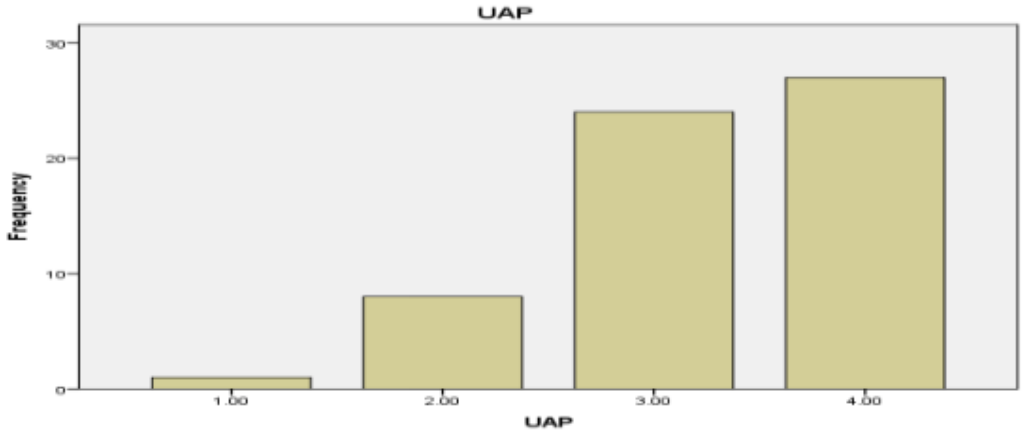


Figure 5: bar graph representation of TIIS on UAP
Source: SPSS Statistics 23 Output from study data, 2022

Inferential Statistics: This study employed simple regression to analyse the impact of technology innovation and information services (TIIS) and academic performance of the users (UAP)

Table 6a: *Simple Regression: Coefficients*

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.367	.111		3.297	.002
TIIS	.893	.033	.962	26.966	.000

a. Dependent Variable: UAP

Source: SPSS Statistics 23 Output from study data, 2022

The table 6a simple regression analysis result shows that the coefficient of TIIS is 0.893 with probability value of 0.00 less than 0.05 level of significance, indicating that TIIS has positive and statistical significant impact on UAP. In other words, 89% in TIIS lead to increase in academic performance of the users.

Table 6b below presents simple regression analysis of variance (ANOVA) which explained the overall model under estimate.

Table 6b: *ANOVA*

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	31.658	1	31.658	727.149	.000[b]
Residual	2.525	58	.044		
Total	34.183	59			

a. Dependent Variable: UAP

b. Predictors: (Constant), TIIS

Source: SPSS Statistics 23 Output from study data, 2022

The table 6b result shows that F-statistic value is 727.149 with probability of 0.00 less than 0.05 levels of significance, suggests that overall model is good fit to explain the nexus between the dependent (UAP) and independent variable (TIIS). In other words, the regression model is statistically significant, $F(1.58) = 727.149$, $p = .00$. This indicates that overall, the model applied can statistically predict the dependent variable.

Lastly, table 6c presents simple regression model summary.

Table 6c: *Model Summary*

Mode	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.962[a]	.926	.925	.20866

a. Predictors: (Constant), TIIS

Source: SPSS Statistics 23 Output from study data, 2022

The R^2 (R-squares) represents the proportion of variance in the dependent variable that can be explained by our independent variable (technically it is the proportion of the variation accounted by the regression model above and beyond the mean model). However, R^2 is based on the sample and it is a positively bias estimate of the proportion of the variance of the dependent variable accounted for by the regression model. And adjusted R^2 value (Adj R squared), which correct positive bias to provide a value that would be expected in the population. This result suggests that the independent variable, TIIS explains 0.926 about 93% of the variability of the dependent variable UAP in the population. Adjusted R^2 is also an estimeate of the effect size, which at 0.925 about (93%) is indicative of a medium effect size. In conclusion, the linear regression established that introduction of TIIS could significantly predict UAP, $F(1.58) = 727.149$, $p = .000$ and TIIS accounted for 93% of the explained variability in UAP. The regression equation was: predicted TISS = 0.367 + .893 TIIS.

Conclusion and Recommendations

This study examines the impact of library technology innovation and library information services on users' academic performance in ADUN. This study employed both primary and secondary data which were sourced from field survey and literature review on dependent variable (UAP) and independent variable (TIIS). The study population consists of sample of 70 respondents out of which 60 respondents participated in the study using purposive sampling technique. Thereafter, descriptive and inferential statistics with the aids of SPSS were used to analyse both qualitative and quantitative data sourced. The results of this analysis are presented in series of foregoing tables in section 4. Findings of the study reveal that on the weighted average, the majority of the responses agree that application of TIIS is easy. More so, the majority of the responses agreed that TIIS contributes immensely on their learning skill. Moreover, majority of the responses agreed that TIIS has very great impact in their academic performance. 89% increase in TIIS lead to increase in academic performance of the users'. Lastly, findings reveal that introduction of TIIS statistically predict UAP, and that TIIS accounted for 93% of the explained variability in UAP.

Therefore, it can be concluded that TIIS have positive and significant impact on the user's academic performance in ADUN. Based on the findings of this study, the following recommendations are suggested: That, Nigerian government and proprietors of institutions of learning at all levels should formulate policies that would integrate technological innovations in library services as regulation.

ADUN should prioritize upskilling the library staff and entire library users in order to maximize the benefits of all innovations of the decade for knowledge enhancement.

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