

Civil Servant's E-Government Adoption Levels: Are age and context matters?

Iman Sudirman

Department of Industrial
Engineering
Institut Teknologi Bandung
Bandung, Indonesia
iman_s@mail.ti.itb.ac.id

Atya Nur Aisha*

Department of Industrial
Engineering and Management
Institut Teknologi Bandung
Bandung, Indonesia
atyanuraisha@gmail.com

Joe Monang

Department of Industrial
Engineering and Management
Institut Teknologi Bandung
Bandung, Indonesia
joemonang@gmail.com

Ilham Reza Prasetyo

Department of Industrial
Engineering
Institut Teknologi Bandung
Bandung, Indonesia
ilhamrezaprasetyo@gmail.com

Abstract – This study examines the differences of e-government adoption by civil servants among age groups and between mandatory and voluntary context using UTAUT model. It used a non-probability sampling technique and an online survey to collect the data. A one-way ANOVA using SPSS was conducted to analyze the data. The study finds that most employees have the highest positive adoption levels in effort expectancy. Furthermore, there are significant mean differences between employee's age group of performance expectancy for mandatory system and facilitating conditions for voluntary system. However, there is no statistically different on civil servant's adoption level between mandatory and voluntary context.

Keywords: e-government, employee adoption, age, context, UTAUT

I. INTRODUCTION

The implementation of information and communication technology (ICT) in public sector has changed the way of government interacts with their citizens, business, and employees. Over the last decades, ICT has shifted traditional government services into digital ones in many countries and has been utilized not only in numerous public transaction processes, such as e-service delivery and e-procurement, but also in various civil service management systems, for example e-office. These transformations have resulted in a new form of government called electronic government (e-government) [1].

Like other countries, Indonesia has also adopted the concept of e-government to create good governance and increase the quality of public service delivery. It was introduced under Presidential Directive No. 6/2001 on Telematics and provided a legal basis for the Ministry of Communication and Information to manage the execution of e-government throughout the country [2]. Subsequently, the government issued Presidential Directive No. 3/2002 on National Policy and Strategy of E-Government which instructed ministers, governors and mayors to develop e-government in their respective institutions. Recently, the government has also introduced Presidential Decree No. 95/2018 on E-Government which provided general policy and guidance for national, regional and local governments to implement e-government.

According to [3], the implementation of e-government in Indonesia is lagging behind when compared to other ASEAN

countries. Figure 1 shows that Indonesia's E-Government Development Index (EGDI) and Participation Index (EGPI) are 0.5258 and 0.6180 respectively in 2018. These scores put Indonesia in the rank of 107 of 193 countries in EGDI and the rank 92 of 193 countries in EGPI. Therefore, there is an urgency to figure out the best way to improve e-government implementation in Indonesia. This issue is important because, as pointed out by [4], the challenge of implementing e-government in developing countries is mostly due to the following factors: insufficient high-quality human resource availability, lagging technological infrastructure, low innovative capacity, lack of wealth, unheeded rule of law and opaque transparency levels.

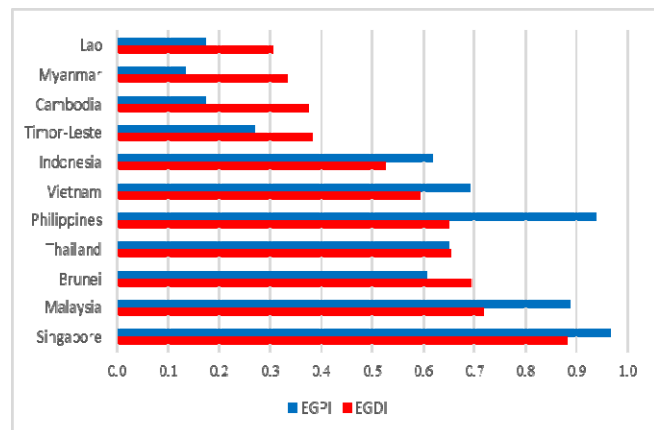


Fig. 1. E-Government Development Index among ASEAN Countries

Although the implementation of e-government offers several benefits, such as better services delivery, reduced cost, increased accountability, greater information access and improved internal management and control [5], not all e-government implementation is successfully accomplished. Most e-government implementation have failed either partially or totally [6]. Many factors affect the success of e-government implementation. According to [7], one of major factors for successful implementation of e-government is related to government employees' adoption of the system. The government employees may encounter such serious barriers when adopting e-government as security issues and technological concerns, and thus hindering their adoption of the system. Unless they have positive reactions and intent to use e-government, the successful implementation of e-

government may not be realized. Therefore, the study of e-government adoption from employee perspectives is crucial.

Based on [8]'s study, there are numerous studies regarding the adoption of e-government from employee perspective. However, those studies have rarely used the Unified Theory of Acceptance and Use of Technology (UTAUT). Most of them applied the Technology Acceptance Model (TAM) and Diffusion of Innovation/Innovation Diffusion Theory (DOI/IDT) in their studies. This study intends to fill this gap. This paper tries to investigate civil servant adoption of e-government in Indonesia using the UTAUT model. It will examine the differences of e-government adoption by employees among age groups and between mandatory and voluntary context because some researches have indicated the importance of these factors in explaining technology adoption [8], [9] and [10]. Research questions in this study are: (1) What are civil servant's adoption levels towards e-government? (2) Is there a significant difference in the adoption level of civil servant towards e-government related to age and context?

II. LITERATURE REVIEW

A. E-Government

There are several definitions of e-government circulating in the literature. E-government can be defined, in particular, as the use of web-based internet application by governments in order to improve its information and service access and delivery to such various stakeholders as citizens, business partners, employees, other agencies and government bodies [11]. According to [12] e-government refers to the utilization of ICT to enhance the services and operations to multiple users, for example citizens, companies and other governmental entities. Another definition of e-government can be found in the work of [13] who defines e-government as the government's use of ICT to make better public service delivery and access and to increase accountability and transparency of government.

In general, e-government points out the importance of technology and its ability to transform and enhance public administration processes [14]. It has become a crucial element of managerial reform and may be dominant in future governance [15] as the potential benefits of e-government are numerous including increased efficiency of administration process, reduced cost for data acquisition and distribution, and more effective business operation [16].

B. Unified Theory of Acceptance Use of Technology

The most comprehensive model developed to study user acceptance and the use of information technology is the UTAUT [17]. UTAUT is developed to assess the likelihood of success for new technology introduction and to help develop intervention such as training and marketing targeted at population of users as to make them more inclined to use the technology. UTAUT is considered comprehensive because it is based on 8 prominent behavioral theoretical model, that are TAM, Combined TAM and TPB, the Social Cognitive Theory, Model of PC Utilization, Motivational Model, DOI, Theory of Planned Behavior, and the Theory of Reasoned Action.

UTAUT has identified four predictive determinants of behavioral intention to adopt technology: social influence,

effort expectancy, facilitating conditions, and performance expectancy [18]. They have also proposed four moderators: gender, age, experience, and voluntariness of use. In short, performance expectancy is the perception of individuals that using the technology will help them in accomplishing their jobs. Effort expectancy is individuals' perception of the easiness in applying the technology. Social influence is a person's perception that important people believe that he or she should use the technology. Facilitating conditions is a person's perception that some resources and facilitations are provided by organizations to help him or her when using the technology.

As shown in Table 1, several recent studies related to e-government acceptance from employee perspective using the UTAUT model can be found in the literature. Those studies have been conducted in various countries and used different methods.

TABLE I. SUMMARY OF RECENT E-GOVERNMENT STUDIES USING UTAUT

<i>Author</i>	<i>Country Focus</i>	<i>Description</i>
[19]	Nigeria	the technology used was not clearly stated; employing two-way ANOVA.
[20]	Slovenia	the technology used was e-recovery information system; employing structural equation model.
[21]	Oman	the technology used was not clearly stated; employing multilinear regression.
[22]	Taiwan	the technology used was e-government learning; employing structural equation model.
[23]	Botswana	the technology used was document workflow management system; employing multivariate analysis

[19] used UTAUT in the context of public servant readiness to adopt e-government. Anxiety and attitude towards behavior were included as constructs of behavior intention, both of which were proven to be insignificant in [18]. It was argued that, although insignificant, these 2 constructs were actually considered as indirect determinants in [18]. In this study, it was discovered that these 2 constructs, along with the other 4 constructs of UTAUT were significant determinants for behavioral intention.

[20]'s study was intended to measure the effect of moderating factors on public servants' intention to use an e-recovery government system regarding tax which was a mandatory environment. Personal value was introduced as an additional construct to account for intrinsic motivator which was considered important in a mandatory environment. Although theoretically sound, adding personal value was proven to be unsuccessful in improving explanatory power of UTAUT. Hence, this construct was removed from the final model.

[21] used UTAUT to understand the e-government acceptance from the employee perspective. This study only used 2 constructs, social influence and facilitating condition, from the original UTAUT. It was argued that e-government implementation in Oman, in which this study was based, was still at an initial stage, resulting in a minimal benefit for performance and effort as the reason of omitting 2 other

constructs. Both of the constructs were found to be significant determinants of behavioral intention.

The focus of [22]'s study was to investigate public servants' intention to use government e-learning program. E-learning is a non-mandatory program. To accommodate this context, policy factor and barrier factor were introduced as additional determinants of behavioral intention. Policy factor was meant to represent the incentive policy of using e-learning while barrier factor was meant to represent the resistance circumstances that affected intention to use e-learning. In this study, these 2 additional constructs proven to be significant in affecting behavioral intention. Moreover, it was also discovered, surprisingly, that only performance expectancy from the original UTAUT factors that was significantly affecting behavioral intention.

Using UTAUT, [23] tried to understand factors influencing an e-government document system adoption by public servants. A modification to UTAUT was regarding the moderating factors, by removing experience and voluntariness of use. Experience was removed because this factor was considered to be only relevant in a longitudinal study, while this study is a cross-section one. Voluntariness of use was removed because the e-government system is mandatory. The result of this study confirmed that all of the constructs were significant determinants of behavioral intention, but with a less explanatory power than it was suggested in [18].

III. METHODS

This study was conducted in the government of West Java province. It is one of the highest numbers of civil servants. In addition, West Java Province is the most populous region in Indonesia. To collect the data, we used an online survey. The items used to examine employee adoption of e-government were adapted from [18]. We used all four items in their study for social influence, effort expectancy, facilitating conditions, performance expectancy, and all three items for behavioral intention. These items were first translated to Bahasa. Then, pretesting of the measures was carried out to 6 government employees in order to make their wording as clear as possible. Based on pretesting results, several slightly adjustment was applied.

This study employed a non-random sampling technique. The sample size was determined by utilizing Slovin's formula. Using a 90% confidence coefficient, the total sample required was 100. Two sets of questionnaires (for mandatory and voluntary systems) were conveniently distributed to the respondents. The mandatory system referred to SKP Online (a web-based performance management system), while the voluntary systems referred to official websites of government agencies. In order to avoid central tendency in responding the questions, the respondents provided their answer on a 6-point Likert scale ranging from strongly disagree to strongly agree.

A one-way ANOVA using SPSS was conducted to test whether determinant factors were different among age groups and between mandatory and voluntary systems. Prior running ANOVA test, we checked the validity and reliability of the questionnaires using Pearson correlation coefficient and Cronbach's alpha respectively. We chose 0.7 as minimum value of these coefficients [24]. Thus, items that

have values of validity and reliability coefficients less than 0.7 will be omitted.

IV. RESULTS AND DISCUSSIONS

Among 100 valid respondent's data, the majority of the respondent was woman (62%), and the rest was male (38%). Based on the position, respondent from managerial level (lower-, middle-, and upper manager) was only 20%. Most participants were between 36 to 50 years old (61%). The demographic characteristic of the respondents can be seen in Table 2.

TABLE II. DESCRIPTIVE STATISTICS OF RESPONDENT DEMOGRAPHIC INFORMATION

		Frequency	Percentage
Gender	Male	38	38%
	Female	62	62%
Age	≤ 35	14	14%
	36 - 50	61	61%
	≥ 51	25	25%
Position	Manager	20	20%
	Staff	80	80%

The data was first examined to verify the construct validity and reliability of the mandatory instrument and voluntary instrument. Construct validity was measured by Pearson coefficient correlations (r value) between the individual item and the construct. Result for the mandatory instrument suggested that one item should be deleted (FC4), because the coefficient correlation was low (r value = 0.462). Meanwhile other items in mandatory instrument and voluntary instrument were acceptable, because the coefficient correlation was high (r value > 0.7).

Reliability test showed that the items in the questionnaire were reliable with a Cronbach's alpha is greater than 0.7 as suggested by [24]. The Cronbach's alpha value for mandatory instrument was 0.92 and for voluntary instrument was 0.934. The internal consistencies of the five dimensions were varied, shown in Table 3.

TABLE III. THE RELIABILITY OF DIMENSIONS OF CIVIL SERVANT' ADOPTION LEVEL TOWARDS E-GOVERNMENT

Dimensions	Mandatory		Voluntary	
	Items	Cronbach Alpha	Items	Cronbach Alpha
Performance Expectancy	4	0.827	4	0.909
Effort Expectancy	4	0.852	4	0.878
Social Influence	4	0.811	4	0.901
Facilitating Condition	3	0.707	4	0.737
Behavioral Intention	3	0.853	3	0.765
Overall reliability	18	0.92	19	0.934

In this study, the adoption level toward e-government was measured for two types of e-government system, namely mandatory and voluntary. Mandatory system referred to the implementation of the application that should be used by all government employees in West Java Province for a certain purpose, in this case was SKP Online (a web-based performance management system). Meanwhile the voluntary system was an application that could be used

voluntarily by the employee for supporting their job. In this case, we used official websites of government agencies.

A. Mandatory System

According to Table 4, the behavioral intention (BI) for mandatory system among government employee was relatively high (4.8167). There was no significant difference within the age group of employees. It means that most government's employee would intend to use the mandatory system.

Furthermore the perception of performance expectancy levels of government employees towards mandatory system was relatively high (4.5125). Among the age group of government employees there was significant mean differences in performance expectancy (PE). The oldest group had the highest positive perception ($F=2.708$, $p=0.072$, $p<0.1$). They thought that using mandatory system will help them in accomplishing their jobs. One possible explanation for this finding was that the oldest group had experience related to the transition of traditional performance assessment processes using paper-based to computerized-based. This technology transformation made the assessment process more efficient rather than traditional process. This result was similar to findings in [19] that showed the positive significant association between performance expectancy and age for e-government readiness in public servant.

TABLE IV. AGE AND ACCEPTANCE OF EMPLOYEES TOWARD MANDATORY E-GOVERNMENT

		N	Mean	Std. Deviation	F	Sig.
PE	< 35	14	4.4107	0.80627	2.708	0.072*
	36 – 50	61	4.4057	0.83562		
	> 55	25	4.83	0.64031		
EE	< 35	14	5.0357	0.29183	0.921	0.401
	36 – 50	61	4.877	0.55269		
	> 55	25	5.03	0.66661		
SI	< 35	14	4.4107	0.77588	0.741	0.479
	36 – 50	61	4.3975	0.85315		
	> 55	25	4.63	0.75042		
FC	< 35	14	4.7381	0.45627	0.633	0.533
	36 – 50	61	4.694	0.66191		
	> 55	25	4.8667	0.69389		
BI	< 35	14	4.7381	0.58731	1.386	0.255
	36 – 50	61	4.765	0.65077		
	> 55	25	4.9867	0.41366		

*significant at $p < 0.1$

The perception of effort expectancy (EE) of government employees towards the mandatory system was the highest (4.9375) compared to other dimensions as shown in Table 4. In term of age differences, there was no significant difference between age group. It means that most government employees agreed that existing mandatory system was easy to use.

The perception of social influence (SI) of government employees towards the mandatory system was also relatively high (4.4575). But, there was no statistically difference based on age groups. It indicated that most government employees perceived that the mandatory system was used because the influence of their important people.

Meanwhile, the facilitating conditions (FC) in mandatory system was perceived high (4.7433) by most of government employees. There was no significant difference among age group for this dimension. It showed that the organizations have already provided supports to help the employee to use the technology.

In some, the results indicated that most employees had a high adoption levels in mandatory system. Furthermore, there was a significant mean differences among age groups of performance expectancy in mandatory context.

B. Voluntary System

According to Table 5, the behavioral intention (BI) for voluntary system among government employee was relatively high (4.4825). There was no significant difference within the age group of employee. It means that most employee government would intend to use the voluntary system.

The government employee's perception on performance expectancy in voluntary system was the highest compared to other dimensions (4.8375). Related to age differences among government employees, there was no significant difference. It means that most government employees thought that using the voluntary system would help them in accomplishing their jobs.

The perception of effort expectancy (EE) of government employee towards the voluntary system was high (4.8375). In term of age differences, there was no significant difference between age group. It means that most government employee perceived that the voluntary system was easy to use.

The perception of social influence (SI) of government employee towards the voluntary system was relatively high (4.51). But, no statistically difference was found based on age groups. It indicated that most government employees perceived that the voluntary system was used because the influence of their important people.

The perception of facilitating conditions (FC) in voluntary system was high (4.7225). Table 5 showed a significant difference in terms of facilitating conditions (FC) among age groups ($F=2.399$, $p=0.096$, $p<0.1$). The oldest group had the highest positive perceptions because there was a good facilitating conditions.

According to [25] the facilitating condition is an important aspect for technology adoption in older populations. The different perceptions towards facilitating conditions between young and old group happen due to the different needs in using technology. Younger employees tend to be familiar with technology, so they do not need facilitation or assistance in adapting new technologies related to e-government. While for older employees, it requires adequate assistance in adapting a new technology related to e-government.

In some, the results indicated that most employees had a high adoption levels in voluntary system. Furthermore, there was a significant mean differences among age groups of facilitating conditions in voluntary context.

TABLE V. AGE AND ACCEPTANCE OF EMPLOYEES TOWARD VOLUNTARY E-GOVERNMENT

		N	Mean	Std. Deviation	F	Sig.
PE	< 35	14	4.3036	1.16098	1.386	0.255
	36 – 50	61	4.418	0.99239		
	> 55	25	4.74	0.49728		
EE	< 35	14	4.8393	0.44514	0.778	0.462
	36 – 50	61	4.791	0.59193		
	> 55	25	4.95	0.42696		
SI	< 35	14	4.2679	1.15802	1.694	0.189
	36 – 50	61	4.459	0.94006		
	> 55	25	4.77	0.49958		
FC	< 35	14	4.5179	0.9118	2.399	0.096*
	36 – 50	61	4.6926	0.5192		
	> 55	25	4.91	0.39449		
BI	< 35	14	4.7857	0.36061	0.04	0.961
	36 – 50	61	4.8306	0.62546		
	> 55	25	4.84	0.63187		

*significant at $p < 0.1$

C. Comparison between Mandatory and Voluntary System

UTAUT model suggested the voluntariness can explain the variation of technology adoption [18]. Based on our result, there was no statistically different on civil servant’s adoption level between mandatory and voluntary system, as seen in Table 6.

TABLE VI. ONE WAY ANOVA ON MANDATORY AND VOLUNTARY E-GOVERNMENT SYSTEM

		Sum of Squares	df	F	Sig.
PE	Between Groups	0.045	1	0.06	0.807
	Within Groups	148.454	198		
	Total	148.499	199		
EE	Between Groups	0.5	1	1.675	0.197
	Within Groups	59.094	198		
	Total	59.594	199		
SI	Between Groups	0.138	1	0.188	0.665
	Within Groups	145.122	198		
	Total	145.26	199		
FC	Between Groups	0.022	1	0.059	0.809
	Within Groups	73.316	198		
	Total	73.337	199		
BI	Between Groups	0.005	1	0.014	0.905
	Within Groups	69.746	198		
	Total	69.751	199		

Overall, this study showed that civil servant had a relatively high adoption level towards e-government across all dimensions. The highest positive adoption level of most employees related to effort expectancy (EE), as seen in Figure 2. It means that employees thought both mandatory and voluntary system was easy to use. It implied that most government employees did not find the any significant difficulty in adopting the existing e-government system.



Fig. 2. Employee’s perception on mandatory and voluntary system

Although the study showed important findings in public sector, this study had several limitations. It was carried out in West Java Province. Thus, it is possible that different result may occur when the research is performed in other locations, due to culture differences. Another limitation of this study is the sampling method that used quota sampling and limited to 100 respondents, thus it can’t be generalize. Further research can collect more data to generalize the result.

V. CONCLUSION

This study provides empirical evidence on civil servant’s adoption levels toward e-government. The study finds that the highest positive perception of most government employees is related to effort expectancy. From the result, there are mean differences among government employee’s age groups of performance expectancy for mandatory system and facilitating conditions for voluntary system. The oldest group has the highest level of performance expectancy towards e-government in mandatory system and the highest level of facilitating conditions in voluntary context. Meanwhile, there is no significant difference of civil servant’s adoption levels between mandatory and voluntary context. It may imply that the civil servant has a high positive adoption towards e-government.

REFERENCES

- [1] Rehman, M. & Esichaikul, V. (2012). Factors influencing e-government adoption in Pakistan. *Transforming Government: People, Process and Policy*, 6(3), 258-282.
- [2] Rose, M. (2004). Democratizing information and communication by implementing e-government in Indonesian regional government. *The International & Library Review*, 36(3), 219-226.
- [3] United Nations. (2018). *E-government survey: gearing e-government to support transformation towards sustainable and resilient societies*. New York.
- [4] Ifinedo, P. (2012). Factors influencing e-government maturity in transition economies and developing countries: a longitudinal perspective. *ACM SIGMIS Database: the DATABASE for Advances in Information Systems*, 42(4), 98-116.
- [5] Weerakkody, V., Irani, Z., Lee, H., Osman, I., & Hindi, N. (2015). E-government implementation: A bird’s eye view of issues relating to costs, opportunities, benefits and risks. *Information Systems Frontiers*, 17(4), 889-915.
- [6] Heeks, R. (2003). *Most e-government-for-development projects fail: how can risks be reduced?* (Vol. 14). Manchester: Institute for Development Policy and Management, University of Manchester.
- [7] Gupta, K. P., Bhaskar, P., & Singh, S. (2017). Prioritization of factors influencing employee adoption of e-government using the analytic hierarchy process. *Journal of Systems and Information Technology*, 19(1/2), 116-137.
- [8] Rana, P. N., Dwivedi, Y. K., & Williams, M. D. (2013). E-government adoption research: an analysis of the employee’s perspective. *International Journal of Business Information Systems*, 14(4), 414-428.
- [9] Magsamen-Conrad, K., Upadhyaya, S., Joa, C. Y., & Dowd, J. (2015). Bridging the divide: using UTAUT to predict multigenerational tablet adoption practices. *Computers in Human Behavior*, 50, 186-196.
- [10] Soja, E. & Soja, P. (2017). Exploring root problems in enterprise system adoption from an employee age perspective: a people-process-technology framework. *Information Systems Management*, 34(4), 333-346.

- [11] Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government Information Quarterly*, 18(2), 122-136.
- [12] Al-Jaghoub, S., Al-Yaseen, H., & Al-Hourani, M. (2010). Evaluation of awareness and acceptability of using e-government services in developing countries: the case of Jordan. *The Electronic Journal Information Systems Evaluation*, 13(1), 1-8.
- [13] Anthopoulos, L. D. & Reddick, C. G. (2016). Understanding electronic government research and smart city: a framework and empirical evidence. *Information Polity*, 21(1), 99-117.
- [14] Tung, L. L., & Rieck, O. (2005). Adoption of electronic government services among business organizations in Singapore. *The Journal of Strategic Information Systems*, 14(4), 417-440.
- [15] Moon, M. J. (2002). The evolution of e - government among municipalities: rhetoric or reality? *Public Administration Review*, 62(4), 424-433.
- [16] Ebrahim, Z., & Irani, Z. (2005). E-government adoption: architecture and barriers. *Business process management journal*, 11(5), 589-611.
- [17] Obi, T., & Iwasaki, N. (2015). *A Decade of World E-Government Rankings (Vol. 7)*. IOS Press.
- [18] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.
- [19] Olatubosun, O., & Madhava Rao, K. S. (2012). Empirical study of the readiness of public servants on the adoption of e-government. *International Journal of Information Systems and Change Management*, 6(1), 17-37.
- [20] Dečman, M. (2015). Understanding Technology Acceptance of Government Information Systems from Employees' Perspective. *International Journal of Electronic Government Research (IJEGR)*, 11(4), 69-88.
- [21] Alraja, M. N. (2016). The effect of social influence and facilitating conditions on e-government acceptance from the individual employees' perspective. *Polish Journal of Management Studies*, 14.
- [22] Chung, H. Y., Lee, G. G., & Kuo, R. Z. (2016). Determinants of public servants' intention to adopt E-government learning. *Review of Public Personnel Administration*, 36(4), 396-411.
- [23] Mosweu, O., & Bwalya, K. J. (2018). A multivariate analysis of the determinants for adoption and use of the Document Workflow Management System in Botswana's public sector. *South African Journal of Libraries and Information Science*, 84(2), 27-38.
- [24] Panayides, P. (2013). Coefficient Alpha. *Europe's Journal of Psychology*, 9(4), 687 - 696.
- [25] Khechine, H., Lakhali, S., Pascot, D., & Bytha, A. (2014). UTAUT model for blended learning: The role of gender and age in the intention to use webinars. *Interdisciplinary Journal of E-Learning and Learning Objects*, 10(1), 33-52.