Factors Influencing the Adoption of E-Tilang; Empirical Evidence from the UTAUT Model

Eva Yumami [#1], Djoko Budiyanto Setyohadi [#2], Suyoto [#3]

 # Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia

[1] evayumami2015@gmail.com
[2] djoko@mail.uajy.ac.id
[3] suyoto@staff.uajy.ac.id

Abstract

Mid-Year 2017 The Republic of Indonesia Police publishes innovation of e-tilang technology. E-tilang is a mobile app online by traffic police to take action against traffic offenders on the highway. E-tilang aims to improve service to the public and cut fines for abuse of traffic violations. This research factor influences acceptance and use of e-tilang by using UTAUT model. This research conducted in Bengkulu area with 152 traffic police. This study analyzed data using structural equation modeling techniques (SEM) and with the help of Amos 22 software. The results show that performance expectancy, Effort expectancy, and social influence have a value of $p < 0.05$. Which means that the variable has a positive effect on the use of e-tilang. Facilitating Condition has no significant effect on intention using e-tilang because it has a value of $p > 0.05$. The results of this study are important steps to improve e-tilang services.

Keywords: E-tilang, Information System, Innovation Technology, Unified Theory Acceptance and Use of Technology (UTAUT).

I. Introduction

Currently, information technology is growing rapidly in government. This is particularly important given the potential to improve services, cut costs and accessibility to citizens [12]. E-government provides certain benefits of society transparency in government processes, cost and time savings through efficient services. E-government for government helps simplify procedures, improve office management and create effective government regulations [27] [18]. In mid-2017, the State Police of the Republic of Indonesia issued e-tilang innovation technology. E-tilang is an online application used by traffic police. E-tilang aims to improve service to the public and cut the misuse of payment of fines to traffic police on the highway. Traffic police are responsible for ensuring that vehicle drivers comply with traffic regulations [11] [14]. E-tilang reflects the strategy of the traffic police in delivering information and communications to the public. This is in line with Lindsay et al study, which identifies that 72% of information technology has a major impact on police work and enhanced police ability to solve problems [29].

Unified Theory Acceptance and Use of Technology (UTAUT) by Venkatesh et al., is a model developed in the field of acceptance and use of technology. This UTAUT model describes intend the user in using the system information and behavior of its users. performance expectancy, effort expectancy, social influence, and facilitating conditions have a direct influence on behavior intention in UTAUT. These four constructs used to measure from e-Government services at present. The linkage between the main constructs at UTAUT shows a high significance of technology acceptance [8]. Based on the above conclusions, the researcher will identify the factors that influence the acceptance and use of e-tilang on traffic police using UTAUT method. This research will be useful for developing additional literature based on current conceptual data and future research in

Indonesia and its territory. The findings of this research can be a consideration and subsequent policy in the development of information and communication technology services in the field of Police.

II.   Literature Review

UTAUT research by Venkatesh (2003) is a research model on the acceptance and use of information technology [8]. According to Alshehri, his research investigates possible UTAUT for the use of technology received in government [15]. The findings write down that UTAUT is eligible for use to explain accept e-government. Increasing the acceptance and use of e-government especially in the service to the community makes the service easier and faster. Information technology effect ability police to solve problems [29]. These findings suggest that the use of new technologies can improve performance [4]. This suggests that the intention to use has a positive effect on the rate of technology adoption. Lau, explains that performance expectancy greatly influences behavioral intentions to use technology [6]. Effort expectancy explains the ease of service in e-government. Effort expectancy affects behavioral intentions to use technology [8]. Social influences can easily influence each other. Facilitating conditions that illustrate the extent to which the organizational and technical infrastructure support the use of the system, this is like earlier studies [16] [37].

III.   Research Model and Hypothesis

Unified Theory Acceptance and Use of Technology (UTAUT) is a research model adopted from Venkatesh (2003) [8]. UTAUT is about acceptance information technology. This method is composite of Theory of Reasoned Action (TRA) [34], Planned Behavior Theory (TPB) [9], Technology Acceptance Model (TAM) [7], Extension of the Technology Acceptance Model (TAM2) [35], Diffusion of Innovation Model (DOI) [5]. The strength of this model is widely used in various studies and applies it extensively to various technologies [20]. The UTAUT model consists of performance expectancy expectations, work expectations, social influences, facilitation conditions and behavioral intentions that play an important role as a direct determinant of usage behavior [8] [37]. UTAUT model as shown in Fig. 1.
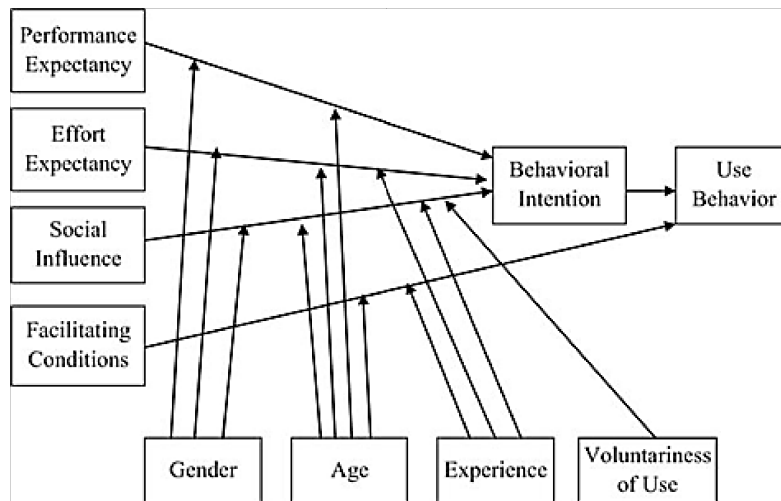

Fig. 1 UTAUT Model [8].

An insight into established research suggests that the model has been empirically tested for studies of e-government adoption primarily in government (G2B). Empirically this study is the most widely used and applied adoption and acceptance model, providing useful insights and implications for understanding one's intentions in using e-government services [19]. This research uses four UTAUT constructions that are performance expectancy, effort expectancy, social influence, and facilitating conditions having the effect of intention to use.

Some earlier studies used UTAUT [17] [21]. There are three constructs defined as a direct determinant of intention behaving in UTAUT, namely performance expectancy, effort expectancy and social influences, used to measure the current e-government service experience by users. The fourth construct, condition facilitation, is a direct determinant of the use and adoption behavior of e-government services. Based on the UTAUT model, it can estimate that this key factor influences the adoption of e-tilang. The linkages between major constructs at UTAUT have demonstrated a high significance of technology acceptance and have been shown to consistent with many studies [23] [28].

The core construction of UTAUT is closely related to the context of this study. Performance expectancy is one of UTAUT's construction, performance expectancy explains how much one believes that using a system can help the job to get the desired results [8]. This performance expectancy construct derives from the combination the concept of benefit perception (TAM / TAM2 and C-TAM-TAB), extrinsic motivation (MM), occupational conformance (MPCU), relative profit (IDT), and expected outcomes (SCT). Performance expectancy makes it possible to get access to information quickly and conveniently. performance expectancy greatly affects the user's intentions [6]. The hypotheses summarized as follows:
H1: Performance Expectancy will have a positive effect on behavioral intention to use e-tilang service.

Effort expectancy describes the level of ease of using the system. Effort expectancy is combination TAM / TAM2 and MPCU methods. Effort Expectancy explains the ease of service e-tilang, how users interact with the user interface. This construct is like earlier research that business expectations influence the user's attitude to usage [24]. The hypotheses summarized as follows:
H2: Effort Expectancy has a positive effect on behavioral intention to use e-tilang service.

The Social Effect is the UTAUT construct that explains how much one believes that using a new system can lower the effort in work [7]. This construct describes the person's ease or environment to influence each other. The hypotheses summarized as follows:
H3: Social Influence has a positive influence on behavioral intent to use e-tilang service

Facilitating conditions is how much one believes that existence a good organizational and technical infrastructure, can support the use of the system [8]. Facilitating conditions is a very important service to the organization. The hypotheses summarized as follows:
H4: Facilitating Conditions has a positive influence on behavioral intentions to use e-tilang services.

IV. RESEARCH AND METHODOLOGY

Case studies in this research are traffic police in Bengkulu area. The number of traffic police respondents is 165 people. The survey conduct using a questionnaire given to all traffic police. Questionnaires distribute over simple random sampling techniques based on earlier research reference [1]. Determination of the number of respondents refers to earlier studies [3] and base on McCallum et al [26]. Another consideration is that in SEM, a sample size of 100-200 for sample size determination.

Data collected using a questionnaire designed in two parts, the first part designed to collect demographic information. The second part of the contents of the questionnaire based on the five-point Likert scale. Five points of Likert scale ranged from 1 to 5 each strongly agrees, agree, neutral, disagree and strongly disagree.

A total of 165 questionnaires distributed and 152 returned, with a response rate of 87.36%. In this study, the researchers used the Structural Equation Modeling (SEM) approach to test data and with the help of AMOS 22 software, SEM techniques allowed researchers to check the construction model and to estimate the structural relationship between latent variables simultaneously [10]. Respondent's demographics the results show in TABLE I.

TABLE I

Respondent's Demographic Data (N=152)

Character		Frequency	Percent
Gender	Male	133	87,50%
	Female	19	12,50%
Age	Less than 25	23	15,13%
	26-30	31	20,39%
	31-35	92	60, 53%
	More than 36	6	3,95%
Educational level	High School	132	86,84%
	Bachelor	17	11,18%
	Master	3	1,98%
Internet Experience	Experienced	150	98,68%
	Inexperienced	2	1,32%
E-tilang Usage	Less than 1 month	19	12,50%
	1-3 month	27	17,76
	More than 3 months	106	69,74%

V.   Data Analysis and result

Based on the model used in this study data analysis using Structural Model Estimation (SEM) and help AMOS 22. The following is the result of reliability and validity test using the software used Amos 22.

I.   Reliability Test.
The value of reliability that qualifies if the average value of the AVE and loading factor values greater than 0.5. Furthermore, the CR value must greater than the AVE value [10]. Based on the calculation, the value of AVE for each construct is 0.636, 0.639, 0.655, 0.565 and 0.568. While the value of CR is 0.898, 0.904, 0.866, 0.867 and 0.891. This shows that the value of AVE and CR value has met the recommended value of 0.5 and shows a good reliability test. The results show in TABLE II.

TABLE II

RESPONDENT'S DEMOGRAPHIC DATA (N=152)

Variable	Items	Factor Loadings	A.V.E.	C.R.
Performance Expectancy	PE1	0.803	0.6364	0.8982
	PE2	0.701		
	PE3	0.807		
	PE4	0.876		
	PE5	0.802		
Effort Expectancy	EE1	0.874	0.6396	0.9045
	EE2	0.713		
	EE3	0.815		
	EE4	0.791		
	EE5	0.846		
Social Influence	SI1	0.732	0.6555	0.8664
	SI2	0.709		
	SI3	0.798		
	SI4	0.806		
	SI5	0.709		
Facilitating Conditions	FC1	0.756	0.5655	0.8677
	FC2	0.719		
	FC3	0.826		
	FC4	0.759		
	FC5	0.703		
Behavioral Intention	BI1	0.831	0.5682	0.8971
	BI2	0.8		
	BI3	0.794		
	BI4	0.712		
	BI5	0.845		

II. Discriminant Validity Test

Discriminate validity is a different measure than others. This test conducted to measure whether two different factors, yielding valid data on to the AVE square root ratios and available factors [19], shown in TABLE III.

TABLE III
DISCRIMINANT VALIDITY

Discriminant Validity					
	PE	EE	SI	FC	BI
PE	0.7998				
EE	0.3380	0.8097			
SI	0.2830	0.2610	0.7520		
FC	0.0710	0.0630	0.0730	0.7538	
BI	0.4150	0.3930	0.3690	0.0930	0.7977

III. Confirmatory Factor Analysis (CFA)

The CFA change model test will drag across the entire model. The results of the confirmatory factor analysis (CFA) show a chi-square value of 1.405, indicating the proper. The chance value indicates a value of 0.000 or an incorrect model. The value of RMSEA 0.052 indicates a good fit model. The GFI score of 0.842 indicates small conformity, AGFI of 0.806 indicating a good fit model [10]. The TLI and CFI scores of 0.952 and 0.958 respectively show good values all exceeding the suggested value of 0.90 [13] [30]. Overall can concluded a good suitability model. The results show in TABLE IV.

TABLE IV

CRITERIA MODEL FIT

Goodness of fit index	Cut-off value	Research Model	Model
Chi-Square	< 5.00	1.405	Good Fit
Significant probability	≥ 0.05	0	Poor Fit
RMSEA	≤ 0.08	0.052	Good Fit
GFI	≥ 0.90	0.842	Marginal Fit
AGFI	≥ 0.80	0.806	Good Fit
TLI	≥ 0.90	0.952	Good Fit
CFI	≥ 0.90	0.958	Good Fit

IV. Hypothesis Result

After testing the fit model criteria showing that overall showed a good level of conformity, then a theoretical hypothesis tested. The test conducted to find the relationship between latent construction through SEM technique on AMOS software. The list of the path coefficients and their significance and hypothesis testing results show in TABLE V.

TABLE V

HYPOTHESIS TESTING RESULTS

			Estimate	S.E.	C.R.	P	Supported
BI	<--	PE	0.367	0.116	3.151	0.002	Yes
BI	<--	EE	0.174	0.083	2.113	0.035	Yes
BI	<--	SI	0.726	0.13	5.57	***	Yes
BI	<--	FC	0.01	0.052	0.189	0.85	No

From data processing, it is known that CR values show the value of 1.96 and P value below 0.05 thus can be said that 3 hypotheses have influence, and one hypothesis has no significant effect because has P value more than 0.05. The results show that performance expectancy has a positive effect on behavioral intention, this is in line with earlier studies [15] [19]. They express performance expectancy with a positive correlation between behavioral intention. Effort expectancy ($\beta = 0.002$) has a greater influence than Performance expectancy ($\beta = 0.035$). This is also the same as earlier studies that show performance expectancy has a positive impact on behavioral intention [21]. Social influence ($\beta = 0.000$) has a positive effect on behavioral intention. Facilitating conditions has a value of $\beta = 0.850$ which shows a P value of 0.05, meaning that facilitating conditions have no significant effect on behavioral intention. According to Venkatesh [37], the facilitation conditions show the level of consumer confidence that its organizational and technical infrastructure helps them to use the system [37]. Facilitating conditions related to how users access, the cost of using the system and the availability to use the system.

VI. Discussions

In this study, performance expectancy has a positive influence use e-tilang. The findings show that e-tilang is useful in work as it can improve performance. This study is in line with Venkatesh's research which states that the level of individual confidence when using the system can help improve performance [37]. Usefulness is useful for traffic police because e-tilang can use anywhere and anytime. The perceived benefits have described a trust to use the system in improving performance [33]. Performance expectancy also sees the expected results of system usage because a better reason can predict people receiving the use of information technology [36]. From the research note that the use of e-tilang can improve service to the community.

Effort Expectancy has a positive effect on traffic police in using e-tilang. Traffic cops say e-tilang is easy to learn. According to Venkatesh [37], the level of ease is very influential in using the system. Construct This means an important factor in e-tilang adoption. The e-tilang application also provides an easy user interface. These results show that ease of use in e-tilang can improve performance and expected effort. E-tilang can cut illegal levies with good results. The results of this study are like some of the previous researchers [15] [22] [25] [32]. Social influence has a positive influence on the use of e-tilang. People who are important to traffic police have a big influence on the use of e-tilang. Director of traffic directs traffic police to use e-tilang. The use of e-tilang are also influenced by other co-workers [19] and users tend to comply with applicable regulations [30]. Liu et al. Also revealed that a significant social influence on continuation intention using mobile services [38].

Research shows that facilitation conditions have no significant effect on the intention to use e-tilang. Facilitation conditions Regional police and Bengkulu resort were still inadequate. Regional police and Bengkulu resort do not have special people who help them use difficulties using e-tilang. This special force exists only on the nation's capital. In UTAUT, help the conditions of the use of technology within an organization's environment. Facilitating conditions can serve as a proxy for controlling real and direct behavior directly [9]. Traffic sign-in is still using a manual tilang. Traffic policemen register traffic violators using the e-tilang app and then back on tilang paper. This becomes less effective e-tilang because it still uses a tilang manually. The use of e-tilang should easier and faster. According to Lindsay et al, technology services that are easy and fast can improve police ability in solving problems quickly [29]. From the survey results are also known to the Internet network sometimes a constraint far from the city. Access to a favorable set of facilitation conditions tends to higher for use of technology in organizations [8] [37].

VII. Conclusions

This research identifies factors influencing the acceptance and use of e-tilang by using UTAUT model. This research uses UTAUT main model that is performance expectation, work expectation, social influence and condition of the facility which directly influence use e-Tilang. This study performs data analysis using structural equation modeling (SEM) technique and with the help of Amos 22 software. The findings in this study show 3 accepted hypotheses and 1 hypothesis rejected. The result of hypothesis 1 has value ($\beta = 0,002$, $p < 0,05$) to show that performance expectancy has a positive effect on the use of e-tilang. This suggests that the hypothesis 1 supported by the results of the study. The result of hypothesis 2 has value ($\beta = 0.035$, $p < 0.005$) indicating that effort expectancy significant influence on the use of e-tilang and the result of research supports hypothesis 2. The result of hypothesis 3 has value ($\beta = 0.000$, $p < 0.005$) which shows that social influence has a positive and significant influence on the use of e-tilang. The results support hypothesis 3. Further, the hypothesis 4 has a value ($\beta = 0.850$, $p < 0.005$) indicating that facilitating conditions have no positive effect of using e-tilang. Value, $\beta = 0.850$ is greater than $p < 0.005$ so the hypothesis 4 rejected. These findings suggest that e-tilang are easy to use, capable of improving performance and can lower work effort. The results of this study are important to improve condition facilities in e-tilang services to more effective.

REFERENCES

[1]   Al. A. A. A. A. K. F. V. Kumar, "E-government adoption and user's satisfaction: an empirical investigation," Euro-Med J. Bus., vol. 11, no. 1, 2016.
[2]   B. Engotoit, G. M. Kituyi, and M. B. Moya, "Influence of performance expectancy on commercial farmers' intention to use mobile-based communication technologies for agricultural market information dissemination in Uganda," J. Syst. Inf. Technol., vol. 18, no. 4, pp. 346–363, 2016.
[3]   C.-C. Chang, "Library mobile applications in university libraries," Libr. Hi-Tech, vol. 31, no. 3, pp. 478–492, 2013.
[4]   D. K. R. L. A. B. P. Legoherel, "Re-examining perceived usefulness and ease of use in online booking: The case of Hong Kong online users," Int. J. Contemp. Hosp. Manag., vol. 27, no. 2, pp. 185–198, 2013.
[5]   E. Mustonen-Ollila and K. Lyytinen, "Why organizations adopt information system process innovations: a longitudinal study using Diffusion of Innovation theory," Info Syst. J, vol. 13, pp. 275–297, 2003.
[6]   E. T. J. L. Lau, "Behavioral intention to adopt mobile banking among the millennial generation," vol. 17, no. 1, 2016.
[7]   F. D. Davis, "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," MIS Q., vol. 13, no. 3, p. 319, 1989.
[8]   G. B. D. and F. D. D. R. Viswanath Venkatesh, Michael G. Morris, "User Acceptance of Information Technology: Toward a Unified View," J. Chem. Inf. Model., vol. 27, no. 3, pp. 425–478, 2003.
[9]   I. Ajzen, "The theory of planned behavior," Organizational Behav. Hum. Decis. Process., vol. 50, pp. 179–211, 1991.
[10] J. Hair, W. Black, J. Babin, R. Anderson, and R. Tatham, "Multivariate data analysis," 2006.
[11] L. Bates, M. J. Darvell, and B. Watson, "Young and unaffected by road policing strategies: Using deterrence theory to explain provisional drivers' noncompliance," Aust. N. Z. J. Criminol., vol. 50, no. 1, pp. 23–38, 2017.
[12] L. Carter and F. Bélanger, "The utilization of e-government services: Citizen trust, innovation, and acceptance factors," Inf. Syst. J., vol. 15, no. 1, pp. 5–25, 2005.
[13] L. Hu and P. M. Bentler, "Fit indices in covariance structure modeling: Sensitivity to under parameterized model misspecification.," Psychol. Methods, vol. 3, no. 4, pp. 424–453, 1998.
[14] L. J. Bates, J. Davey, B. Watson, M. J. King, and K. Armstrong, "Factors contributing to crashes among young drivers," Sultan Qaboos Univ. Med. J., vol. 14, no. 3, pp. 297–305, 2014.
[15] M. A. Alshehri, "Using the UTAUT Model to Determine Factors Affecting Acceptance and Use of E-government Services in the Kingdom of Saudi Arabia," pp. 1–264, 2012.
[16] M. Akhtar Shareef, V. Kumar, U. Kumar, and Y. Dwivedi, "Factors affecting citizen adoption of transactional electronic government," J. Enterp. Inf. Manag., vol. 27, no. 4, pp. 385–401, 2014.
[17] M. Alshehri, S. Drew, and R. Alghamdi, "Analysis of Citizens' Acceptance for e-Government Services: Applying The UTAUT Model," IADIS Int. Conf. Theory Pract. Mod. Comput. Internet Appl. Res. 2012, pp. 69–76, 2012.
[18] M. B. Kayani, M. E. Haq, M. R. Perez, and H. Humayun, "Analyzing Barriers in e-Government Implementation in Pakistan," Int. J. Infonomics, vol. 4, no. 3, pp. 494–500, 2011.
[19] M. Barua, "E-Governance Adoption in Government Organization of India," Int. J. Manag. Public Sect. Inf. Commun. Technol., vol. 3, no. 1, pp. 1–20, 2012.
[20] M. D. Williams, N. P. Rana, and Y. K. Dwivedi, the unified theory of acceptance and use of technology (UTAUT): a literature review, vol. 28, no. 3. 2013.
[21] M. O. Ahmad and J. Markkula, "Factors affecting e-government adoption in Pakistan: a citizen's perspective," People, Process, vol. 7, no. 2, pp. 225–239, 2013.
[22] M. Rehman, V. Esichaikul, and M. Kamal, "Factors influencing e-government adoption in Pakistan," Transform. Gov. People, Process Policy, vol. 6, no. 3, pp. 258–282, 2012.
[23] M. S. Azam, "E-Services Adoption: Processes by Firms in Developing Nations," Adv. Bus. Mark. Purch., vol. 23, pp. 7–290, 2015.
[24] M. Williams, N. Rana, and Y. Dwivedi, the unified theory of acceptance and use of technology (UTAUT): a literature review, vol. 28, no. 3. 2015.
[25] P. Verdegem and G. Verleye, "User-centered E-Government in practice: A comprehensive model for measuring user satisfaction," Gov. Inf. Q., vol. 26, no. 3, pp. 487–497, 2009.
[26] R. C. MacCallum, M. W. Browne, and H. M. Sugawara, "Power analysis and determination of sample size for covariance structure modeling.," Psychol. Methods, vol. 1, no. 2, pp. 130–149, 1996.
[27] R. El-Haddad, A. Tsohou, and M. Karyda, "Implementation Challenges for Information Security Awareness Initiatives in E-Government," Ecis, vol. 7, no. 1, pp. 1–10, 2012.
[28] R. J. Raja Yusof, A. Qazi, and I. Inayat, "Student real-time visualization system in classroom using RFID based on UTAUT model," Int. J. Inf. Learn. Technol., vol. 34, no. 3, pp. 274–288, 2017.
[29] R. Lindsay et al., "Journal of Systems and Information Technology Adapted technology acceptance model for mobile policing"A technology acceptance model of innovation adoption: the case of teleworking Adapted technology acceptance model for mobile

policing," J. Syst. Inf. Technol. Internet Res. Iss Soares J. Res. Interact. Mark. Eur. J. Innov. Manag., vol. 13, no. 4, pp. 389–407, 2011.

[30] R. P. Bagozzi and K.-H. Lee, "Multiple routes for social influence: The role of compliance, internalization, and social identity," Soc. Psychol. Q., vol. 65, no. 3, pp. 226–247, 2002.

[31] R. P. Bagozzi and Y. Yi, "On the evaluation of structural equation models," J. Acad. Mark. Sci., vol. 16, no. 1, pp. 74–94, 1988.

[32] S. AlAwadhi and A. Morris, "Factors influencing the adoption of e-government services," J. Softw., vol. 4, no. 6, pp. 584–590, 2009.

[33] S. Alwahaishi and V. Snásel, "Consumers' Acceptance and Use of Information and Communications Technology: A UTAUT and Flow Based Theoretical Model," J. Technol. Manag. Innov., vol. 8, no. 2, pp. 9–10, 2013.

[34] T. Madden, P. Ellen, and I. Ajzen, "A Comparison of the Theory of Planned Behavior and the Theory of Reasoned Action," Personal. Soc. Psychol. Bull., vol. 18, no. 1, pp. 3–9, 1992.

[35] V. Venkatesh and Davis, "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies," Manage. Sci., vol. 46, no. 2, pp. 186–204, 2000.

[36] W.-B. Lin, M.-K. Wang, and K. P. Hwang, "The combined model of influencing online consumer behavior," Expert Syst. Appl., vol. 37, no. 4, pp. 3236–3247, 2010.

[37] X. Venkatesh, Viswanath., Thong, James, Y.L. & Xu, "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," MIS Q., vol. 36, no. 1, pp. 157–178, 2012.

[38] Y. Liu, H. Li, V. Kostakos, J. Goncalves, S. Hosio, and F. Hu, "An empirical investigation of mobile government adoption in rural China: A case study in Zhejiang province," Gov. Inf. Q., vol. 31, no. 3, pp. 432–442, 2014.