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Assessing Students' Perception of Internet of Things using Technology Acceptance Model

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Abstract

This quantitative exploratory survey study examined accounting students' acceptance of Internet of Things (IoT) technology among a sample of 343 accounting students from Nigerian public universities. The students' mean age was 26.00±6.48years. Electronic copy of the research instrument was emailed to the students for completion. Statistical analysis of the research data was carried out at 0.05 level of significance. Results revealed significant positive associations of accounting students' perceived usefulness with perceived ease of use and intention to use IoT technology. Also, results indicate that accounting students' perceived ease of use correlated significantly with their intention to use IoT technology. The study also showed that there were no significant differences among the accounting students on the acceptance of IoT technology by gender and program type. The interaction of gender and program type did not produce any significant difference in students' acceptance of IoT technology with regard to perceived usefulness; perceived ease of use; and intention to use. It is suggested that accounting students should be motivated to embrace the opportunities that abound in IoT technology. Finally, the researcher notes that IoT needs to be further addressed in the accounting education, even in advance to its potential mandate for financial reporting.

Keywords: Acceptance, Accounting Students, Internet of Things; Nigerian universities

Introduction

The Internet of Things (IoT) has been described as the interconnection of devices through the Internet and this includes the interconnection of physical and digital worlds, objects, or assets (Sohaib et al., 2017; Yilmaz & Hazar, 2019b, 2019a). The term 'IoT' has also been referred to as the "network of physical objects (*things*) that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet" (Oracle, 2021). The earliest use of the word, 'Internet of Things,' is often attributed to Kevin Ashton, a British technologist, who used the term in a 1999 presentation made to Procter and Gamble(Institute of Chartered Accountants in England and Wales, 2019). Experts have noted that the use of IoT technology in the accounting industry can help improve the quality and relevance of accounting information available in real-time (Wu et al., 2019) as well as improve data accuracy and integrity of accounting information systems (Cao & Zhu, 2012).

A major concern is that available models of accounting information systems depend exclusively on mechanical entry of accounting information that does not meet the prerequisite for well-timed recorded information(Wu et al., 2019). But, the IoT technology can monitor the episode of events in real-time and the real-time situation of main products, thus enabling the conveyance of such information to data-processing systems like distributed ledgers for accomplishing the goal of sharing real-time information (Valentinetti, & Muñoz, 2021; Wu et al.,

2019). The real-time information can be utilized by accounting professionals for planning business, allocating resources in a better way and for proper budgeting, cost planning and forecasting(Chandi, 2017).

It has been observed that the collection of accounting information and data required for carrying out financial obligations is one of the many issues facing accounting firms(Kumar, 2021). With IoT technology, however, techniques for collecting and processing accounting data could become less cumbersome, more streamlined, and less error-prone (BBN Times, 2021; Kumar, 2021). Thus, several contributors have further observed that deploying IoT technology in the accounting profession could result in better decision-making and risk management, better auditing, better optimization of cost and time, streamlining of accounting processes, and better work/time management by accountants (BBN Times, 2021; Kumar, 2021; Landman, 2020). The IoT technology with the appropriate accounting software can be used for automation of the accounting process, and accordingly result in improvement of the accounting system and overall productivity(Kumar, 2021).

Given that at present, there are over seven billion devices connected to the IoT, there are projections by IT professionals that this figure will increase to ten billion by the year 2020 and up to twenty-two billion by the year 2025 (Oracle, 2021). Recognizing the acceptance and confidence levels of potential users of any innovative technology is necessary for the expansion of such technology (Taherdoost, 2018). Therefore, Yilmaz and Hazar (2019) argued that it is essential to examine the acceptance level of this technology among students of accountancy because IoT technology has a wide range of applications in this profession. Moreover, the Institute of Chartered Accountants in England and Wales (2019) found that IoT technology can help advance accounting and management fields in several areas like data quality; product quality; transaction processing; asset, revenue, cost and risk analysis; and employee performance.

Currently, there are limited number of empirical studies as regards accounting students' acceptance of IoT technology despite it being a novel technology with potential benefits for accounting firms and accounting professionals. To our knowledge, the available study was among accounting and finance students from universities in Turkey which demonstrated a positive correlation between students' perception about ease of use and usefulness and the intention to use IoT technology; perception about ease of use positively correlated with students' perception about the usefulness of IoT (Yilmaz & Hazar, 2019a). In as much as IoT technology will continue to advance, it is expected that accounting professionals will identify avenues for them to increase their involvement at various levels of operation and strategic planning including being able to assist in tackling a range of IoT challenges like security and privacy concerns (Institute of Chartered Accountants in England and Wales, 2019). Aldredge Rogers and Smith (2021) observed that most universities do not teach the technological competencies and skills required today for the advancement of the accounting profession. Thus, the main objective of this study was to examine the acceptance of Internet of Things (IoT) technology among a sample of accounting students from Nigerian public universities.

Hypothesizing

The theory that guided this research is the technology acceptance model (TAM) theory by Davis (1989). The theory of technology acceptance model states that when an individual thinks that a new product (in this case IoT technology) is useful (perceived usefulness; *PU*) and easy to use (perceived ease of use; *PEOU*), there is an increased likelihood of having the intention to use (*IU*) the product. Thus, the researcher proposed, using this theoretical model, that accounting students' acceptance of IoT technology will remain the same irrespective of gender and program type if they perceived IoT to be usefulness and easy to use, and this will

invariably correlate with the likelihood of having the intention to use IoT technology (see Figure 1).

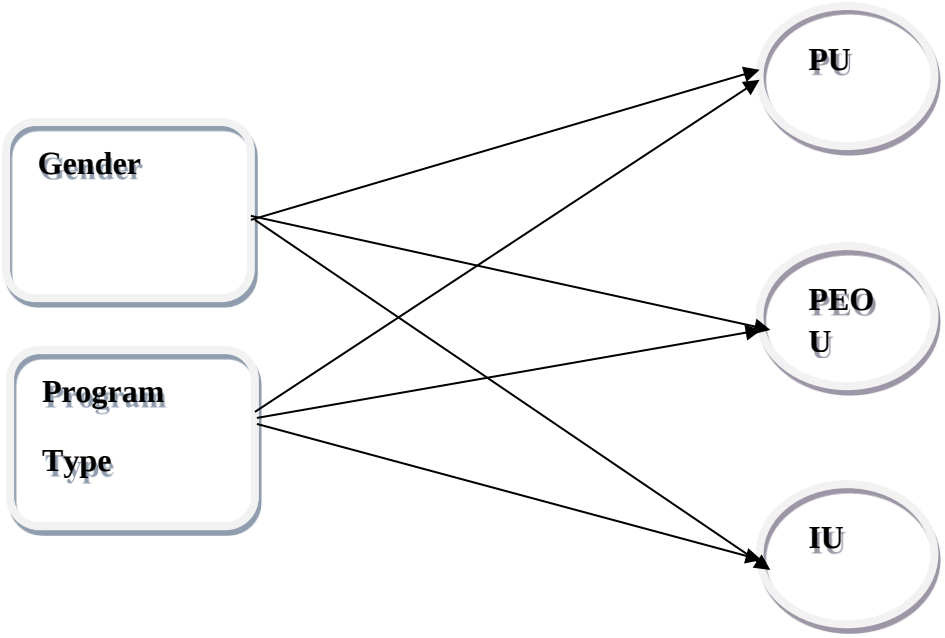

Figure 1: Hypothetical model for students' acceptance of IoT technology
Note: PU=perceived usefulness; PEOU=perceived ease of use; IU=intention to use

Methods

Study Ethics, Design and Sample

After obtaining the required ethical clearance for this research from the Research Ethics Committee at the University of Nigeria, this quantitative exploratory student survey which was conducted from August to November 2023 covered a stratified sample of 343 accounting students from four public universities in the Southern region of Nigeria. All the accounting students who participated in this study electronically provided written informed consent. The researcher used the single population regression formula in Gpower statistical software at 95% confidence interval, 5% acceptable error margin and 80% *a priori* statistical power to establish the study sample size (Faul et al., 2007). A probable 10% non-response rate was put into consideration; as a result, a sample correction formula was used to arrive at the total sample for the research.

Study Procedure

Letters of invitation to be part of the study were sent out to students of accountancy departments of selected universities through the student executives with details of how to reach out to the researchers and information about the study. Thereafter, in-person, face-to-face visitations were made to the accountancy departments at the selected universities where the researchers met with the students and their representatives to discuss more about the study including data privacy and confidentiality issues. Interested students were asked to supply their email addresses to be able to receive the survey instrument for completion and return.

Research Instrument

The electronic copy of the research instrument adapted from Igwe et al. (2019) which has a total of 20 items assessing students' acceptance of IoT technology based on three constructs – perceived usefulness (*PU*; 10 items), perceived ease of use (*PEOU*; 5 items), and intention to use (*IU*; 5 items) developed on a 4-point Likert-type scale [strongly disagree (1) –

strongly agree (4)] – was emailed to accounting students who indicated interest to participate in this study. The first section of the instrument sought the students' sociodemographic information (age, gender and program type) whereas the second section contains items measuring students' acceptance of IoT in three clusters. Cronbach's alpha reliability of the different subscales of this survey instrument were as follows: perceived usefulness (0.82 α), perceived ease of use (0.85 α), and intention to use (0.83α). Sample item include: The use of IoT can help expedite accounting process (PU). I do not consider IoT technology as a hard nut to crack (PEOU). I would love to deploy IoT technology in my accounting practice (IU).

Data Analysis

The data of the students' sociodemographic characteristics (age, gender and program type) were analysed descriptively. Statistical analysis of the main research variables were carried out at 0.05 level of significance using Pearson *r*, regression analysis with bootstrapping, and multivariate analysis statistics. Data cleaning was completed through Epi-Info statistical software (version 7) (Dean et al., 2011) whereas the main research data analysis was achieved with IBM SPSS version 13 and WarpPLS version 8.

Results

Table 1: Descriptive statistics for students' variables

Student variables	Category	*f*(%)	Statistics	*P*-value
Age	*Mean age	*26.00±6.48	*t*= 74.32	<.05
Gender	Male	120 (35.0)		<.05
	Female	223 (65.0)	x^2= 30.93	
Program	Undergraduate	200(58.3)		<.05
Type	Master's	97 (28.3)	x^2= 107.66	
	Doctorate	46 (13.4)		

f=frequency; %=percentage, t=t-test value; x^2= Chi-square value

Results in Table 1 show 343 students completed the study. The students' mean age was 26.00±6.48years. In respect of gender, male students were 120 while female students were 223. By program type, undergraduates were 200 master students were 97, whereas doctorate students were 46.

Table 2: Means and Pearson Correlations of Study Variables

Variables		Mean(SD)	PU	PEOU	IU
PU	Pearson *r*	3.334(.29)	__	.86**	.60**
PEOU	Pearson *r*	3.335(.31)		___	.68**
IU	Pearson *r*	3.300(.31)			___

**p<.01; *SD=Standard Deviation; PU*= perceived usefulness; *PEOU*= perceived ease of use; *IU*=intention to use.

Results in Table 2 indicate significant positive associations in accounting students' perceived usefulness (*PU*), perceived ease of use (*PEOU*) (Pearson *r*=.86, *p*<.05, .968) and their intention to use (*IU*) (Pearson *r*=.60, *p*<.05) IoT technology.

Table 3: Between-subjects multivariable analysis of students' acceptance of IoT technology

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	PU	.062[a]	5	.012	.136	.984
	PEOU	.153[b]	5	.031	.326	.897

	IU	.508[c]	5	.102	1.060	.383
Program type	PU	.031	2	.015	.170	.844
	PEOU	.042	2	.021	.221	.802
	IU	.239	2	.119	1.247	.289
Gender	PU	.006	1	.006	.071	.791
	PEOU	.000	1	.000	.002	.961
	IU	.086	1	.086	.900	.344
Program type *	PU	.048	2	.024	.263	.769
Gender	PEOU	.124	2	.062	.657	.519
	IU	.227	2	.114	1.187	.306
Corrected Total	PU	30.771	342			
	PEOU	31.883	342			
	IU	32.790	342			

df=degree of freedom; PU= perceived usefulness; *PEOU*= perceived ease of use; *IU*=intention to use

Between-subjects multivariate analysis results in Table 3 revealed that male and female accounting students did not differ in their acceptance of IoT technology with regard to perceived usefulness ($F(1,342)=.017$, $p=.791$; perceived ease of use (F (1,342)= .002, $p=.961$; and intention to use($F(1,342)=.900$, $p=.344$. Also in Table 4, the results showed that undergraduates, master's and doctorate students did not differ in their acceptance of IoT technology with regard to perceived usefulness ($F(2,342)=.170$, $p=.844$; perceived ease of use (F (2,342)= .221, $p=.802$; and intention to use($F(2,342)=1.247$, $p=.289$. The interaction of gender and program type did not produce any significant difference in students' acceptance of IoT technology with regard to perceived usefulness ($F(2,342)=.263$ $p=.769$; perceived ease of use (F (2,342)= .657, $p=.519$; and intention to use($F(2,342)=1.187$, $p=.306$.

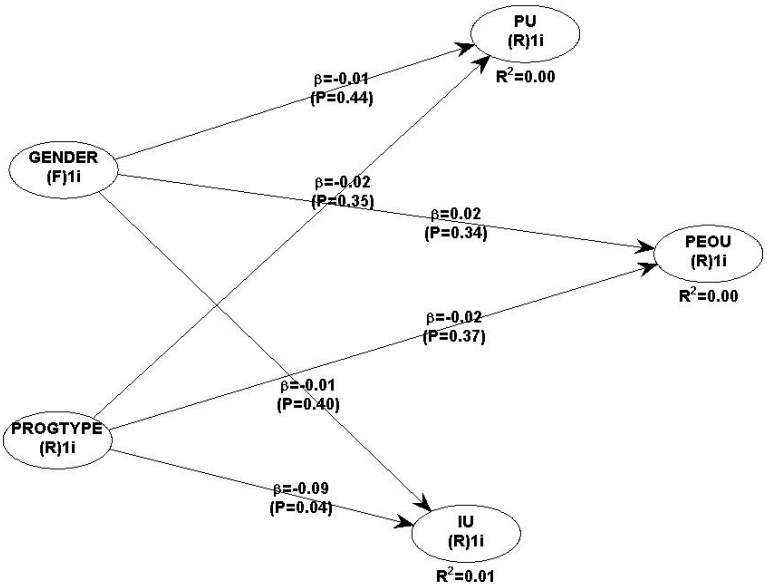

Figure 2: Path diagram model for students' acceptance of IoT technology

Figure 2 shows a path diagram model for students' acceptance of IoT technology with standardized βeta coefficients of 0.01 for perceived usefulness (PU), 0.02 for perceived ease of

use (PEOU) and 0.01 for intention to use (IU) by gender. Furthermore, standardized βeta coefficients of 0.02 for perceived usefulness (PU), 0.02 for perceived ease of use (PEOU) and 0.09 for intention to use (IU) were obtained in terms of program type.

Table 4: Multivariate tests of students' acceptance of IoT technology

Effect		Value	*F*	Hypothesis df	Error df	Sig.
Program type	Wilks's Λ	.988	.678	6	670	.668
Gender	Wilks's Λ	.994	.693	3	335	.557
Program type * Gender	Wilks's Λ	.989	.595	6	670	.734

Wilks's Lambda (Wilks's Λ)

The multivariate test in Table 4 revealed that gender did not significantly affect students' acceptance of IoT technology ($F(3,335)=.693$ $p=.557$; Wilks's Λ=.994) neither did the students' program type ($F(6,670)= .678$ $p=.668$; Wilks's Λ=.988). In the multivariate test, the interaction of gender and program type did not also result in any significant difference in students' acceptance of IoT technology ($F(6,670)=.595$ $p=.734$; Wilks's Λ=.989). The study results supported our proposed hypothesis.

Discussion

The objective of this study was to examine accounting students' acceptance of Internet of Things (IoT) technology among a sample of accounting students from Nigerian public universities. Findings showed significant positive associations of accounting students' perceived usefulness of IoT with perceived ease of use of IoT and intention to use IoT. Also, results indicate that accounting students' perceived ease of use of IoT correlated significantly with their intention to use this technology in practice. These results support the findings of a previous study that demonstrate a positive correlation between students' perception about ease of use and usefulness and the intention to use IoT technology; and students' perception about ease of use and usefulness of IoT (Yilmaz & Hazar, 2019a). The Institute of Chartered Accountants in England and Wales (ICAEW) (2019) noted that the emergence of IoT technology presents viable opportunities for professional growth of accounting professionals and to benefit maximally from such opportunities, they have to expand their skills, knowledge, and attitudes. More importantly, it has been observed that IoT data could be utilised for the expansion of accounting boundaries and to help accounting professionals to become more valuable to establishments (Institute of Chartered Accountants in England and Wales, 2019).

The study also showed that there were no significant differences among the accounting students by gender and program type. As the accounting profession is being greatly influenced by the growing recognition of IoT technology, it is expected that irrespective of gender, this technology will put accounting professionals in a better position to provide improved services by making financial activities more traceable as well as enable them to offer better advice to business organizations and other clients(CaseWare International, 2021). Therefore, Nigerian accounting students ought to be equipped with all the prerequisite skills and knowledge regarding IoT technology so as to be able to catch up with the trend of this technology as applicable in their chosen profession. Tucker (2017) observed that even though the use of IoT in accounting is still at its early stage, its application will likely pave way for financial information and data automation, changes in invoicing and reporting procedures, new accounting models, and significant changes in how accountants offer advice to clients in matters such as tax

planning, financial management, as well as financial analysis. Smith (2020) noted that the deployment of IoT in a business organization could potentially transform how they manage accounting information and could boost the finance department's capacity to sustain the business. According to Van Niekerk and Rudman (2019), the use of IoT by a business firm could produce more value for them by means of generating and integrating data, promoting information quality, and collecting information in real-time using sensor technologies incorporated in distinctively recognizable mechanical or virtual assets. However, when applying IoT technology, an organization must ensure that they hold on to features of validity, reliability, wholeness and timeliness with respect to their financial information(Van Niekerk & Rudman, 2019). Given these issues, it is important to introduce an IoT technology course to accounting students early enough in their program to enable them to become well-prepared to use this technology in their service delivery when they go into practice as professional accountants. According to Qasim and Kharbat (2020), academia should consider recent industry implementation of novel technologies during the design of accounting curriculum so as be able to train graduates for the market and to guarantee their employability. In this regard, Aldredge Rogers and Smith (2021) argued that university accounting curriculum requires a strategic transformation given the rapid changes and evolution of technologies and businesses as well as expectations for accountants. The authors believes that now is the time for accounting academics "to explore ideas that spark the development of a world-class accounting curriculum within universities and transform accounting education into preparation for a true learned profession" (Aldredge Rogers & Smith, 2021, p. 87). In order for universities to prepare accounting students to be able to adapt to the rapidly changing corporate world, Kinory, Smith, and Church (2020) suggested hands-on training for the students to teach them the basics of blockchain network, its framework and essential tools that can facilitate new blockchain development.

Conclusion

This study examined accounting students' acceptance of IoT technology among a sample of accounting students from Nigerian public universities. The main conclusion is that accounting students' perceived ease of use of IoT technology correlated significantly with their intention to use this technology. The study also showed that there were no significant differences among the accounting students by gender and program type in terms of acceptance of IoT technology. The main implication of this research is that Nigerian accounting students need to be motivated to embrace the opportunities that abound in IoT technology for the advancement of the accounting education in the country. Also, information technology courses that can help to further expand students' skills, knowledge, and attitudes in regard to IoT technology should be incorporated into the school curriculum and be taught by experts. There is also a need for large scale research to understand accountancy lecturers' status as regards acceptance of IoT and inclusion of courses to address the knowledge gap in the use of this technology. In terms of limitation, the main limitation of this research is that it was restricted to just accounting students, thereby, leaving out other student groups in the business administration specialty. Also, survey data was collected using questionnaires and this data collection method is prone to overestimation or underestimation of issues under consideration on part of the respondents. It is suggested that future researchers should collect qualitative data on students' acceptance of IoT and endeavour to study other student groups in the business administration specialty. Also, future research should explore students' understanding of the role of blockchain technology in accounting information system. Finally, the researcher believes that IoT needs to be further

addressed in the accounting education, even in advance to its potential mandate for financial reporting.

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