

The Empirical Study of Usability and Credibility on Intention Usage of Government-to-Citizen Services

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Abstract

E-government allows governments to service citizens in a more timely, effective, and cost-efficient method. The most popular benefits of Government-to-Citizen (G2C) are the simple posting of forms and registrations, serve citizens, improvement of education information and e-voting. This paper analyzes the influence of website usability and the credibility on both citizen satisfaction and citizen intention to use an e-government website, as well as the impact of citizen satisfaction on citizen intentions. To prove the validity of our proposed research model, empirical analysis was performed with 366 valid questionnaires using Partial Least Square. The results of the research show that credibility of website e-government usage had significant effects on citizen satisfaction which in turn affects citizen intention to use, and citizen satisfaction also significantly affected citizen intention to use. However, the usability of e-government websites slightly influences citizen satisfaction and citizen intention to use.

Keywords: Government-to-Citizen (G2C); E-government; Usability; Credibility; Satisfaction; Usage Intention;

1. Introduction

E-government is a large study area in the era of globalization. Presently many governments have implemented e-government websites to service citizen activities (i.e. ministry offices, province public services, municipality public services and multiple departments of public service). However, there are three similar characteristics of each definition of e-government. Firstly, it is a new modern interaction mechanism between the government and citizens and interested stakeholders. Secondly, the new way of interaction involves information technology between government and citizens through the internet. Finally, the main purpose of e-government is to improve the quality of public services from government to citizens [37]. Al-Hujran et al. [4] confirmed e-government has been used and is imperative for governments to increase public services, resulting in better transparency, accountability and public services. When the government increases transparency, accountability and governance of public services, it can increase government performance and, at the same time, possibly create new public value for citizens and businesses [30-32].

Scholars believed that the rise of direct government to citizen (G2C) services would improve government transparency, direct civic engagement, as well as offer new and innovative service possibilities [38]. In the dimensions of political and citizen dialogue, the application of information technology can improve public accountability such as public administration, which does not entail substantial changes of government to citizen relationships [30]. Therefore, information technology allows governments to serve citizens in a more timely, effective, and cost-efficient method. Early implementation of e-government systems may face the challenge of citizen resistance, require cultural sensitivity, and change the paradigm of interaction between governments and citizens. However, the interaction of the G2C of e-government systems can increase citizens participation in the public sector such as tax payments, education services, and health service [15]. Currently, e-government appears in various

paradigms, such as e-voting, e-filing, e-service, e-budgeting [37]. Historically, the concept of e-government development was based on three major driving forces: globalization, information technology advancement, and quality of life improvement with global economic activities.

In this study, two indicators were developed: credibility and usability. Credibility is defined as the quality of being believable or trustworthy in the disciplines of computing and information technology. Credibility is also present when all the information and resources in the website are clearly delineated (such as name of authors, date, sources, domain, site design and writing style). Usability is defined as the quality attribute that assesses the simplicity of user interfaces. Usability also refers to methods for improving ease-of-use during the design process. In the G2C website, usability and credibility are both necessary conditions to improve the quality of public services. Thus, these two indicators are used to determine the relationships among citizens, satisfaction and intention use in the area of G2C. We integrated the mentioned indicators with the citizen satisfaction and citizen intention use, adopted from the technology acceptance model (TAM).

2. Basic Concepts, Research Framework and Hypotheses Development

2.1. Credibility

The basic definition of credibility encompasses the qualities of trust and belief. In the field of human computer interaction (HCI), credibility is used to explain the interaction between systems and information. Robins & Holmes [35] defined credibility as the believability or trustworthiness of information retrieval in the WWW.

In the past, credibility forms part of reliability, Ayeh [5] described credibility as the critical factor relevant to the cognitive processes which determine affective and conative responses for consumer online travellers. In the area of website design, credibility is used to experiment and to examine the effects of perceptions of website authors and website visitors [18]. Other studies outline as credibility significant role in shaping students' perceptions regarding scholarly information on the web [25]. Metzger & Flanagin [23] confirmed that the credibility and trust of information found in online environments are used to prove cognitive heuristics in credibility evaluation, as in case of networked digital media.

Rains & Karmikel [32] described a positive relationship between the presence of structural features and perceptions of website credibility, as well as a positive relationship between the presence of message characteristics and attitudes in the area of a "healthy" website. Aesthetics and credibility in website design are crucial to ensure sales, or to procure services [35]. In web based communication, credibility is the closest link to dynamism which includes unwritten factors such as design and aesthetics [20].

Some studies have used multiple criteria to describe credibility, which allows for a more comprehensive understanding. Rieh [34] summarized the criteria regarding credibility, and defined it as reliability, trust, authority, accuracy and quality. Within the context of e-government, ensuring that websites are credible is both an ethical and legal imperative [22].

However, the reason citizens did not trust e-government services is due to a lack of security in online transactions to retain personal information, as well as the cyber regulation [7]. Thus, website providers need to consider credibility due to perceived credibility in e-government websites, which can influence adoption and satisfaction.

In another study, Cugelman et al. [14] confirmed that website credibility and users' behavioral intentions have strong directionally related relationships. The source of credibility also has been validated to have a significant impact on satisfaction. Albright and Levy [3] investigated the effect of source credibility on recipients' reactions and found that credible website sources resulted in favorable reactions from recipients. Therefore we concluded:

H1: Credibility of the G2C positively influences usage intention.

H2: Credibility of the G2C positively influences satisfaction.

2.2. Usability

Usability is considered to be one of the most important quality factors for web applications. Usability makes products and systems easier to use, which more closely match user needs and requirements. Huang & Benyoucef [22] defined usability as capability of the software product especially for websites to be understood, learned, operated, and attractive to the users.

Coursaris et al. [13] describe disability as the impact of intention to use in the area of mobile devices for wireless data services. Fernandez [16,17] validated in their empirical study that the usability used as an inspection method for model driven aspects of web development. Flavián et al. [19] found that the usability positively affects consumer loyalty to the website. Abdeldayem [1] explained usability as the attitudes toward online activities, and that online intention behavior is affected by ease of use. However, the literature on online consumer behavior found that usability impact is even more relevant, since it not only affects satisfaction but also favors future behavioral intentions. Belanche et al. [6] found that in websites, usability strongly affects satisfaction, which in turn affects intention to use. However, contrary to expected, usability does not directly affect intention to use, but it has an indirect effect through consumer satisfaction. The usability effect on consumer satisfaction is moderated by perceived risk.

Kim and Eom [24] concluded that usability is the critical factor to achieve user satisfaction. Maditinos and Theodoridis [26] pointed out that both quality of the interface and quality of the information provided to consumers (two key aspects of usability of the website) have a significant effect on the levels of user satisfaction. According to all these ideas, we propose the following hypothesis:

H3: Usability of the G2C positively influences usage intention.

H4: Usability of the G2C positively influences citizen satisfaction.

2.3. Satisfaction and intention to use of G2C

Although these theories do not confirm specific beliefs relevant for a particular behavior on information technology or information system usage, the scholars agree that the beliefs-satisfaction-intention behavior chain of causality ultimately enhances user behavior. Satisfaction is an effect that may be captured as a positive (satisfied), indifferent, or negative (dissatisfied) feeling. Affect (as attitude) has been confirmed and validated in management information system areas (such as TAM based studies, Delone and McLean IS success model and ECM based studies) as an important determinant of intention, regarding information system usage. These previous findings suggest a substantial relationship between satisfaction and usage intention. Evidence shows that user's satisfaction with information technology may lead to information technology usage established via increased usage intention. Antonio et al. [4] described user satisfaction as a positive association with user continuous intention. In the area of e-government, Alawneh et al. [2] point out that user satisfaction is a crucial factor for continual usage of e-government services, and for the success or failure of e-government.

In the area of information system application, user intention use is a critical factor, ECM is a theory used to explain and to analyze user activity to continue or discontinue information system usage based on users' expectations.

At the user level, intention to use in information systems is deemed to be a critical factor to solve the problems of providers and companies for many studies in the area of e-commerce, e-banking, e-learning and self-service technologies [8-10]. In this study, citizen intention use is the most powerful factor of governments to perform B2C e-government usage behavior. Thus, the following hypothesis is derived as follows:

H5: Satisfaction positively influences citizen usage intention towards G2C.

Through the above discussion, we synthesized the related constructs, and proposed the research model shown in Figure 1 to explain and predict the intention of use towards credibility and usability of e-government websites.

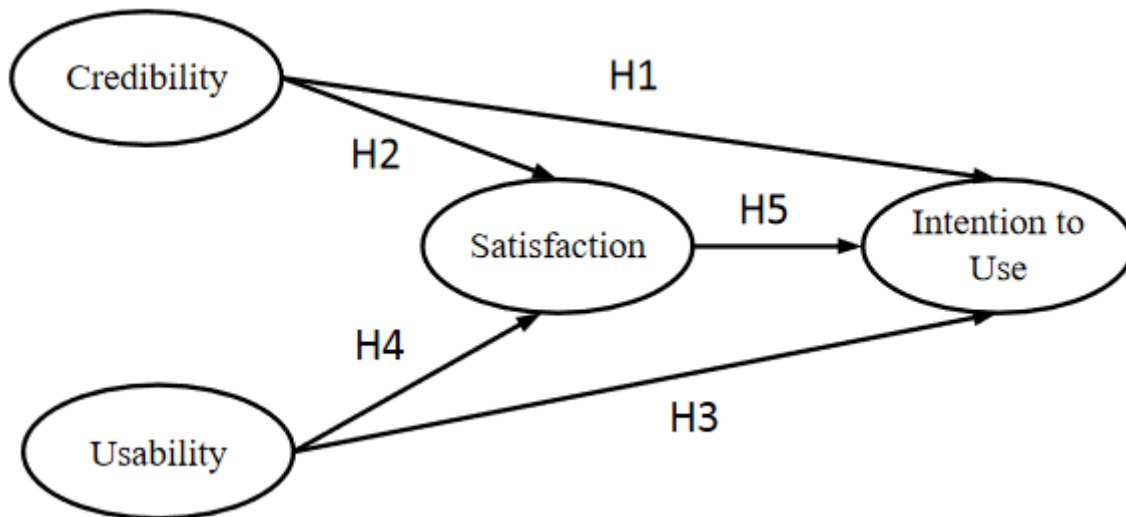


Fig. 1. Research Framework

3. Research Method

To achieve content validity, questionnaire items in this study are originally adopted or appropriately revised from relevant existing research. The questionnaire is divided into two parts. The first part of the questionnaire is designed to collect personal information of users in e-government including gender, age, education, occupation, usage experiences of e-government, and frequency of e-government usage. The second part consists of theoretical constructs of the proposed model to measure users' perceptions regarding the continued use of e-government. The scale items of each construct consists of multiple quizzes utilizing a five point Likert scale ranging from five (strongly agree) to one (strongly disagree). The scale items of constructs and sources are as follows:

- Credibility: Three items adapted from Cugelman et al. [14], Fogg et al. [20] and Huang & Benyoucef [22].
- Usability: Four items adapted from Belanche et al. [6]
- Satisfaction: Three items adapted and modified from Belanche et al. [6] and Chen [8].
- Intention use: Three items adapted and modified from Belanche et al. [6] and Chen [9].

In this study, convenience sampling and an online questionnaire were used to collect data (google form and e-mail). There are two top e-government websites in Indonesia (<http://www.surabaya.go.id/>) and (<http://bandung.go.id/>) and were utilized in our sampling. The respondents were university and lecturers because they are qualified and have strong experience utilizing e-government systems. We collected 432 responses for this survey in total. After eliminating invalid responses, 366 valid samples were obtained and the valid response rate of this survey is 84.72%. The profile of the participants is shown in Table 1.

Table. 1. Characteristics of Subjects

Characteristic	No	%
1. Gender		
Male	219	59.83
Female	147	40.16

2. Age		
21-30	340	92.89
31-40	19	5.19
Older than 40	7	1.91

4. Data Analysis

Evaluation Of the measurement model (or outer model in PLS) aims to assess the validity and reliability of the model. Outer model included reflective indicators, which are evaluated through convergent and discriminant validity of the indicators latent constructs and composite reliability. On the other hand, evaluation of the inner model aims to predict the relationship between latent variables. Inner models are evaluated to examine the magnitude of the percentage of variance explained by assessing the value of R-Square for endogenous latent constructs [36, 33, 23]. Therefore, we will evaluate both the measurement model and inner models for this study.

To test reliability, we performed factor loading, Cronbach's α and Composite reliability. To test validity of the constructs, we performed two tests: the convergent validity test, and the discriminant validity test. We applied the Fornell and Larcker method [21] to confirm convergent validity. We suggested convergent validity, if the factor loading of the indicators are greater than 0.5, the average variance extracted (AVE) is greater than 0.5, and reliability is greater than 0.7 (as shown in Table 2). In addition, we established a cross loading matrix (as shown in Table 3) to test the discriminant validity and to confirm whether the loading factors were greater than the cross loading.

Table. 2. Factor loadings and cross loadings

	Cred	IntU	Sat	Usa
Cred1	<u>0.801</u>	0.638	0.687	0.570
Cred2	<u>0.636</u>	0.227	0.431	-0.010
Cred3	<u>0.776</u>	0.322	0.534	0.308
IntU1	0.436	<u>0.751</u>	0.522	0.406
IntU2	0.541	<u>0.908</u>	0.594	0.371
IntU3	0.475	<u>0.803</u>	0.495	0.189
Sat1	0.645	0.449	<u>0.864</u>	0.452
Sat2	0.565	0.646	<u>0.677</u>	0.202
Sat3	0.572	0.407	<u>0.787</u>	0.359
Usa1	0.148	0.317	0.133	<u>0.736</u>
Usa2	0.509	0.411	0.532	<u>0.906</u>
Usa3	0.463	0.345	0.404	<u>0.876</u>
Usa4	0.334	0.218	0.217	<u>0.880</u>

Table. 3. Reliability analysis, convergent validity and correlation matrix

	Chronbach's Alpha	CR	AVE	IntU	Cred	Sat	Usa
IntU	0.76	0.78	0.68	1.000			

Cred	0.62	0.86	0.60	0.590	1.000		
Sat	0.67	0.82	0.61	0.655	0.768	1.000	
Usa	0.88	0.91	0.73	0.397	0.468	0.432	1.000

Common method bias is a major challenge for many scholars. Podsakoff et al. [31] argue that the problem in common method bias could induce impact bias conclusions. In this study, procedural and statistical remedies were used to reduce the impact of common method bias. After the Outer Model was estimated and matched with the criteria, the next step was to measure the structural model in PLS, called the inner model [36, 33, 23]. In the structural model evaluation, the R-Squares of endogenous latent variables were used as the predictive power of the structural model. Each change of the R-Squares values can be used to explain the certain exogenous latent variables that have a substantial influence on the endogenous latent variable. According to the R-square value of the structural model, it can be concluded as strong (≥ 0.75), moderate (≥ 0.5) or weak (≥ 0.25) because R-Squares represent the amount of variance of the construct described by the model. From the analysis, the value of R-Square on the construct of citizen intention use is 0.5 and the construct citizen satisfaction value is 0.5. This means that the existing model is moderate.

The second test in the structural model is a hypothesis test. This hypothesis test is used to examine the level of relationship between one variable and another variable. As shown in table 4, all the hypotheses are significant and their t-values are greater than 1,645. All the five hypotheses formulated in this study are supported.

Table. 4. T-Statistics of path coefficients

Hypothesis	Path	Standardized Path Coefficient	t-value	supported
H1	Cred-> IntU	0.173**	2.548	Yes
H2	Cred-> Sat	0.725***	20.647	Yes
H3	Usa -> IntU	0.112*	1.951	Yes
H4	Usa -> Sat	0.093*	1.814	Yes
H5	Sat -> IntU	0.474***	7.214	Yes

***: $p < 0.001$, **: $p < 0.05$, *: $p < 0.1$

5. Discussion

According to the analysis results and research framework shown in Table 4 and Fig 1, the relationship between credibility of the e-government website and citizen-intention-use is positive and significant (H1 is supported; coefficient = 0.173, p-value < 0.05 , and R -square = 0.547). Secondly, the relationship between credibility of e-government websites and citizen satisfaction is positive and significant (H2 is supported; coefficient = 0.725; p-value < 0.001 , R-square = 0.597). Thirdly, the relationship between usability of e-government websites and citizen-intention-use is positive and significant (H3 is supported; coefficient = 0.112; p-value < 0.1 , R-square = 0.547). website positively influence citizen satisfaction (H4 is supported; coefficient = 0.093; p-value < 0.1). Finally, the relationship between citizen satisfaction and citizen-intention-use (H5 is supported; coefficient = 0.474; p-value < 0.001 , R -square = 0.547).

According to the analysis results, we reached the following conclusions. Credibility of e-government websites presents important indicators to determine citizen satisfaction and citizen-intention-use. This is because e-government websites are based on trusted sources, detailed information, and have an ability to protect identities and citizen

information. Thus the results are significant and have an impact on citizen behavior, satisfaction, and citizen intention use. Usability is the other important indicator, which is used to determine usage on e-government websites and taking into account citizen intention to use.

Based on the study of Telanche and Huang [22], we developed a relationship between usability and credibility to satisfaction and intention to use. The results of the study would be helpful for software developers, especially for the development and design of e-government software, in terms of usability and credibility, which are essential in this area. Secondly, from the academic perspective, this research provides value reference sources regarding: the study of e-government, assessing citizen satisfaction, citizen intention to use, and researching usability and credibility. Thirdly, from the managerial perspective, this study is also very useful for policy makers or stakeholders, especially in government areas and thuse-government will be positioned as a benchmark of public services, and impact policy-making relatively.

Therefore, both credibility and usability give a strong impact on citizen perceptions of G2C e-government. According to Table 4, the significant degree of credibility is higher than usability in the relationship between satisfaction and intention-to-use. In other words, the degree of relationship between usability and intention-to-use is not so highly significant. Therefore, we could conclude that users are more satisfied with the credibility of e-government service than usability does.

Public users who are satisfied with e-government services tend to maintain an advantageous relationship with the e-service. Accordingly, citizens who feel highly satisfied with G2C e-government typically gain a pleasurable experience when visiting e-government platforms.

References

- [1] Abdeldayem, M.M., 2010. A study of customer satisfaction with online shopping: evidence from the UAE. *International Journal of Advanced Media and Communication* 4 (3), 235–257.
- [2] Alawneh, A., Al-Refai, H., & Batiha, K. (2013). Measuring user satisfaction from e-Government services: Lessons from Jordan. *Government Information Quarterly*, 30 (3), 277–288.
- [3] Albright, M. D., & Levy, P. E. (1995). The effects of source credibility and performance rating discrepancy on reactions to multiple raters. *Journal of Applied Social Psychology*, 25, 577–600.
- [4] Antonio, F., Pereira, D. M., Saraiva, A., Ramos, M., Aparecida, M., & Freitas, M. (2015). Computers in Human Behavior Satisfaction and continuous use intention of e-learning service in Brazilian public organizations. *Computers in Human Behavior*, 46, 139–148.
- [5] Ayeh, J. K. (2015). Travelers' acceptance of consumer-generated media: An integrated model of technology acceptance and source credibility theories. *Computers in Human Behavior*, 48, 173–180.
- [6] Belanche, D., Casaló, L. V., & Guinalíu, M. (2012). Website usability, consumer satisfaction and the intention to use a website: The moderating effect of perceived risk. *Journal of Retailing and Consumer Services*, 19 (1), 124–132.
- [7] Bélanger, F., & Carter, L. (2008). Trust and risk in e-government adoption. *The Journal of Strategic Information Systems*, 17 (2), 165–176.
- [8] Chen, S. C. (2012). To use or not to use: understanding the factors affecting continuance intention of mobile banking. *International Journal of Mobile Communications*, 10 (5), 490-507.
- [9] Chen, S.-C., Chen, H.-H., & Chen, M.-F. (2009). Determinants of satisfaction and continuance intention towards self-service technologies. *Industrial Management & Data Systems*, 109 (9), 1248–1263.
- [10] Chou, J. -R., & Hsiao, S. -W. (2007). A usability study on human computer interface for middle-aged learners. *Computers in Human Behavior*, 23 (4), 2040–2063.
- [11] Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*, 295 (2), 295–336.

-
- [12] Chin, W.W., Newsted, P.R. (1999). Structural equation modeling analysis with samples using partial least squares. In: Hoyle, R. (Ed.), *Statistical Strategies for Small Sample Research*. Sage, Thousand Oaks, CA, pp. 307–341.
- [13] Coursaris, C. K., Hassanein, K., Head, M. M., & Bontis, N. (2012). The impact of distractions on the usability and intention to use mobile devices for wireless data services. *Computers in Human Behavior*, 28 (4), 1439–1449.
- [14] Cugelman, B., Thelwall, M., & Dawes, P. (2008). Website credibility, active trust and behavioral intent. *Lecture Notes in Computer Science (including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 5033 LNCS, 47–57.
- [15] Evans, D., & Yen, D. C. (2006). E-Government: Evolving relationship of citizens and government, domestic, and international development. *Government Information Quarterly*, 23 (2), 207–235.
- [16] Fernandez, A., Abrahão, S., & Insfran, E. (2013). Empirical validation of a usability inspection method for model-driven Web development. *Journal of Systems and Software*, 86 (1), 161–186.
- [17] Fernandez, A., Insfran, E., & Abrahão, S. (2011). Usability evaluation methods for the web: A systematic mapping study. *Information and Software Technology*, 53 (8), 789–817.
- [18] Flanagin, A. J., & Metzger, M. J. (2003). The perceived credibility of personal Web page information as influenced by the sex of the source. *Computers in Human Behavior*, 19 (6), 683–701.
- [19] Flaviá n, C., Guinalí u, M., Gurrea, R., 2006. The role played by perceived usability, satisfaction and consumer trust on website loyalty. *Information & Management* 43 (1), 1–14.
- [20] Fogg, B.J., Soohoo, C., Danielson, D.R., Marable, L., Stanford, J., & Tauber, E.R. (2003). How do users evaluate the credibility of Web sites? A study with over 2500 participants. *Proceedings of the 2003 conference on designing for user experiences* (pp. 1–15). New York, NY, USA: ACM.
- [21] Fornell, C., & Larcker, D. F. (1981). **Evaluating structural equation models with unobservable variables and measurement error**. *Journal of Marketing Research*, 18 (1), 39–50.
- [22] Huang, Z., & Benyoucef, M. (2014). Usability and credibility of e-government websites. *Government Information Quarterly*, 31 (4), 584–595.
- [23] Kaufmann, L., & Gaeckler, J. (2015). A structured review of partial least squares in supply chain management research. *Journal of Purchasing and Supply Management*, 21 (4), 1–14.
- [24] Kim, E., Eom, S., 2002. Designing effective cyber store user interfaces. *Industrial Management and Data Systems* 102 (5), 241–251.
- [25] Liu, Z. (2004). Perceptions of credibility of scholarly information on the Web. *Information Processing and Management*, 40 (6), 1027–1038.
- [26] Maditinos, D.I., Theodoridis, K., 2010. Satisfaction determinants in the Greek online shopping context. *Information Technology and People* 23 (4), 312–329.
- [27] Metzger, M. J., & Flanagin, A. J. (2013). Credibility and trust of information in online environments: The use of cognitive heuristics. *Journal of Pragmatics*, 59, 210–220.
- [28] Nielsen, J. (1994). *Heuristic evaluation: Usability inspection methods*. New York: SAGE Publications.
- [29] Nielsen, J. (2000). *Designing web usability: The practice of simplicity*. Thousand Oaks, CA, USA: New Riders Publishing.
- [30] Pina, V., Torres, L., & Acerete, B. (2007). Are ICTs promoting government accountability ? : A comparative analysis of e-governance developments in 19 OECD countries. *Critical Perspectives on Accounting*, 18 (5), 583–602.
- [31] Podsakoff, P.M., S.B. MacKenzie, J.Y. Lee and N.P. Podsakoff. (2003). Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *Journal of Applied Psychology* 88 (5): 879-903.
- [32] Rains, S. a., & Karmikel, C. D. (2009). Health information-seeking and perceptions of website credibility: Examining Web-use orientation, message characteristics, and structural features of websites. *Computers in Human Behavior*, 25 (2), 544–553.
- [33] Rezaei, S. (2015). Segmenting consumer decision-making styles (CDMS) toward marketing practice: A partial least squares (PLS) path modeling approach. *Journal of Retailing and Consumer Services*, 22, 1–15.

-
- [34] Rieh, S.Y. (2002). Judgment of information quality and cognitive authority in the web. *Journal of the American Society for Information Science and Technology*, 53 (2), 145–161.
- [35] Robins, D., & Holmes, J. (2008). Aesthetics and credibility in web site design. *Information Processing and Management*, 44 (1), 386–399.
- [36] Sarstedt, M., Ringle, C. M., Smith, D., Reams, R., & Hair, J. F. (2014). Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *Journal of Family Business Strategy*, 5 (1), 105–115.
- [37] Suroso, A. I., & Ramadhan, A. (2012). Decision support system for agribusiness investment as e-Government service using a computable general equilibrium model. *Advances in Intelligent and Soft Computing*, 144 AISC (VOL. 1), 157–162.
- [38] Taylor, N. G., Jaeger, P. T., Gorham, U., Bertot, J. C., Lincoln, R., & Larson, E. (2014). The circular continuum of agencies, public libraries, and users: A model of e-government in practice. *Government Information Quarterly*, 31 (SUPPL.1), S18 – S25.
- [39] Urbach, N., Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *J. Inf. Technol. Theory Appl.* 11, 5–40.
- [40] Wetzels, G. Odekerken-Schröder, C. van Oppen (2009). Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration. *MIS Quarterly*, 33 (1), 177–195.