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The influence of public service experience on adopting digital government innovations in Ethiopia

Debas Senshaw^{1,2}[0000-0002-1372-9584] and Hossana Twinomurinzi^{1,3}[0000-0002-9811-3358]

¹ Sudan University of Science and Technology, Khartoum, Sudan

²Bahir Dar Institute of Technology, University of Bahir Dar, Ethiopia
debassenshaw@gmail.com

³Department of Applied Information Systems, University of Johannesburg, South Africa
twinoh@gmail.com

Abstract. This research explored the moderating effect of public service experience on the adoption of digital government innovations in Ethiopia. The results from the structural equation modeling (SEM) reveal that public service experience positively moderates the relationship between effort expectancy and behavioral intention to adopt digital government innovations. Unlike previous studies which found that experience positively moderates the relationship between effort expectancy and behavioral intention of less experienced ICT users, this study finds that the longer the time spent in the public service, the higher the perception of government employees regarding the ease of use (effort expectancy) of the digital innovation. The findings might be attributable to the lack of training for government staff. The paper makes recommendations for IS research, government policy and practice in similar low-income countries.

Keywords: Digital Government; Digital Innovation; WoredaNet; UTAUT.

1 Introduction

Governments have been using information and communication technology (ICTs) to provide services to their citizen effectively and efficiently [1, 2]. Governments implement digital government to enhance the quality of services as well as to save time and resources needed to provide services. Digital government significantly improves the conveniences and availability of services to citizens to fulfill their demands [3, 4]. Governments also aim to implement digital government to improve the quality of government services and facilitate political processes [4, 5].

However, most governments in low-income countries fail to implement digital government though they invest a significant amount of capital [6, 7]. Previous studies suggest that one of the factors for the failures are low acceptance and use of digital innovations [8, 9]. Most digital government innovations such as government web-based applications are developed by the ICT staff without including the active participation of government employees who would indicate their needs and perceptions towards the digital innovation [9]. Consequently, this results in low user acceptance of digital government services.

In many low-income countries, digital government has not been designed based on the local context but has mainly been adopted from elsewhere [10]. Digital innovations in low-income countries that are based on the local context such as m-pesa [11, 12] have been shown to enjoy rapid adoption compared to innovations that have been adopted from other contexts.

The use of local digital government innovations that can provide accurate, useful, and context-based information for government employees is important especially during difficult times such as the current COVID-19, considering access is now required when working from home [13].

This study focused on evaluating the influence of public service experience (time spent working in government) on adopting locally designed digital government innovations. In this research, government service experience is hypothesized to have a moderating influence as seen in other studies [14, 15] which have shown that prior experience significantly influences the acceptance and usage of digital innovations [15–17].

Experience is different to age in that older users of ICT have been shown to have lower computer self-efficacy as they are driven by ease of use of ICTs as opposed to younger users. The opposite is true in the case of experience. Experienced users of ICT have higher computer self-efficacy as compared to the inexperienced ones [14, 18].

This study assesses the influence of experience on the adoption of a digital government innovation that identifies opportunities for public service innovation within the local context in Ethiopia [19]. Specifically, the study investigated the moderating influence of experience in the public service on the adoption of the digital government innovation using the Unified Theory of Acceptance and Use of Technology (UTAUT) [20, 21].

The remainder of the paper is organized as follows: The next section gives the theoretical background of digital government and digital government innovation. It is followed by the Unified Theory of Acceptance and Use of Technology (UTAUT). The research design is followed by the results and analysis section. Then, discussion of findings is presented. Finally, the paper draws conclusions and identifies limitations and future research.

2 Theoretical Background

2.1 Digital Government

Digital government has, in some contexts, been defined as a digital platform that aims to achieve improved governance in government [22]. Digital government is also defined as the use of ICTs that can transform government initiatives and services by enhancing their quality [23]. Digital government plays a significant role in achieving better efficiency of government by changing citizens' behavior [4, 23]. However, the advantage of digital government can only be achieved if the technologies are accepted by the users [9]. The next section describes a digital government platform in Ethiopia and a digital innovation targeted at the digital platform.

2.2 Overview of the Adaptive Capability Digital Innovation

The WoredaNet is a digital government platform using fiber and satellite infrastructure across Ethiopia that was implemented by the government of Ethiopia with the intention to provide government services to the lowest administrative regions (Woredas). The name WoredaNet comes from "Woreda" which is Amharic for an administrative region with a population of about 100,000. It has the equivalent meaning of a district.

The WoredaNet provides various digital government services to Woredas. Among the services provided are video-conferencing, internet, electronic messaging, and voice over IP between federal, regional, and Woreda sites.

There are 1,050 Woredas in Ethiopia, 976 of which (93%) have access to the WoredaNet. Despite the access, only a few Woredas actively use the WoredaNet [24]. Considering this, a digital government adaptive capability web-based app was created based on the findings of the adaptive capabilities of Woredas that innovatively use the WoredaNet. Adaptive capabilities are capabilities that seek to introduce a new service or a new way of performing a service [25, 26]. A case study with a qualitative-interpretive approach was adopted to identify the adaptive capabilities of three *innovative* Woredas. Elaborated Action Design Research (EADR)[27] was followed to create the digital government web-based app (Fig. 1).

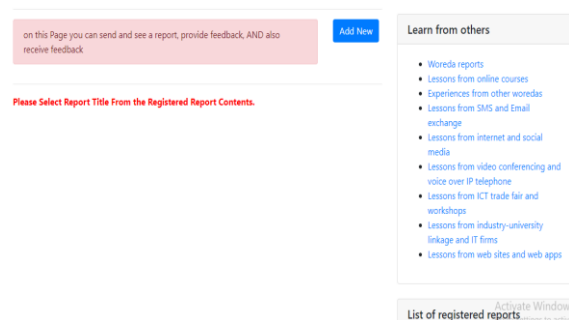


Fig.1.Digital government adaptive capability web-based app

2.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) [15] examines the intention of users to adopt and use information systems [20, 21]. UTAUT integrates the key features of previous adoption models. UTAUT was preferred to the newer UTAUT2 as it explicates the achievement of learning tasks in the work place [28]. UTAUT has four important constructs; performance expectancy (PE), effort expectancy (EE), social influence (SI), and Facilitating conditions (FC); that are determinants of the behavioral intention (BI) and usage [15, 29]. Moreover, UTAUT also uses four variables (experience, gender, age, and voluntariness of use) as moderators.

The UTAUT model was adopted in this study to explain the moderating effect of public service experience on the acceptance and adoption of the web-based app.

Performance expectancy (PE). Performance expectancy refers to the extent to which a user believes that using ICT enhances the job performance [30]. It plays a significant role in validating intention to use [31]. When users expect that the ICT improves their job performance, they tend to accept the technology [32–34]. Moreover, experience affects the influence of performance expectancy on the intention to use ICTs [9]. Therefore, the following hypothesis is tested:

H1: Performance expectancy positively influences behavioral intentions of government employees to use the app, moderated by experience.

Effort Expectancy (EE). Effort expectancy refers to the extent of ease related to the use of ICTs [15, 35, 36]. The amount of effort the user puts in affects the behavioral intention of users to accept or adopt ICTs. Moreover, experience affects the influence of effort expectancy on the intention to use ICTs [15]. Therefore, the following hypothesis was tested:

H2: Effort expectancy positively influences the behavioral intentions of government employees to use the app, moderated by experience.

Social Influence (SI). Social influence refers to the extent to which an individual thinks the boss or colleagues believe he or she should use the new ICT [15]. Social communication affects users' intention to use ICTs [37]. Moreover, experience influences the effect of social influence on behavioral intentions to use ICTs [15, 17]. Therefore, the following hypothesis was tested:

H3: Social influence positively influences the behavioral intentions of government employees to use the app, moderated by experience.

Facilitating Conditions (FC). Facilitating conditions refer to the availability of resources to use the ICT [15]. Unpredictable support of resources results in lower use behavior, whereas predictable support of resources positively influences use behavior [30]. Moreover, experience influences the effect of facilitating conditions on use behavior [15]. Therefore, the following hypothesis is tested:

H4: Facilitating condition positively influences government employee's use behavior of the app, moderated by experience.

3 Research Design

3.1 Data Collection and Evaluation

Non-probability sampling was used to select ten Woredas that have access to the WoredaNet. The Amhara Regional State Science, Technology, and Information

Communication Commission (STICC) supported the principal researcher in distributing the questionnaire online and assigning the WoredaNet exerts in each Woreda to facilitate the evaluation of the app. The process owners (those who manage similar tasks or processes in the public agency) and experts, Woreda administrators/representatives in the Woredas participated.

The questionnaire consisted of a 5-point Likert-scale from strongly disagree to strongly agree and demographic questions. Following the suggestions by Owoseni and Twinomurinzi [38], the twenty items were modified from previous literature to ascertain scale validity. From a survey of 400 questionnaires administered, only 270 complete responses were obtained in 25 days between Dec. 3 to 27,2019.

SPSS 26 and AMOS 26 were used to capture and process the data [38–40]. The normality of the data was checked for compliance with the assumption of the general linear regression model. The skewness and kurtosis of the constructs (for each item) were identified. Most of the items were within the acceptable range of -2 and $+2$ [41, 42], except for a few items where kurtosis was greater than 2.0. The results showed acceptable skewness and kurtosis values.

There were fewer women than men. This might be attributed to the unequal representation of women in Ethiopia's education, training, and employment sectors despite the recent significant actions [43]. Table 1 presents demographics.

Table 1. Respondents' demographic data

	Variable	Frequency	Percent
Gender	Male	185	68.5
	Female	85	31.5
Experience	5years and below	29	10.7
	6-10	123	45.6
	11-15	101	37.4
	16-20	17	6.3
Age	30 and below	43	16
	31-35	121	44.8
	36-40	86	31.9
	41 and above	20	7.3
Education	Diploma	35	13

Bachelor	186	68.9
Masters	49	18.1

4 Result and Analysis

4.1 Measurement Model

Confirmatory Factor Analysis (CFA) was used to evaluate the data, while covariance-based SEM was implemented to create the model and test the hypotheses [38]. Covariance-based SEM is fitting for model measurement, where the latent variables could drive meaning from the measured variables [39, 40].

The CFA model examines the influence of constructs on the responses. CFA verifies the arrangement of constructs that are considered. The model was also accessed for its reliability and validity. The final refined model ($\chi^2=234.850$, $df=154$, $p\text{-value}=0.000$), had acceptable fit indices: $\chi^2/df=1.530$, $GFI=0.920$, $TLI=0.956$, $CFI=0.964$, $NFI=0.904$, $RMSEA=0.044$.

The acceptable reliability and validity measurements revealed that items shown in the model were supposed to be relevant. Due to the acceptable results by CFA, it enabled to build the structural model.

4.2 Structural Model

Maximum likelihood estimates, using AMOS26 were applied to measure the structural model. As a result, acceptable fit indices ($\chi^2/df=1.848$, $GFI=0.902$, $TLI=0.928$, $CFI=0.940$, $NFI=0.880$, $RMSEA=0.056$) were displayed. Results of regression weights as indicated in the structural model are represented in Table 2. The structural model with a chi-square (χ^2) value of 293.786, df value of 159, and $p\text{-value}$ of 0.000 was displayed. This revealed that the model fitted the data adequately. As a result, it is possible to conclude the research hypotheses using the structural model (shown in Fig.2). The numbers following the UTAUT constructs in the SEM signifies the items in the construct.

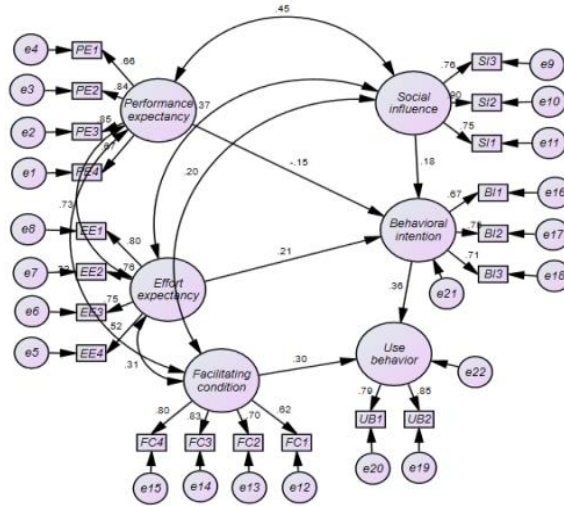


Fig.2.The structural model results

Performance expectancy ($\beta=-0.151$, $p\text{-value}>0.05$) and effort expectancy ($\beta=0.213$, $p\text{-value}>0.05$) do not influence the behavioral intention of government employees to use and accept the new government digital innovation. This may be attributed to 89.6% of the respondents with more than 5 years of experience using the government digital platform the WoredaNet as a tool. This helped them to adjust their perception to use new ICTs based on the accumulated knowledge [16, 18, 37, 44–47].

Table 2.Regression Weights (Groupnumber1-Default model)

Independent variable	Relation	Dependent variable	Estimate (β -values)	P-value	Hypothesis conclusion
Performance expectancy	→	Behavioral intention	-0.151	0.256	Rejected
Social influence	→	Behavioral intention	0.184	0.033	Accepted
Effort expectancy	→	Behavioral intention	0.213	0.105	Rejected
Behavioral intention	→	Use behavior	0.360	0.000	Accepted
Facilitating condition	→	Use behavior	0.301	0.000	Accepted

On the other hand, social influence has a positive impact on the intention to use the app ($\beta=0.184$, $p\text{-value}<0.05$). This means that when employees are encouraged by their leaders or colleagues, they will more likely use the app. Moreover, the behavioral intention ($\beta=0.360$, $p\text{-value}<0.05$) indicates a significant positive impact on the use behavior of government employees. This demonstrates that when employees have a greater intention of using the app, they will use it more frequently. Facilitating conditions ($\beta=0.301$, $p\text{-value}<0.05$) demonstrate the importance of accompanying resources

to use the app. In other words, when government employees are supported with the appropriate resources to use the app, they will frequently use it.

4.3 Moderating Effect

To assess the effect of public service experience on the key constructs, a bootstrap technique with 200 iterations was run to ensure stability[48]. The results (Table 3) revealed not all hypotheses are supported. The relationship between effort expectancy and behavioral intention ($\beta=0.310$, $p\text{-value}=0.042$) was positively moderated by public service experience with $t\text{-value}=2.031$. In other words, a positive beta value suggests a positive moderating influence.

Table 3. Moderator analysis results

Hypothesis	Relationship	Std. Beta	t-value	p-value	Decision
H1	PE x Experience→BI	-0.117	-0.858	0.391	Rejected
H2	EE x Experience→BI	0.310	2.031*	0.042	Accepted
H3	SI x Experience→BI	-0.030	-0.323	0.747	Rejected
H4	FC x Experience→UB	0.102	1.354	0.176	Rejected

Notes: *: Significance at 0.05 levels

On the other hand, all other hypotheses except H2 are rejected indicating public service experience does not affect the relationship between performance expectancy and behavioral intention, social influence and behavioral intention, and facilitating condition and use behavior.

5 Discussion of Findings

These results are partially consistent with the UTAUT model in that experience has a positive impact on the relationship between effort expectancy and the intention to use and adopt digital government innovations; and that experience does not have a moderating effect on the relationship between performance expectancy and intention behavior [15, 16].

Although works [15, 16, 18, 37] indicate that experience significantly moderates the relationship between effort expectancy and intention to use behavior, particularly in the case of lower experienced users, the study shows a different outcome. 89.6% of the respondents (government employees) have more than 5 years of public service experience using the digital government platform, WoredaNet, as a tool to provide government services. The results nonetheless indicate that experience still significantly influences the relationship between effort expectancy and intention behavior ($\beta=0.310$, $p\text{-value}<0.05$) of government employees to accept and use the new government digital innovation. In other words, the greater the service experience, the higher the perception of employees regarding the ease of use to use the new government digital innovations.

One of the reasons attributed to these results, as indicated in the response of the evaluation, was government employees are rarely provided with a start-up training program that facilitates usage (effort expectancy) of new government digital innovations. For example, WoredaNet experts were assigned by the STICC to merely facilitate the evaluation response rate and assist evaluators when they needed help during evaluation. This implies that government organizations should set up a start-up training program on how to use a new digital government innovation in order to enhance the perception of ease of use (effort expectancy) of employees to accept and use a new government digital innovation. Previous research indicated that setting up a start-up appropriate training and adequate support to the users of ICT considerably influences the ease of use (effort expectancy) of ICTs [16, 18, 37, 44–47].

On the other hand, the research showed that public service experience does not have a moderating effect on the relationship between performance expectancy and behavioral intention ($\beta=-0.117$, $p\text{-value}>0.05$), nor does it have a moderating effect between social influence and behavioral intention ($\beta=-0.030$, $p\text{-value}>0.05$). It also does not have a moderating effect on the relationship between facilitating condition and use behavior ($\beta=0.102$, $p\text{-value}>0.05$) of government employees.

As indicated above respondents have enough experience in using the government digital platform, WoredaNet as a tool. This means that the usefulness of the new digital government innovation is not a significant issue as their previous experience helps them improve the perception to use the new digital innovation [16, 18].

Similarly, these experienced government employees may not be significantly influenced by their social relations to use the new government digital innovation as they have enough experience in using the government digital platform, the WoredaNet [15, 16, 18, 49].

Moreover, these employees may not also be significantly influenced by facilitating conditions such as organizational support to use the new digital government innovation since they have long experience in using the WoredaNet digital platform [37, 49, 50].

6 Conclusion

The study aimed to explore the moderating effect of public service experience on the acceptance and adoption of a new digital government innovation, in the form of a web-based app. UTAUT model was adopted in this research. Moreover, structural equation modeling (SEM) was used to examine the moderating effect of public service experience on acceptance and adoption of the government digital innovation. The research revealed that public service experience only has a positive moderating effect on the relationship between effort expectancy and the behavioral intention ($\beta=0.310$, $p\text{-value}<0.05$) of government employees to accept and use digital innovation.

Although the respondents were experienced in using the WoredaNet digital platform as a tool to provide government services, it still has a positive impact on the perception of ease of use of the new digital government innovation. This implies that having public service experience alone is not sufficient to enhance the perception of

ease of use (effort expectancy) of new digital government innovation. Therefore, government organizations should design appropriate start-up training strategies before they implement any new digital innovation.

6.1 Limitation and Feature Research

The research was limited to using only public service experience as a moderating factor. Future studies should also consider other moderating factors such as age and gender (which was imbalanced) to examine their effects on the relationship between the independent and dependent variables of the UTAUT model.

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