Evaluation of the Factors Influencing the Trust of Millennial Citizens in E-Government

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Abstract. This study aims at identifying the effect of the millennial generation’s perceptions regarding risks, security, and trust in the Internet when utilizing e-government services. A total of 291 data items were collected through online surveys and this information was analysed quantitatively with the SEM method by employing the Smart PLS application. The confidence of this generation in applications is observed to be influenced by software quality and trust in the Internet, but not information quality and faith in the government. Furthermore, trust in the Internet is unaffected by internal risk, while the intention to use this medium is influenced by reliance on applications and also affected user behaviour.

1. Introduction

Online services have currently become a trend and practically all areas of life have been equipped and supported by these facilities. The influence of web 2.0 development promotes all sectors to compete in providing online services [1]. E-government as an online service is mandatory for the administration and these facilities can either be informational or transactional. The informational amenities are delivered through web pages, while the transactional is implemented horizontally and vertically by the millennial generation in conjunction with the government between related agencies [2]. Through e-government, the quality of services offered to the millennial generation and involved stakeholders can be improved by the government [1].

E-government has also received considerable attention from academics and researchers, based on investigating the factors influencing the use of this service by millennials [3]. Another interesting research topic regarding the adoption of this practice is the level of the millennial generation’s trust in e-government services [4] [5].

The success of these facilities is inseparable from the participation of this generation as users. Previous researches identified the role of this age group as vital and the use and derivation of benefits from these services by millennials rendered e-government facilities successful [6] [7].

Trust symbolizes a predictor for ascertaining and also influencing the adoption of an e-government service as an application [8]. The term “Millennials” refers to individuals who were born in the 1980s and entered the workforce in the early 2000s. These persons are more educated than the previous generation, have a higher competence in utilizing Information and Communication Technology (ICT), and are also more reliable social media users [9]. The members of this generation grew up during a period when Internet use was
booming. This age group possesses more innovative ideas and creativity and can therefore become agents of change. Based on statistical data obtained from the Central Statistics Agency (BPS), 90 million citizens at a proportion of 33.77% out of Indonesia’s total population falls into the millennial generation category.

Furthermore, this age group represents an important part of e-government service adoption in Indonesia. The first is due to a large population, while the second is related to a future role as the nation’s next-generation [9]. The above matters were some of the considerations in selecting the study respondents. This research was expected to better understand the millennials’ standpoints in the e-government service adoption. Therefore, the government was able to design the right policies to increase the utility of these facilities in the community.

As mentioned earlier, the element of trust has become an important part of technology adoption. Komika and Benbasat in their study proposed a Trust-based technology adoption model. This adoption model, then inspired many researchers to try to understand the relationship between trust and the level of people’s desire to adopt technology [29]. In this study, we try to understand whether trust in technology adoption in the context of e-government with millennial respondents also has the same phenomenon as the context of the previous study.

In this study, we divide trust into three parts, which we believe are an integral part of an e-government service. Namely trust to government, trust in applications and trust in the internet. Where the three parts of this trust will affect the community trust in e-government services.

Considering that the application is the initial interface that will directly interact with the community, we want to explore it furthermore. Especially, any elements affecting citizen’s trust in the application. Refer to the results of previous studies, we found that trust in applications is influenced by software quality and information quality [30].

Based on the previous explanation about the elements of trust, risk, information quality, and software, we want to explore furthermore the millennials’ intentions and behaviors in utilizing the e-government services. The structure of this paper is divided into the first part which discussed the background and motivation of the research, while the second examined relevant theories and studies, and then the research methodology was assessed. The ensuing section analyzed the results, discussion, and conclusions.

2. Literature Study
This section discussed the theory and related studies from previous works to obtain an overview of relevant outcomes regarding this study. The preceding research was, therefore, the basis for this investigation.

Consequently, the definitions and findings of the study components this research focuses on, particularly the elements of trust, risk, quality of information, and quality of software were described.

1. Trust
This entails an important part of associations and describes human interaction and relationship development in a positive manner. The phenomenon also refers to the willingness to depend on other parties or unfamiliar entities. Subsequently, this reliant group was unaware of the credibility, content, and purpose of the information provided by the other party [10].

Trust has several types including:

a. Knowledge-based Trust: This is based on the availability and capacity to acquire knowledge from dependable parties.

b. Trust in Technology: refers to the willingness of the group deciding to depend on the information-providing party through the application and the ability to perform certain tasks [11].

c. Cognitive-based trust: this discussed a situation where trust was built on first impressions without being initiated by any interaction [10].

2. Multi-dimensional Trust
This describes a construct used to measure individual trust levels in information systems and is divided into several parts. These comprised a) Security trust: implies that the information system is safe
from hacking and the entry of viruses or malware, b) Privacy trust: suggests that personal information submitted into the information system was either private or confidential and not disseminated to unauthorized parties, c) System Logic Trust [12].

3. Risk
This was associated with the exposure and loss of personal information while using the internet as a transaction medium. With concern to e-government, risks reduced the interest of millennials in using this service. This component also decreased the trust of these individuals in the e-government services [13].

In other studies, e-government risks were defined as the fear of losing rather than gaining benefits while using information technology, due to the accessibility of an individual’s privacy by other parties as a result of transpired damage [14].

4. Software Quality
This was determined by the user’s needs and affected by the software performance, particularly the number of existing defects, and the presence of system interoperability [16].

5. Information Quality
This measured the semantic success [17] and was observed to affect the satisfaction level, trust, and desire of the millennial generation as users of e-government websites [18]. Furthermore, this quality was also a degree of the outcomes of e-government applications [19]. For instance, the semantic success derived from existing information made up of several attributes including intrinsic, contextual, representation, and access, among others was measured.

3. Research Hypothesis

![Figure 1. Research Model.](image)

The figure above shows the research model that we developed to be tested in this study. The model refers to the trust-based technology adoption model developed by Komiak and Benbasat [29]. We considered additional elements such as software quality, information quality and internet risk in the model.

In this model we hypothesize that the intention of using the e-government service is directly influenced by trust in the application, whereas trust in the application is influenced by two other lementtrusts, namely tetust to the government itself and trust in the internet
The above representation is a study hypothesis and examines the influence of each factor based on a predetermined research model. When the software quality of an application is good, the millennial generation displayed greater confidence in existing e-government programs [20][21].

**H1: Software quality has a positive effect on Trust Application.**

Faith in an application is engendered when the millennial generation builds an understanding of the benefits of the available information in the program. Also, the need and reliability of the information provided by e-government services increase the trust of this generation in these applications and encourages continued use [22][23].

**H2: Information quality has a beneficial influence on trust in applications.**

The fewer risks associated with using the internet, the more confident the millennial generation were in using e-government programs [h4]

**H3: Internet Risk has an advantageous impact on trust in the internet.**

Good governance leads to a higher trust in e-government programs as an administrative service [24]. Additionally, confidence in the government also urges this generation to share experiences and motivate others to use the applications [22].

**H4: Faith in the Government has a favorable effect on Trust in Applications.**

Belief in communication through the internet naturally enhances faith in e-government services [23]

**H5. Confidence in the Internet has a positive impact on Trust in Applications.**

E-government trusted in terms of the information provided, government systems, and the e-government applications, promote the continued use of available e-government services [24].

**H6. Trust in Application has a beneficial influence on the Intention to Use this software.**

The adoption behaviour is influenced by the intention to use e-government programs to access administrative services [22][24].

**H7. Intention to Use Application has an advantageous effect on Use Behaviour.**

4. Methodology

**A. Participants**

This study aimed at evaluating the factors related to the millennial generation’s trust in utilizing administrative services through e-government programs. The members of this age group possessing greater competence in information technology were selected as respondents by employing the purposive sampling method. This was a quantitative research and the data was collected by distributing questionnaires. To ensure that the potential subjects were of the millennial generation, preliminary questions were generated with due regard to the candidate’s age. The similarity of the responses to the poll criteria allowed the respondent to answer the core questionnaire inquiries. The surveys were distributed online using the Google Form and the links shared through social media, websites, and community groups, where most of the participants were members of the millennial generation. This research uses a purposive sampling technique to determine that respondents who have certain characteristics will answer the questionnaires. Consequently, a total of 291 respondents filled out the questionnaire.

This research uses the SEM method with Smart PLS application in processing data by using PLS (Partial Least Sampling) using the bootstrapping method or random multiplication. Therefore, the assumption of normality will not be a problem for PLS. Apart from being related to data normality, by doing bootstrapping, PLS does not require a minimum number of samples. Research with a small sample can still use PLS.

**B. Research Instruments**
Several constructs from previous studies were adopted into the concepts were employed as study variables and included Software Quality, Information Quality, Internet Risk, Trust in Government, Trust in Application, Trust in Internet, Intention use to the application, and Use Behaviors.

Each construct had a different number of indicators and was measured by a Likert scale with four levels of assessment. These were Level 1 = strongly disagree, level 2 = disagree, level 3 = agree, and level 4 = strongly agree.

C. Data analysis

The details were obtained using the SmartPLS version 3 software and subsequently processed by employing the SEM (Structural Equation Model) analysis method. This technique was used due to the capability in testing causal relationships between constructs possessing several indicators. The test was composed of two stages. The initial phase measured the validity and reliability test models to eliminate unacceptable indicators. The second was a structural simulation to test the hypothesis.

5. Results and Discussion

The data collected through questionnaires were processed with the Smart PLS Version 3 application. The valid responses were from a total of 291 subjects. The following were the profiles of respondents:

| Demographic Character | Number of Respondents (people) | Percentage |
|-----------------------|--------------------------------|------------|
| Gender                |                                |            |
| Male                  | 198                            | 68.3%      |
| Female                | 93                             | 32.7%      |
| Profession            |                                |            |
| Pupil and student     | 291                            | 100%       |
| Education             |                                |            |
| Primary school/Equal  | 12                             | 4.2%       |
| Junior high school/Equal | 15                          | 5.1%       |
| Senior high school/Equal | 129                         | 44.2%      |
| Diploma/Equal         | 26                             | 8.7%       |
| Bachelor degree/Equal | 109                            | 45.2%      |

For the data analysis using SEM through the Smart PLS Version 3 software, two key steps were performed and these were the measurement, and the structural evaluation models; 1. Measurement Evaluation Model

The stage aimed at ensuring all the existing constructs met the standards and consisted of 2 steps, namely the validity and reliability tests. The validity assessment comprised two stages which were the discriminant and the convergent validity tests. Meanwhile, the reliability assay was used to determine the dependability and consistency of the data.

a. Reliability Test

This was to discover whether the constructs were realistic. The outputs of the SmartPLS application were examined for the values of Composite Reliability (CR), Average Variance Extract (AVE), and Cronbach’s Alpha. The data were declared as reliable when certain criteria were attained. The values were CR > 0.7, AVE > 0.5, and Cronbach’s Alpha > 0.7.

| Table 2. Reliability and Validity Tests |
|----------------------------------------|
| AVE | CR | R Square | Cronbach's Alpha |
|-----|----|----------|------------------|
|     |    |          |                  |
Based on the table above, the CR and Cronbach’s Alpha values were noted to be greater than 0.7, while the AVE value was above 0.5 [25]. Therefore, all the constructs in this research model were reliable.

b. Validity test
This was of two types, particularly the discriminant and convergent validity. Subsequently, this evaluation was performed to measure the authenticity of the questionnaire, such as whether an entity was capable of being estimated [25].

The validity test referred to the output of the SmartPls loading factors. Therefore, the convergent validity test was used to determine the correlation between the indicators and all the research model constructs. The statistic was declared valid when the score was above 0.6, as well as more than the indicator values of the other constructs [25].

Based on the output loading factor, this statistic was above 0.6 and was greater than the indicator measures of the other constructs. Therefore, the markers of all the variables were valid.

Meanwhile, the discriminant validity tests were portrayed by the AVE scores. The variance of each construct was expected to be greater than the existing AVE values [25].

|   | II   | IQ   | Risk | SQ   | TI   | TA   | TG   | UB   |
|---|------|------|------|------|------|------|------|------|
| II | 0.7674 | 0.9081 | 0.4904 | 0.8476 |
| IQ | 0.7504 | 0.9002 | 0 | 0.8339 |
| Risk | 0.753 | 0.9013 | 0 | 0.8358 |
| SQ | 0.7054 | 0.9054 | 0 | 0.8607 |
| TI | 0.7654 | 0.9703 | 0.0609 | 0.8468 |
| TA | 0.7704 | 0.9096 | 0.6604 | 0.8508 |
| TG | 0.7809 | 0.9145 | 0 | 0.8599 |
| UB | 0.8182 | 0.931 | 0.634 | 0.8888 |

The AVE value of each construct was depicted in the reliability and validity test tables. According to this chart, the variances were greater than the AVE scores, and all the constructs were concluded to have fulfilled the criteria.

2. Evaluation of Structural Measurement
Before testing the hypothesis, it was necessary to ensure the fitness of the study model. This evaluation was performed by observing the “coefficient determinant” or R2 values [25].

R2 is defined as a simultaneous influence derived from the total effect of each independent variable (exogenous) on the dependent variable (endogenous). Based on the data analysis, this score (simultaneous influence) estimated from the independent variable software quality, information quality, Trust in Government, and other dependent parameters, particularly Trust in the Internet, and the Trust in Application was 0.66. Meanwhile, the dependent Trust in the Internet factor was influenced by the independent Internet Risk variable with an R2 value of 0.61. The simultaneous influence score of Trust in Government, Application, and Internet on the Intention to Use Application was 0.490. The Use
Behavior was affected by the other variables and had an R2 of 0.634. Therefore, these results revealed the Use Behavior was able to predict 63% of consumer attitude when adopting e-government applications. An overview of the relationship between the R2 scores of the variables is presented in the figure below:

Figure 2. Path Coefficient and R2 Research Model

The hypothesis testing was visible from the P-Value as the SmartPLS application output. Out of the seven initial hypotheses, three were rejected and four subsequently accepted. The premise was discarded when the P-value was greater than 0.05 and these hypothetical scores are shown in table 4:

Table 4. Hypothesis Test Results

| Hypothesis       | PC     | T      | P-value | Results  |
|------------------|--------|--------|---------|----------|
| H1= SQ -> TA     | 2.503  | 2.1315 | 0.0339  | Accepted |
| H2=IQ -> TA      | 2.113  | 1.9422 | 0.053   | Rejected |
| H3= R -> TI      | 1.94   | 1.911  | 0.057   | Rejected |
| H4=TG-> TA       | 0.916  | 0.8529 | 0.3944  | Accepted |
| H5=TI-> TA       | 3.967  | 3.6995 | 0.0003  | Accepted |
| H6=TA-> II       | 11.343 | 11.8759| 0.0001  | Accepted |
| H7= II-> UB      | 16.041 | 14.2222| 0.0001  | Accepted |

Therefore, the following are discoveries from the above analysis results:

**Hypothesis 1** which stated that the software quality elements had positive effects on trust applications was accepted. Therefore, applications with good software quality generated greater confidence from the millennial generation in using e-government services. These findings were similar to a study by Christof Budnik, where trust in an application was discovered to be influenced by the quality of existing software [20], and was corroborated by other researchers [21].

**Hypothesis 2** was rejected. This premise proposed that user confidence in the applications was affected by information quality and an increase in this yielded greater trust and continued use by the millennial generation. However, a positive effect of the information quality elements e-government application trust was not observed. This was interpreted to mean the information provided by these applications were of unreliable quality, hence the millennial generation had little trust promote sustained e-government application use. Notwithstanding, Ally Lee and Yair Levy in a study stated that millennials’ confidence in e-government services was influenced by the quality of information and the trust in applications increased with higher information quality, [26]. Likewise, Joungkum Kim and the team discovered this variable was influenced by the quality of the data presented through the application [27].
Hypothesis 3 stated that the elements of Internet Risk exerted a positive effect on trust in the internet and was rejected. This meant that the fewer risks developed while using the internet, the more convinced millennials were in utilizing e-government services. Also, the greater threats experienced during internet use to access e-government programs did not affect the trust of the millennial generation in the internet. The findings of previous studies were, therefore, not in line with these results. Earlier research by Ilmudeen Aboobucker and Yukun Bao had stated that higher risks posed by the internet such as data loss when accessing a service, reduced the user trust in the internet [36]. A similar circumstance produced the outcomes that the lower the risks during internet use, the higher the trustworthiness. [4]

Hypothesis 4 proposed that the elemental effects of Trust in the Government and in Applications were positive and was subsequently rejected. The confidence in administrative services also promoted these individuals to trust e-government programs as a means of governmental applications to serve the millennial generation. However, these results were contradictory to previous studies where good governance motivated millennials to believe in government applications [28]. Another research revealed that trust in the government also affected trust in e-government applications [22].

Hypothesis 5 suggested that the elements of Trust in the Internet and in Applications yielded positive effects and was therefore accepted. This proposition illustrated that the use of e-government applications accessed via reliable internet automatically affected the level of trust. These findings were consistent with earlier researches where the influence of the millennial generation's trust by confidence in the internet was discovered [11].

Hypothesis 6 revealed a positive effect between the Trust in Application and the Intention to Use, and was subsequently accepted. This was interpreted that trusted e-government services based on the provided information, government systems, and e-government applications motivated millennials to continue the use of the available e-government services. These findings were linked to previous results where millennials’ trust in e-government programs increased the willingness to use the provided e-government services [28].

Hypothesis 7 was accepted. This hypothesis stated that the Intention to Use Application had a beneficial effect on Use Behavior. These findings were related to previous researches by Mijail Naranjo-Zolotov and Tiago Oliveira where a person's attitude and behavior while using an application were influenced by the individual's intention [21] [24].

6. Conclusion
This study discovered the aspects of information quality, internet risk, and trust in government did not influence e-government program access by the millennial generation. Meanwhile, the aspects of software quality and confidence in the internet affected the trust in e-government, and also the desire to use this program. Therefore, the government was able to improve these attributes that increase e-government adoption by the millennial generation.

Also, further study was suggested to explore other aspects of understanding the extent to which e-government services have been properly adopted by this generation. Several considerable elements include service and system quality, as well as other aspects that motivate millennials to adopt e-government.

References

[1] G. V. Pereira, M. A. Macadar, E. M. Luciano, and M. G. Testa 2017 Delivering public value through open government data initiatives in a Smart City context p. 213–229.
[2] Rana N P, Dwivedi Y K, Lal B, Williams M D, and Clement M 2017 Citizens’ adoption of an electronic government system : towards a unified view Inf. Syst. Front. p. 549–568.
[3] Y. Akg, 2018 Adoption of E-Government Services in Turkey Adoption of E-Government Services in Turkey Türkiye’de E - Devlet Hizmetlerinin Kabulü The acceleration of the internet and the developments of Information and Communication
[4] Alzahrani L, Al-Karaghouli W, Weerakkody V 2017 Analysing the Critical Factors Influencing Trust in E-government Adoption from Citizens’ Perspective: A Systematic Review and A Conceptual Framework p. 1–27.

[5] Alzahrani L, Al-Karaghouli W, Weerakkody V 2018 Investigating the impact of citizens’ trust toward the successful adoption of e-government: A multigroup analysis of gender, age, and internet experience Inf. Syst. Manag 35 2 p. 124–146.

[6] R. Pérez-morote and C. Pontones-rosa 2020 Technological Forecasting & Social Change The effects of e-government evaluation, trust and the digital divide in the levels of e-government use in European countries Technol. Forecast. Soc. Chang 154 p. 119973.

[7] Faulkner N, Jorgensen B, and Koufariotis G 2018 Can behavioural interventions increase citizens’ use of e-government? Evidence from a quasi-experimental trial,” Gov. Inf. Q.

[8] M. Mahmood, M. Osmani, and U. Sivarajah The Role of Trust in E-Government Adoption: A Systematic Literature Review p. 1–16.

[9] R. D. Childs, P. Robinson, T. M. Mcgovern, and G. Gingrich 2015 The millennial generation Transform. Am. Gov. Rebooting Public Sq., pp. 307–321.

[10] X. Li, T. J. Hess, and J. S. Valacich 2008 Why do we trust new technology? A study of initial trust formation with organizational information systems 17 1.

[11] A. J. M. Jr and S. E. Pippin 2009 Security and Privacy Trust in E-Government: Understanding System and Relationship Trust Antecedents p. 1–10.

[12] N. Veeramootoo, R. Nunkoo, and Y. K. Dwivedi 2018 What determines success of an e-government service? Validation of an integrative model of e-filing continuance usage Gov. Inf. Q. 35 2 p. 161–174.

[13] M. N. Fakhruzzaman and D. V. Dimitrova 2020 Factors influencing e-government adoption in Indonesia: The importance of perceived risk J. Adv. Res. Dyn. Control Syst. 12 6 p. 125–13.

[14] T. Wahyuningrum and K. Mustofa 2017 A Systematic Mapping Review of Software Quality Measurement: Research Trends, Model, and Method 7 5 p. 2847–2854.

[15] A. Kankanhalli, Y. Charalabidis, and S. Mellouli 2019 IoT and AI for Smart Government: A Research Agenda Gov. Inf. Q. 36 2 p. 304–309.

[16] R. Nullusna, P. I. Sandhyyaduhita, A. N. Hidayanto, and K. Pusavat 2017 The relation of e-government quality on public trust and its impact on public participation Transformation. Gov. People, Process Policy 11 3 p. 393–418.

[17] T Rasool and N F Warrach 2018 Does quality matter: A systematic review of information quality of E-government websites ACM Int. Conf. Proceeding Ser. p. 433–442.

[18] R Santa, J B Macdonald, and M Ferrer 2018 The role of trust in e-Government effectiveness, operational effectiveness and user satisfaction: Lessons from Saudi Arabia in e-G2B,” Gov. Inf. Q. p. 1–12.

[19] C Budnik 2012 Software Testing, Software Quality and Trust in Software-Based Systems p. 253.

[20] M A Akbar, J Sang, A A Khan, and F Amin 2018 Improving the Quality of Software Development Process by Introducing a New Methodology — AZ-Model.

[21] M Z I Lallmahomed, N Lallmahomed, and G M Lallmahomed 2017 Factors influencing the adoption of e-Government services in Mauritius Telemat. Informatics 34 4 p. 57–72.

[22] Y K Dwivedi, N P Rana, M Janssen, B Lal, M D Williams, and M Clement 2017 An empirical validation of a unified model of electronic government adoption (UMEGA) Gov. Inf. Q., 34 2 p. 211–230.

[23] M Naranjo-Zolotov, T Oliveira, and S Casteleyen 2019 Citizens’ intention to use and recommend e-participation: Drawing upon UTAUT and citizen empowerment Inf. Technol. People. 32 2, pp. 364–386

[24] W W Chin 2010 How to Write Up and Report PLS Analyses.

[25] A Lee and Y Levy 2014 The effect of information quality on trust in e-government systems transformation Transform. Gov. People, Process Policy 8 1 p. 76–100.

[26] E. Cody-Allen and R. Kishore, “An extension of the UTAUT model with e-quality, trust, and satisfaction constructs,” SIGMIS CPR ’06 - Proc. 2006 ACM SIGMIS CPR Conf., vol. 2006, no. April, pp. 82–89, 2006.

[27] E. Abu-Shanab and A. Al-Azzam, “Trust Dimensions and the Adoption of E-Government in Jordan,” Int. J. Inf. Commun. Technol. Hum. Dev., vol. 4, no. 1, pp. 39–51, 2012.
[28] S. Y. X. Komiak and I. Benbasat, “The Effects of Personalization and Familiarity on Trust and Adoption of Recommendation Agents,” *MIS Q.*, vol. 30, no. 4, pp. 941–960, 2018.

[29] A. A. R. Deden Witarsyah Jacob, Mohd Farhan Md Fudzee, Mohamad Aizi Salamat, Shahreen Kasim, Hairulnizam Mahdin, “Modelling End-User of Electronic-Government Service: The Role of Information quality, System Quality and Trust Modelling End-User of Electronic-Government Service: The Role of Information quality, System Quality and Trust,” 2017.

[30] A. Kesharwani and S. S. Bisht, “The impact of trust and perceived risk on internet banking adoption in India An extension of technology acceptance model,” vol. 30, no. 4, pp. 303–322, 2012.