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Environmental Factors: Examining the Analytical Power of Its Dimensions in Explaining the Adoption of a Unified Identification System of MDAs in Uganda

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ABSTRACT

The use of the unified identification system (UIDS) can undoubtedly result in increased effectiveness and efficiency, improvement in the quality of life, reduction of crime, enhanced transparency, and good government. This study examined the dimensions of environmental factors in explaining the adoption of a unified identification system (UIDS). Dynamic capability theory (DCT), technology-organisation-environment (TOE) framework, and diffusion of innovation (DOI) were used as grounding theories. The study opted for a concurrent triangulation research design. The results revealed that government support, competitive pressure, and perceived trust are significant and support the adoption of a unified identification system. However, user readiness was insignificant in explaining the use of UIDS in the Ugandan context. This study recommends that policymakers focus on government support as it is a symbol of leadership in IS innovation adoption.

KEYWORDS

Adoption, Agencies, Departments, Environmental Factors, Ministries, Unified Identification System

INTRODUCTION

In this paper, we methodologically isolate the contribution of the four dimensions of environmental factors in explaining the adoption of Unified Identification systems (UIDs) in Uganda. UIDS can be defined as the broad administrative sector concerned with the integration of different channels of access to public services, while digital identification refers to the ways through which a state can identify its citizens for access to public services (Mensah, 2020; Basyal, Poudyal, & Seo, 2018). The current trend of the digital identification era has many opportunities when adopted as witnessed in the early adopters like Denmark, Estonia, Germany, India, and Finland (Gemalto, 2018; Silas & De Wet, 2017). These benefits include improvement in service delivery (Ajay, Mandalika & Manish, 2019), cheaper ways of doing business (Ari-Veikko, 2010), support of government policies especially in the provision of high-quality services at a relatively low cost (Susan & Norman, 2018), ensuring high-level security to personal details (Digital Single Market, 2016) among others. Though this has not been

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the case in the African states such as Ghana, Mali, Malawi, Nigeria, Kenya, and Uganda (Fazekas, Skuhrovec, & Wachs, 2017). Despite the efforts, challenges of budget constraints, unnecessary delays due to limited financial resources, and sometimes indefinite suspension of the entire integration process have frustrated the process (Anderson et al., 2016; Foster, 2015).

Review of literature on UIDS engrossed the researcher's attention on the perspectives of UIDS implementation, adoption status, and UIDS adoption rate in the developing world (Mensah, 2020; Sant et al., 2016; Falcone, 2018; William & Steven, 2010). UIDS adoption and usage have been successful in the developed world, unlike in the developing world (Kaabachi & Obeid, 2016). Several factors can explain this. For instance, the majority of IS adoption theories have been designed from developed countries' context (Alzahrani, Al-Karaghoul, & Weerakkody, 2017), imbalance on the demand-supply curve (governments paying attention to providing their citizenry with electronic services without inquiring the users on what they wanted (Formunyuy & De Wet, 2018), lack of transparency and accountability in the developing countries and limited infrastructural development (Fazekas, Skuhrovec, & Wachs, 2017). These issues have deprived developing countries of the benefits of UIDS. For a developing country like Uganda to enjoy the benefits of UIDS, the adoption rate has to be achieved. It is against this background that the researcher focuses on the UIDS adoption rate. The Ugandan government, through the National Information Technology Authority (NITA-U), has developed several strategies. The strategies include a data centre, installation of 336 meters of fibre optic cables across the country, building 71% websites coverage in Ministries, Department, and Agencies (MDAs) and enacting IT security regulations to enable the integration process for the unification of all MDAs (NITA-U, 2019). Despite these efforts by the government to have a shared database, only 10 MDAs out of 130 (8%) have accessed the service modules on the National Integration Platform (National IT survey report, 2018). The factors that explain the low take-up rate has not been fully explored. If the remaining 120 (92%) MDAs stay uncooperative in the integration process, it may impede the achievement of Uganda's vision 2040, the achievement of sustainable development goals by 2030. Although the review of extant literature attributes this challenge to environmental factors (Wasfi, 2015, Susan & Norman, 2018; Silas & De Wet, 2017) little is known in the Ugandan context hence the relevance of this study.

An external environment which is defined as the arena in which an organization conducts its business (Wasfi, 2015) has not been given much attention concerning UIDS adoption. Some scholars like (Sune & Skau, 2015) identified several factors such as competitive pressure, regulatory actions, and customer satisfaction requirements in explaining adoption in areas of electronic health, customer relation management, electronic business, and knowledge work systems. Earlier studies have investigated the role of environmental factors in explaining technology adoption (Yigitbasioglu, 2015; George, 2015; Kaabachi & Obeid, 2016). However, only two dimensions have been identified, that is government support and competitive pressure. There is no study known to the researcher that has identified environmental factors in explaining the adoption of UIDS. Thus, this study identified perceived trust, user readiness, competitive pressure, and government support to explain the dynamics of MDAs in enhancing the adoption of UIDS.

Several theoretical models have been used to study the adoption of technological innovations in organizations such as Diffusion of innovation (DOI) (Rogers, 2003) Theory, Technology Acceptance Model (T.A.M.), Dynamic capabilities (DCT) Theory, Institutional theory and Technology-Organization-Environment (TOE) Theory ((Tornatzky and Fleischer 1990). Prior reviews of literature by scholars like Ramdani & Kawalek (2000), Chau and Tam (1997), found out many of the theories advanced measured IS innovations' adoption and usage at an individual level and also based on the characteristics of the technology itself. This study resolves to use DCT, TOE, and DOI theories in examining the dimensions of environmental factors on the adoption of UIDS in Ugandan MDAs, this is because these theories were used mainly at an organizational level, used jointly in many studies and formed the study dimensions.

The rest of the paper is as follows. Section 2 reviews the literature review and the development of hypotheses. This is followed by the research methodology in Section 3. Section 4 presents the results. The last section entails the contribution to theory and practice, the conclusion, limitations, and future work prospects.

LITERATURE REVIEW

Overview of The Ministries, Departments, and Agencies (MDAs) in Uganda

MDAs have no universally recognized definition across countries; however, they can be defined independently, where a ministry refers to a governmental organization, headed by a minister, that is meant to manage a specific sector of public administration, in Uganda, there are 22 ministries, 60 departments, and 48 Agencies. The primary objectives of these MDAs include achieving the effectiveness of the set objectives as stated in the National Development Plan (NDP), determine whether their policies were guided by and are aligned to the NDP as the overall national policy framework (Ministry of public service report, 2017). Half a decade ago, the government, through NITA-U embarked on the integration of MDAs on a shared database called the National Integration Platform. The reason for this is to improve service delivery through fast service, reduced data redundancy, and elimination of employee and/client ghosting (NITA, 2019). However, a handful of the MDAs have embraced the idea, so this study seeks to examine environmental factors in the adoption of UIDS in Ugandan MDAs.

Unified Identification Systems Adoption

The trend of the digital identification era has been embraced more in the developed world than in the developing world (Wajcman, 2019). Identity is critical and among the strategic development goals of 2030 as proposed and supported by the UN and World Bank. In the developing world, they have been numerous efforts by respective governments, but mostly, they have succeeded in independent identity systems and with noticeable challenges in integrating their systems (Adam & Fazekas, 2018). Much as developed countries have managed to overcome some of the challenges that hinder successful integration of UIDS, for the developing countries, this has not been the case (Mariam & Zoheir; 2015). Rigorous efforts have been made by governments in developing countries to ensure that they put in place transparent identification systems, but this has been frustrated by some challenges such as data duplication, data management and these are more evident in African states (Foster, 2015). According to Susan & Norman (2018), globally the integration process has been hindered by privacy issues based on the argument that integration may invade individual privacy by their respective governments since citizens are mandated to furnish all their details before a card is issued to them (Ali, Mazen & Hassanein, 2018).

Theories Related to Identification System Adoption

Two main types of adoption theories exist, at the individual level and the firm level (Marston et al., 2011). The theories that work at the individual level comprise The Technology Acceptance Model (T.A.M.), The Theory of Planned Behaviour (TPB), and Unified Theory of Acceptance and Use of Technology (UTAUT). According to Oliveira et al. (2014), the adoption theories employed at the firm level are Diffusion of Innovation (DOI) and the technology-organisation-environment (TOE) framework. The DOI and TOE theories predominately guide research on most of IT adoption of new technologies. Three theories were chosen to ground this study, and these are Dynamic Capability Theory (DCT), TOE, and DOI. According to Oliveira et al. (2014), integrating concepts from different models and frameworks provide increased ability to enhance the understanding of the adoption of new technologies and innovations.

Choice of the Theories

Dynamic Capability Theory

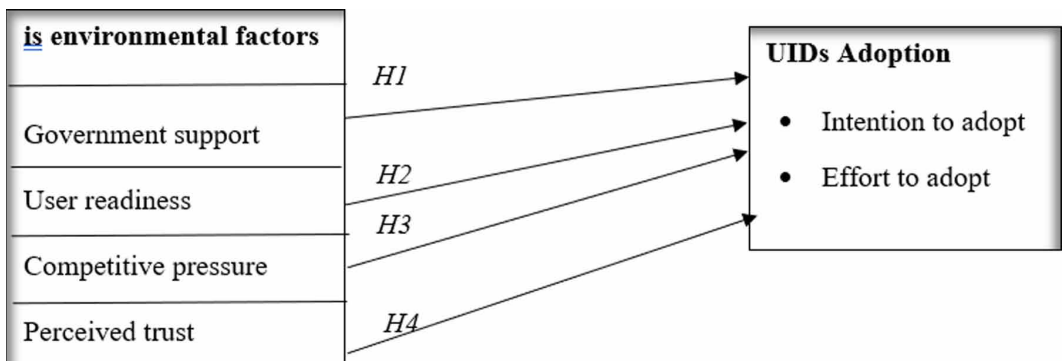
An extension of Resource-Based View (RBV) theory, the DCT makes use of competences that are unique to firms to gain competitive advantage. The theory explains how these competencies are developed, deployed, and protected (Teece et al., 1997). The “dynamic capabilities” framework assumes that an organization’s capability difference is entrenched in three factors: Positions, Process, and Paths. Positions encompass the organization’s ability to change its future range of capabilities. Processes are a determined set of higher-order routines like governance structures, resource allocation processes, and management systems that shape organizational adaptability. Furthermore, because most capabilities are cumulative and develop over time through a series of coordinated investments, they involve commitments to “paths”, rather than discrete projects.

Diffusion of Innovation Theory

To understand the factors responsible for technology adoption, it is crucial to examine the factors that influence the adoption of an innovation. Rogers (2003) explains that the adoption of innovation as a time-consuming process and the rate at which Diffusion of innovation takes place becomes significant for individuals or organizations that are concerned with the adoption of innovation. In this theory, the factors that affect the rate of adoption of innovation are relative advantage, compatibility, and complexity. According to Rogers (2003), relative advantage refers to the degree to which an innovation is perceived as better than the idea it supersedes. Compatibility describes the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. While complexity has been understood as the degree to which an innovation is perceived as difficult to understand and use, therefore, UIDS innovation can only take place if it addresses relative advantage, compatibility, and complexity. Hence, the choice of DOI relates to its ability to unleash innovation through Diffusion that is in early stages such as the UIDS, especially in the developing countries.

Technology Organisation and Environment Framework; The effectiveness of an organization is based upon its fitness towards both internal and external factors such as environment, organization size, and organization strategy (Wasfi, 2015). Therefore, decision-makers should take in to account environmental, organizational, and technological factors to make a decision. In this framework, three key determinants were identified that affect organizational adoption: technology, organization, and environment. This is because the significant strength of TOE is addressing environmental influence on the adoption of technology.

Figure 1. Conceptual Framework and Research Hypothesis. Source: Developed from a review of the literature (Tornatzky & Fleisher, 1990; Doom et al., 2012, Alshamaila, 2013; Evangelista et al., 2010, Chao & Chandra, 2012).



Government Support and UIDS Adoption

Government support has been recognized as a critical factor affecting innovation diffusion (Kehinde, 2012; Yigitbasoglu, 2015). Zhu, Kraemer & Dedrick (2004) defined government support as “ways in which government regulation (laws) could affect innovation diffusion”. Scholars like (Silas & De Wet, 2017; Nirmaljeet & Ravi, 2019) assert that organizations may adopt a technology willingly or through influences exercised by competitors and partners. Furthermore, (Dutta, Devi, & Arora, 2019) pointed out that the use of a shared database significantly influences adoption decisions. Government strategies or initiatives that encourage MDAs to join the platform, to facilitate shared databases, big data, among others (Ali Al-Sai & Abualigah, 2017).

H1: Government support has a positive impact on the adoption of UIDS.

User Readiness and UIDS Adoption

The role of clients can create pressure to use their technology offerings. In addition to this, client consumer-based pressure can also drive MDAs to adopt the technology. Susan, & Norman (2018). posited that the social interaction between MDA officials and their clients exert pressure that influences UIDS adoption. This indicates that perceived industry pressures from competitors, partners, vendors, and other social influences can influence an MDAs’ adoption decision. Customer readiness influences the adoption process and is an inhibitor towards IS use. When customers are ready in terms of access to the internet, availability of machines among others adoption they push their service providers to go digital and reduce costs in terms of transport and administration time (Mensah, 2020).

H2: User readiness has a positive influence on the adoption of UIDS.

Competitive Pressure and UIDS Adoption

Competition and intense rivalry increase the likelihood of innovation adoption to gain competitive advantage. In this study, competitive pressure focuses on the demand from the MDA clients and suppliers, the efficiency level of that particular MDA, and the benefits that accrue to the use of a system (Gerald, et al., 2019). For this study, external pressure and regulations determine the adoption level of the MDAs (Wasfi, 2015). Competitive pressure is a significant factor in influencing the adoption of IS innovation by enterprises. Studies by (George, 2015; Mark & Martin, 2020) found out that both competitive pressures and external support were significant factors of the adoption of UIDS in MDAs.

H3: Competitive pressure positively affects the adoption of UIDS.

Perceived Trust and UIDS Adoption

Trust is perceived as feelings of security when relying on an entity; perceived trust is strongly linked with customer readiness in the adoption of an IS innovation (Ban, et al., 2019). Perceived trust entails privacy, safety, and security features which ensure confidence and trust to the employees and hence a high adoption rate. Ali Al-Sai & Abualigah (2017) suggest a negative relationship between lack of trust in online transactions and customer attitude, intention to buy, and purchase behavior, with the national IT infrastructure and the computer bills and laws enacted in the country’s safety, is guaranteed hence a high level of adoption.

H4: Perceived trust and adoption of UIDS are positively correlated.

Research Contribution

As earlier pointed out, our focus is on the adoption rate. UIDS is a borrowed innovation in the African states, because of such a background, research and theories have to find ways to enhance adoption in the developing countries (Gyamfi et al., 2019). The most challenging part is that the existing adoption theories were designed for the developed economies' context though the contribution of these theories cannot be denied. These contextual issues have engineered limited guidance on how these prospective adoption challenges can be dealt with. This limitation affects the implementers' decision making (Heeks, 2015). When this is still the case, several initiatives as advanced may not be achieved, or the benefits associated with UIDS adoption may not be achieved (Ranaweera, 2016). Thus, this study addressed the issue of demand rather than the supply side addressed by many scholars (Formunyuy & De Wet, 2018; Wasfi, 2015). It is therefore important to understand the external factors that cause demand, and this why this study opted for environmental factors to explain why and how citizens adopt UIDS.

RESEARCH METHODOLOGY

This study opted for a concurrent triangulation design where both quantitative and qualitative studies were employed simultaneously. The purpose of this method is to understand the problem better by using different but complementary research methods (Creswell, 2003). Primary data was the main data source and was collected using a self-administered close-ended survey questionnaire. MDAs were selected using a simple random sampling technique. The study population comprised of 120 MDAs (NITA-U Report, 2018). The sample size was computed using the Krejcie and Morgan (1970) sample size determination table (see table 1). Hence, the sample size for this study was 99 MDAs. The unit of inquiry is individuals. In this study, five (05) people will be purposefully selected per MDA. These were 1 CEO, 1 ICT head, and three (3) other staff. The respondents assessed environmental factors on the adoption of UIDS on a five-point Likert-scale, ranging from 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, and 1= Strongly Disagree were used to determine the respondents' level of agreement and disagreement with the research's items. The questionnaire items for both independent variables and dependent variables are shown in table 2.

Preliminary data analysis was performed using Statistical Package for Social Scientists (SPSS) version 21. Data screening in terms of missing value analysis (using Little's MCAR test), outliers (using frequencies, box, and whisker, normal probability plot), and parametric tests for normality, linearity, homogeneity, and serial correlation. Descriptive statistics such as frequencies, mean and standard deviations were also computed to gain information about the sample characteristics and study variables. Primary data was the main data source and was collected using a semi-structured interview.

Table 1. Sample size determination

Respondents	Population	sample	Unit of Inquiry	Number	Response size
Ministries	20	16	Head of a unit (1) Head of ICT (1) Other staff (3)	5	80
Government Departments	58	48	Head of a unit (1) Head of ICT (1) Other staff (3)	5	240
Government Agencies	42	35	Head of a unit(1) Head of ICT (1) Other staff(3)	5	175
Total	120	99			495

Table 2. Operationalisation and measurement of variables

Global Variable	Dimensions	Operationalization	Measurement	Questionnaire Items
Environmental factors	Government support	Zhu, Kraemer & Dedrick (2004, p.29) defined government support as “ways in which government regulation (laws) could affect innovation diffusion”).	Respondents rank six items included in the questionnaire on a 5-point scale.	<ol style="list-style-type: none"> 1. There are effective laws in place to combat cybercrimes. 2. The legal environment is conducive to conduct business on the internet. 3. There are effective laws to protect client privacy. 4. The government demonstrates a strong commitment to promoting a UIDS. 5. The government is helping to lower the cost of using UIDS. 6. The government is driving the development of UIDS
	Competitive Pressure	Competition and high rivalry increase the likelihood of innovation adoption to gain a competitive advantage, for this study regulation determine the adoption level of the MDAs (Wasfi, 2015).	Respondents rank five items included in the questionnaire on a 5-point scale.	<ol style="list-style-type: none"> 1. Our customers demand UIDS services offered to them 2. Our suppliers demand UIDS services offered to them 3. Our organization responds quickly to other competitors action on UIDS adoption 4. Many of our competitors are already having a UIDS for doing business 5. Our organization is very alert to UID adoption opportunities to gain competitive advantages
	User readiness	User readiness Influences the adoption process and is an inhibitor towards IS use. When customers are ready in terms of access to the internet, the availability of machines, among others, adoption becomes easy. (Susan & Norman, 2018)	Respondents rank four items included in the questionnaire on a 5-point scale.	<p>UIDS if adopted, Our clients...</p> <ol style="list-style-type: none"> 1)...have the necessary knowledge and skills to use the UIDS in their transactions2)..... are highly motivated to enroll in the UIDS usage3)...perceive no risks associated with the use of UIDS 4)...are sure about the benefits that accrue to the use of UIDS
	Perceived trust	Trust is perceived as feelings of security when relying on an entity. Perceived trust is strongly linked with customer readiness in the adoption of an IS innovation (Ban, et al., 2019).	Respondents rank five items included in the questionnaire on a 5-point scale.	<p>This organization will use UIDS when there is an assurance of ...</p> <ol style="list-style-type: none"> 1)... protection of the client's personal information from access by unauthorized parties. 2)... protection of client's personal information from misuse. 3)... reliable technologies to support the system. 4)... secure technologies to support the system. 5)... stable internet access.
UIDS Adoption	Intention to adopt Effort to adopt	-Use of e.IDs improves service delivery ((Ajay, Mandalika & Manish, 2019), -Integrated data access warrants support for government policies especially in the provision of high-quality services at a relatively low cost (Ajay, Mandalika & Manish, 2019). -Use of a shared database guarantees a high level of security to personal details (Rasha & Othman, 2016)	Respondents rank three items included in the questionnaire on a 5-point scale.	<ol style="list-style-type: none"> 1) This organization intends to adopt a UIDS. 2) It is likely that this organization will take steps to adopt a UIDS in the future. 3) It is likely that this organization will adopt a UIDS in the next 12 months.
			Respondents rank four items included in the questionnaire on a 5-point scale.	<p>How much effort has your organization already put into ...</p> <ol style="list-style-type: none"> 1 ... mobilizing the funds set up a UIDS? 2 ... setting up technical structures to adopt a UIDS? 3 ... sourcing for technical employees? 4 ... sensitizing the public on the use of UIDS?

The reason for this approach was its ability to generate descriptions grounded in reality (Conger & Toegel, 2012). The interview guide was developed after a comprehensive review of the literature on systems adoption and environmental factors (Alvi, 2016). The aim of collecting qualitative data was to complement the quantitative findings using the individual's point of view. The purposive method was used to select heads of units that occupy strategic positions in the MDAs to enable the researchers to get detailed and rich content. Twenty-five (25) heads of units that occupy strategic positions in the MDAs were purposively interviewed to enable us to get detailed and rich content, of the twenty-five (25) respondents engaged in the investigation, twenty (20) were users, and these were categorized as Adopters(10) and Non-Adopters. Each interview on average took 40 minutes. This sample size was determined using the saturation point in the Field (Creswell, 2006; Miles & Huberman, 1994), and this was attained on the 17th respondent.

With the respondents' permission, most of the interviews were audio-recorded and timed, except two respondents who did not want their voices recorded but instead gave the researcher a detailed explanation and enough data from them. Later data were transcribed into MS Word, and themes and subthemes were generated. Closer analysis of field notes and the previous review of the literature led to redefining the interview content hence refinement and addition of more codes and the outcome of this was an iterative process.

RESULTS

The high response rate of 98% was achieved for the quantitative method. Hence, the collected data and the findings from it can be relied on since it was above 70% as recommended by Dillman et al. (2009). Going by exception, the results show that majority of the respondents were between 31-40 years, an indication of youth dominance in the MDAs. Besides, most of them were masters' holders (56.4%), followed by post-graduate diploma holders (29.9%). The results also show that the males were the majority (57.2%), and the females were 42.8%, most of the MDA officials were married (68.4%), followed by the singles and a smaller percentage of 9% are divorced, this can explain the stability of the employees and can be correlated to the time spent while working for the MDAs (Mehay & Bowman, 2005). The heads of the procurement departments also dominated in the study (42.8%). The majority of MDA officials had spent more than 30 years (43.0%), and lastly, the majority of the respondents came from the government departments (46.7%)

The descriptive statistics generated in this study included means and standard deviations, as presented in **Table 3**. On a 5-point Likert scale, the means for environmental factors and adoption of UIDS are 3.344 and 3.421 with standard deviations of 0.361 and 0.387, respectively. According to Field (2009), when deviations are small compared to mean values, it is evident that the data points are close to the means, and hence, calculated means highly represent the observed data.

Results in **Table 4** revealed the factor structure for environmental factors confirms that all three constructs as significant factors. In their order of importance they include; competitive pressure, perceived trust, and government support with 38.983%, 25.973%, and 20.682 respectively. The items under each factor with ratings above 0.50 were retained. Items below were deleted because their importance in explaining the factors was low.

Correlation Analysis

The correlation results in **Table 5** present the environmental factors and adoption of UIDS in MDAs ($r=.457$, $p=.000$). This provides support to the hypothesis which states that there is a significant relationship between environmental factors and the adoption of UIDS among MDAs. This means that positive changes in environmental factors are associated with positive changes in the adoption of

Table 3. Descriptive statistics for statements on environmental factors

Environmental Factors	Mean	Std. Dev
The legal environment is conducive to conduct business on the internet.	3.3094	.72542
There are effective laws to protect client privacy.	3.0574	.86738
The government is helping to lower the cost of using UIDS.	3.3074	.72771
The government has included educational assistance for stakeholders about UIDS.	3.3053	.73278
Our suppliers demand UIDS services offered to them	3.5430	.72091
Our organization responds quickly to other competitors action on UIDS adoption	3.4037	.75754
Many of our competitors are already having a UIDS for doing business	3.6762	.66110
Our organization is very alert to UIDS adoption opportunities to gain competitive advantages	3.5799	.70621
... Secure technologies to support the system.	3.2541	.89545
... Stable internet access.	3.4426	.88843
... technological structures to provide adequate protection of clients.	3.5492	.90040

Source: Primary data 2019

Table 4. Environment Factors factor analysis

Items	Competitive Pressure	Perceived Trust	Government support
Our organization is very alert to UIDS adoption opportunities to gain competitive advantages	0.928		
Our suppliers demand UIDS services offered to them	0.922		
Our organization responds quickly to other competitors action on UIDS adoption	0.911		
Many of our competitors are already having a UIDS for doing business	0.904		
Our customers demand UIDS services offered to them		0.845	
... stable internet access.		0.959	
... secure technologies to support the system.		0.935	
... technological structures to provide adequate protection of clients.		0.935	
The government is helping to lower the cost of using UIDS			0.889
The government has included educational assistance for stakeholders about a UIDS			0.873
The legal environment is conducive to conduct business on the internet			0.829
Variance (%)	38.983	25.973	20.682
Cumulative Variance (%)	38.983	64.956	85.638
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.83	
Approx. Chi-Square		991.329	
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
Rotation converged in 4 iterations			

Table 5. Correlation and descriptive results

Variables	Mean	Std.Dev	1	2	3	4	5	6
Government support (1)	3.503		1					
Competitive pressure (2)	3.284	0.261	.098	1				
Perceived trust (3)	3.185	0.547	.092	.450	1			
Environmental Factors(4)	3.344	0.361	.733**	.437**				
Intention to adopt(5)	3.484	0.437	.107	.432**	.253*	1		
Effort to adopt(6)	3.357	0.531	.364**	.366**	.459**	.272**	1	
Adoption of UIDS (7)	3.421	0.387	.310**	.495**	.457**	.751**	.839**	1

** . Correlation is significant at the 0.01 level (2-tailed). n=99 M.D.A.s

*. Correlation is significant at the 0.05 level (2-tailed).

UIDS among MDAs. The results further show that hypotheses 1, 2, and 3 supported, that government support has a stronger association followed by Competitive pressure and Perceived trust.

The motivation of this study was driven by the possibility of differences in the contribution of environmental factors in explaining the adoption of MDAs. To do this, first, we regressed environmental factors as a global variable with the control variables on UIDS. This is followed by a hierarchical regression where we determine the contribution of each element of environmental factors in explaining the adoption of UIDS.

Regression Results

Whereas environmental factors were earlier conceptualized as four (4) factor variables (government support, user readiness, competitive pressure, and perceived trust), the factor analysis retained only three factors (government support, competitive pressure, and perceived trust). The three factors were subjected to regression analysis. In **Table 6** we regressed the control variable (MDA age) on the adoption of UIDS. The results show that much as the variables explain 0.4% of the variance in the adoption of UIDS, their contribution effect is insignificant at 20.5%. Overall the model explains 19.2% of the variance in the adoption of UIDS. We also examined the variance inflation factor (VIFs) in our models to test for multicollinearity. The highest VIF was well below the threshold value of 10, as suggested by Field (2009), indicating that multicollinearity does not cause a problem to these

Table 6. Regression of Environmental factors (standardized coefficients)

	Model 1	Model 1	Tol	VIF
MDA age	-.063	.008	.976	1.025
Environmental Factors		.458**	.976	1.025
<i>Model summary</i>				
R ²	0.004	0.209		
Adj R ²	-0.007	0.192		
R ² change	.004	0.205		
F-stat	0.38	24.408		
Sig	0.539	.000		

** . Significant at the 0.01 level (2-tailed). Dependent variable = Adoption of UIDS, n=99 MDAs

regressions. However, the results do not tell us that a particular element of the environmental factors have a higher value.

DISCUSSION

This paper aimed to examine the analytical power of environmental factors on the adoption of a UIDS. The results reported in this paper suggest that the government is the largest significant predictor of MDA's adoption. This means that the will and support of the government, the competitive pressure from other agencies and the private sector, and the user trust in the system, usefulness, and benefits they associate with the use of the system among others accelerate adoption (Silas & De Wet, 2017). Government support was also largely mentioned in the qualitative with the 92% agreement. *The government has to give its stand on an innovation, luckily enough for us, this was an initiative by the head of state, and all the computer bills and data protection bills are in favor of the UIDS (MDAI4, male, 49, MDA implementer).*

Previous studies (Gerald et al., 2019; Susan & Norman, 2018; Kevin et al., 2017) are in agreement that government strategies such as shared database, big data, lowered costs and conducive business environment significantly influences the adoption decision. Hence government support has a positive impact on the adoption of UIDS.

This was followed by competitive pressure as another significant predictor of adoption of UIDS; this was in line with (Mark & Martin, 2020) asserts that the external arena of the organization such as opponents increases the likelihood of innovation adoption to gain a competitive advantage in a related business. Also when new technology such as UIDS is accessed, competitive pressure becomes perceptible (Yigitbasioglu, 2015). Therefore competitive pressure positively influences the successful adoption of a UIDS. Qualitative study findings also confirmed this with an 86% agreement. *Being part of the East African community necessitates us to keep updated with the rest of the countries development, transparent and dependable citizen identification is one of the main aims of this collaboration (MDAI9, male, 53, MDA implementer).*

Perceived trust was another significant predictor where trust is perceived as feelings of security when relying on an entity. Perceived trust entails privacy, safety, and security features which ensure confidence and trust to the employees and hence a high adoption rate (Ban, et al., 2019).). This was confirmed in the qualitative study findings by the MDA system user. *Otherwise, us taking on the service but our clients think otherwise can be a huge challenge that is why I think their attitude matters because this comes with the loss of information power, the customers must trust the process to embrace the service (MDAD2, male, 40, MDA Adoptee).*

However, the other dimension of user readiness was insignificant implying that it does not apply in the Ugandan context. Both previous studies and qualitative studies were not in agreement. Studies by (Yildirima & Ali-Eldina, 2018; Rasha & Othman, 2016; Mariam & Zoheir, 2015) argue that user readiness and involvement is critical in the adoption of an innovation and with a 74% agreement of the qualitative study respondent that user readiness is significant in influencing the intention and effort to adopt UIDS. *Resistance from the employees, especially the elderly whose one major concern is retirement and how to deal with the hustle after no salary rather than learning new systems and the hustle of cramming new passwords. (MDAN6, male, 42, M.D.A. Non-Adoptee).*

CONCLUSION, CONTRIBUTION, IMPLICATIONS, AND LIMITATIONS

This study examined environmental dimensions that explain the adoption of a UIDS. Review of literature identified four dimensions that are government support, perceived trust, user readiness, and competitive pressure. The results suggest that the contribution of environmental factors on effort and intention to adopt is better explained when the effect of individual elements are explored. Indeed, government support, competitive pressure, perceived trust, and user readiness contribute differently in

explaining the UIDS adoption in Ugandan MDAs, specifically government support being a significant driver for the effort to adopt UIDS. Whereas environmental factors were earlier conceptualized as a four (4) factor variable (government support, consumer readiness, competitive pressure, and perceived trust), and when these dimensions were regressed, the factor analysis retained only three factors government support, competitive pressure, and perceived trust, dropping user readiness. Also, the study recommends that for the adoption rate to improve, governments should practice user involvement while designing the UIDS requirements rather than imposing it on the citizens.

Theoretical Contribution

Many studies both in the developed and developing world have been carried out on Identification systems adoption (Sune & Sofie, 2015; Yildirima & Ali-Eldina, 2018; Yildiz, 2017; Kaabachi & Obeid, 2016) which shows that it is a very pressing issue. Most scholars have used TOE and DOI to study cloud computing, computerized accounting systems, supply chain, radiofrequency adoption, web services, and electronic data interchange among others (Kuan & Chau, 2001; Ali & Miller, 2017), None of the reviewed studies have used these theories to investigate UIDS adoption. Also, IS adoption studies have emphasized technological, social, economic, and political factors, ignoring the environmental factors (William & Steven, 2010). We incorporated DCT to understand the influence of environmental factors on UIDS adoption from a developing country's perspective. The inclusion of DCT and the use of a multi-theoretical approach provides the study with a comprehensive understanding of UIDS adoption. In other words, the past UIDS adoption studies ignored the fact that the dynamic capabilities of an organization can be affected by the external changes in the environment (Wasfi, 2015). In the same vein, studies closely related to the UIDS like the adhaar of India and Mykad of Malaysia have a different economic, social, institutional, technological, and environmental situation from Uganda thus a universal approach is less likely to be useful in all settings and also important to note these studies were not focusing on MDAs.

Research Implications

Overall, this study has a number of implications. From an academic point of view, we explore the role played by the four elements of environmental factors in explaining UIDS adoption in MDAs and methodologically isolate the contribution played by each element. The results imply that government support, the rivalry from the external environment, and the trust in the system enhances the intention and effort to adopt UIDS in MDAs.

Policymakers should, therefore, focus on government support as it is a symbol of leadership in IS innovation. Also, there is a need to build trust in the users of the system to be in a position to align the philosophy of government service and UIDS management in Uganda and other developing countries at large to improve service delivery.

RESEARCH LIMITATIONS AND FUTURE WORK

Despite the contributions and implications, this study is limited in the following ways. First, this study was limited to MDAs in Uganda, and the results may only be generalized to MDAs in developing countries. Testing the model in other economies may strengthen the empirical evidence provided. Second, the use of hierarchical regression is susceptible to problems associated with sampling error. These limitations, however, can be mitigated by our interaction with the data. Lastly, given that a cross-sectional survey method was employed, changes over time cannot be assessed, and estimates of how quickly study measures might respond to any changes cannot be provided. This is likely because organizations change, as well as systems and circumstances surrounding them.

Future studies might benefit from the use of longitudinal data for the adoption of UIDS in developing countries. Review of the literature also points to the need for a guiding framework for developing countries, therefore designing a framework that can enhance UIDS adoption is another area that researchers should tap into.

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