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This is the accepted version of a paper published in Conference proceedings: Next Generation Computing Applications 2019, NextComp 2019, 19-21 September 2019 Mauritius. The final, published version is available via DOI:
https://doi.org/10.1109/NEXTCOMP. 2019.8883653

# Determinants of E-Government Use in Developing Countries: The Influence of Privacy and Security Concerns

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***Abstract*— There has been growing concern about privacy and security risks towards electronic-government (e-government) services adoption. Though there are positive results of e-government, there are still other contestable challenges that hamper success of e-government services. While many of the challenges have received considerable attention, there is still little to no firm research on others such as privacy and security risks, effects of infrastructure both in urban and rural settings. Other concerns that have received little consideration are how for instance; e-government serves as a function of perceived usefulness, ease of use, perceived benefit, as well as cultural dimensions and demographic constructs in South Africa. Guided by technology acceptance model, privacy calculus, Hofstede cultural theory and institutional logic theory, the current research sought to examine determinants of e-government use in developing countries. Anchored upon the aforementioned theories and background, the current study proposed three recommendations as potential value chain, derived from e-government service in response to citizens (end-user) support, government and community of stakeholders.**

***Keywords*—E-government, South Africa, citizens, influencers**

## I. INTRODUCTION

Modelling developing countries e-government determinants in particular South Africa, have become an imperative issue, as suggested by studies [34, 1]. Like many countries, even though one of the electronic government's (e-government's) benefits/purpose is to enhance "… the interaction between government and citizens (G2C)" [34], like many countries too, inherently, e-government is associated with the use of information technology by government agencies [with the] ability to transform relations with citizens, businesses and other arms of government…."

Due to its purpose(s), characteristically, in South Africa, e-government has also been categorised into four folds as Government-to-Citizen (G2C), Government-to-Business (G2B), Government-to-Employee (G2E), Government-to-Government (G2G). Some of e-government services/uses may include, but not exclusively; e-health (m-health), e-education (m-learning), e-voting, e-tax and e-banking. Despite its usefulness as suggested by its definition as "the use of technology to enhance the access to and delivery of government services to benefit citizens, business partners and employees," there are still several challenges as argued in subsequent sections. Though many challenges have been cited, particular reference has been on how e-government adoption is affected by factors such as; privacy and security concerns, effects of infrastructure both in urban and rural contexts. For instance, recent work on "influences of architectural and implementation choices on cyberinfrastructure quality" suggests that "cyberinfrastructures (CIs) are complex socio-technical-economical systems that are difficult to describe, design, analyze, and evaluate" [62]. As an example; "…e-health CIs are patient-centric community-serving systems that have particular regulations for information security, governance, resource management, scalability, and maintainability" [62].

Given such assessment, it is argued that in order to address both privacy and security risks, capability maturity model integration (CMMI), which is a programme aimed at addressing both process-level improvement training and appraisal be paramount may need attention. What this means is that features of CMMI relative to e-government services should include; organizational preparedness for secure development (OPSD), secure management in projects (SMP), security requirements and technical solution (SRTS) as well as security verification and validation (SVV).

Even though these process areas necessarily do not affect maturity of e-government, it is prudent to examine appraisal results of e-government [62], but most significantly, the current research tends to examine determinants of e-government use in developing countries; the influence of privacy and security concerns. Even though some of these factors have received international [46, 54] attention, it is still apparent in South Africa that little to no firm studies are conducted to examine the determinants or challenges of e-government. As a consequence, and guided by these tentative challenges, the basis of the present study is geared towards examining developing country's e-government adoption – guided by privacy and security risks.

### *A. Methodology on selecting previous work*

While many of the challenges have received considerable attention, there is still little to no firm research on others such as; privacy and security risks, effects of infrastructure both in

urban and rural on e-government. Other concerns that have received little consideration are how for instance, e-government depends on both cultural dimension and demographic constructs in South Africa.

As a consequence of the challenges, the review of work and thus the choice of selection of previous papers was positioned upon technology acceptance model, privacy calculus, Hofstede cultural theory and institutional cultural theory. Guided by such selected theories, the current research was in effect directed by literature on; e-government services related to but not exclusively on; privacy and security concerns, infrastructure in both urban and rural, perceived usefulness, and cultural values. For the most part too, considerable attention was given to both local sources [36, 1, 2, 9, 16, 35, 41] as well as international studies [11, 14, 31 40, 28, 29] as depicted in Table 1.

TABLE I. METHODOLOGY ON SELECTING PREVIOUS WORK

| **Challenges or variables** | ***Theories*** | ***Some Sources*** |
|---|---|---|
| Privacy and security risks | Technology acceptance model Privacy calculus Hofstede cultural theory and Institutional cultural theory | [36, 1, 2, 9, 16, 35, 41] [11, 14, 31 40, 28, 29] |
| E-government infrastructure; urban & rural | | |
| Perceived usefulness Ease of use, | | |
| Perceived benefit, Perceived risks, and | | |
| Cultural values | | |
| Demographic constructs | | |

### B. *Hypothesis development*

Following the introductory section and based on the selection of papers, the hypothesis made is that; continuous use of e-government services in developing countries are significantly influenced by; privacy and security concerns, effects of infrastructure both in urban and rural on e-government, perceived benefit, together with cultural dimensions and demographic constructs.

## II. BACKGROUND AND RELATED WORK

The background accounts for literature survey related with South Africa's e-government services, privacy and security risks, appropriate information systems infrastructure, risk perception, and local cultural nuances effect on e-government.

### A. *Literature Survey- State of e-government services in South Africa and an explanation of hypotheses.*

A recent survey of literature highlights the increasing need for electronic-government services (e-government) among South Africans [35 1]. E-government researchers [35, 16] recognised and explained e-government as the public sector's use of an application of information systems. E-government is essentially used to conduct and execute services to citizens on demand and supply basics, albeit with considerable challenges. It has thus been hypothesised that; data security and privacy risks, appropriate information systems infrastructure, citizen support, the effect of local culture, as reflected in Figure 1, significantly influence e-government use in developing countries. Thus, there exist wide range of determinants or influencers of e-government, which impact e-government services such as; e (electronic)-voting (e-election), e-tax ([eFiling]), e-health (m-Health), e-banking and e-education [24, 47, 17, 57, 43, 30, 39, 10].

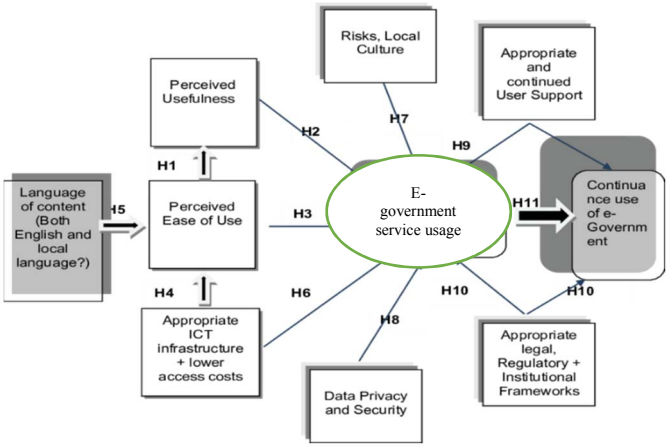


Fig 1. Hypothetical model for current research

Examining the influencers of e-government, particularly in developing countries, has also become imperative even on a global scale. Regardless of the types of e-government, principally, the success/failure (challenges) of e-government arguably correlates with data/personal security and privacy risks, appropriate information systems infrastructure and legal regulations, effect of local culture together with demographic constructs [7, 44, 12]. Even though, there is ongoing research globally on modelling e-government risks, the literature survey on data security and privacy risks, appropriate information systems infrastructure and legal regulations, citizen support, effect of local culture factors as influencers of e-government services in South Africa is not firmly established [44, 7, 12]. These challenges form the basis for the current research as elaborated in subsequent sections. However, despite its usefulness, there are still several challenges as elaborated in subsequent sections [3: 321, 46, 50, 43, 31 5, 39].

### B. *Privacy and security risks concerns*

Majority of both recent and old South African studies [ 35, 1,17, 39] have highlighted numerous challenges associated with e-government services particularly e-voting,

electronic tax (e-tax [eFiling]), e-health (m-health), e-banking to e-education. One such concern is the emerging and disturbing privacy and security risks associated with e-government services in South Africa. What is disturbing is that there is a growing concern amongst citizens about how their personal information is handled and hence the need to address issues of integrity, confidentiality and availability of data, computer programs, data storage mediums, and computer systems. Arguably too, the suggestions are that e-government adoption mostly depends on privacy and security governance – which may or may not relate with poor security cultural factors, trust factors such as information accuracy, reliability, relevance, and local language [6, 34, 1, 9, 16]. These risks on e-government services as reported in [46] may sometimes include; server-side vulnerabilities in the form of operating system attacks. There are also the hypervisor attacks in the form of identifying loopholes in e-government. Others may include client-side vulnerabilities targeting citizen's devices [45]. This vulnerability in the form of trust and privacy risk is explored further under the sub-section viz; local culture nuances and effect on e-government**.** Thus, the suggestion is; the success of e-government would be fruitful if a discerning effort is tailored towards addressing privacy and security risks concerns. The prevailing wisdom is that it could enable rapid adoption of such services with an extended emphasis on the improvement of knowledge of privacy and security risks. As a consequent too, there has been a request [6] for crucial need by signifying that "…the lack of security and consumer trust in service providers …" such as and including government information systems is a "… the major barrier to adoption..." of e-government services. Consequently, to some authors [49, 42, 30] and with particular reference to another researcher [6], it is argued that "consumers need confidentiality, authentication, data integrity, and non-repudiation as key requirements…" for transactional purposes.

### *C. Operability of infrastructure, legal framework*

Due to appropriate (or lack thereof) information systems infrastructure and legal regulations in South Africa and most developing countries, there is a general view [34] that South Africa lags behind in terms of the adoption of e-government services as compared with some regions of Africa such as the East/North African regions. However, it is worth noting that while e-government is gradually gaining a footing in Africa and around the world as reflected in both e-government development index (EGDI) per geographical region, there is still more work to be done as ranked by United Nations E-Government Survey [50]. As of 2018, the EGDI per geographical region in the top 10 African countries indicates that South Africa ranks number 68 after Mauritius ($66^{th}$) [50]. As a concern raised [50], the leading course of the lag is as a result of inappropriate information systems infrastructure and legal regulations and legislature to guide e-government [50, 38].

There is also a view that South Africa is not digitally ready due to lack of technical infrastructure, data privacy, security policies/implantations, and human capital readiness/skills [27, 49, 11, 42, 5, 38]. Thus, also questioning the adoption rate [13]. Due to the lack of adequate adoption in South Africa as suggested by some researchers [50, 37], it has been highlighted [34] that for "…e-government strategies and projects … to be effective, accountability needs to be taken of factors such as "…illiteracy, rural area problems, … weak infrastructure through the development of adequate access methods" as a constituent of e-government. Consequently, it could be argued that developing countries such as South Africa, are likely to reach its full potential if infrastructure, not only in urban, but rural, through the development of adequate access methods is improved.

### *D. Perceived usefulness, ease of use, risk perception and perceived benefit*

Perceived risks usually are citizen's expectations of suffering a loss in pursuit of e-government**.** As defined [51: 11], interoperability in e-governance is "the ability of different systems from various stakeholders of e-governance to work together, by communicating, interpreting and exchanging the information in a meaningful way" hence the dependency and interconnectedness of e-government. In Hawaii (USA), a 2010 study [52] explored the degree to which reputation and security serve as influencers one - tax (e-filing); thus via structural equation modelling (SEM), for instance, it was established that risk perceptions are a function of both reputation and perceived security control. More significantly, it was found that the use of an e-file system largely depends on extra factors such as perceived risk, performance expectancy, and social influence. Through path coefficients analysis [52], it was thus expected that risk perceptions influences e- tax filing and hence e-government services, noting that perceived risk may be as a result of both behavioral. Thus, it is hypothesized that perceived security control reduces risk perceptions and thus a determinant of e-government. Accordingly, based on how authentication, non-repudiation, confidentiality, integrity, and anonymity influence e-government, it is expected from rational thought (privacy calculus theory) that individuals' behaviors redirect the intention, hence adoption of the technology [40]. What is drawn from privacy calculus theory as well as TAM is that discloser of a citizens' personal information is contingent upon whether the citizens deem that the benefits to be acquired from the e-government services outweighs the risks – hence the calculation of privacy or privacy calculus and the characteristics ascribed by TAM. Thus it could be hypothesized that e-government is a function of risk perception and hence a positive correlation could exist between e-government and the constructs; perceived benefit.

### *E. Local culture nuances and effect on e-government*

The first cultural dimension of Hofstede, *individualism-collectivism*, is "the degree to which people in a country prefer to act as individuals rather than as members of groups" [23: 6]. The second dimension is *power distance*, is "the extent to which a society accepts the fact that power in institutions and organizations is distributed unequally" [20]. Third, *uncertainty avoidance* is "the extent to which a society feels threatened by uncertain and ambiguous situations and tries to avoid these situations by providing greater career stability, establishing more formal rules, not tolerating deviant ideas and behaviors, and believing in absolute truths

and the attainment of expertise" [20]. The fourth dimension is *masculinity-femininity*, with masculinity, which is "the extent to which the dominant values in society are 'masculine'—that is, assertiveness, the acquisition of money and things" [20]. Regardless of the position of the South African context, as explained, there are various competing explanations related to influencers associated with e-government services. One that has drawn extensive attention is local cultural nuances. This is because, factors affecting e-government services, internationally and locally differ a great deal [44, 51]. In the past three years, for instance, it has been hypothesised [25] that national infrastructure using Hofstede's cultural dimensions by asserting for instance, in some cases that a nation's masculinity-femininity (MAS) dimension may have an inverse relation with the diffusion of services such as e-government.

Not only could MAS play such a role but that a nation's uncertainty avoidance (UAI) dimension could as well have an inverse relation with the continuous use of e-government. So do other individualism-collectivism (IDV) and power distance (PDI). For instance, the degree to which individualism, power distance, uncertainty together with privacy and security play crucial roles in the adoption of e-government services in South African is not known. While it may be true in Western society [27], cultural theory [18] does not (1) completely address why people behave differently in various societies (2) does not fully recognize institutional heterogeneity across different settings in South Africa. What is meant is that e-government ecosystem should better be viewed in the definition of institutional logic theory "…as the socially constructed, historical patterns of cultural symbols and material practices, including assumptions, values, and beliefs, by which individuals and organizations provide meaning to their daily activity, organize time and space, and reproduce their lives and experiences" [49]. What it means in another independent research [26: 1] in Germany and Switzerland was to attempt to advance constructs to explain "(1) dispositional factors such as privacy concerns and institutional trust [that] may affect situation-specific privacy and (2) that privacy assessment which may also be determined by momentary affective states". In essence, and by far supporting option, institutional logics theory offers interrelationships found in institutions in social systems and individuals as suggested in its definition. Thus responding to the question of "…how individual and organizational actors are influenced by their situation in multiple social locations in an inter-institutional system…" such as culture [47]. As a consequence, to previous work [47], it is argued [49] that the exploration of "…interactions between culture and other predictors... and the fact that contextual and attitudinal predictors vary between different cultures…" recommended that a discrete model is developed thus enabling e-government friendly environment. Confirmed research does not also exist to correlate South Africa's poor understanding of cultural dimensions and e-government adoption.

## III. Theoretical Framework (Model)

Research in the past five years suggests that having a single model (models) as a standard measure for e-government causes insufficiency. This is because, myriad of factors affect e-government adoption. The technology acceptance model (TAM), institutional logic theory, privacy calculus, and Hofstede cultural models collectively serve as models for that reason. As theories, they are expected to explain the factors used to evaluate e-government concerning citizen's intent and extent of use.

One other reason for the inclusion of institutional logics theory, privacy calculus, and Hofstede cultural theory is partly due to the different constructs associated with modelling determinants of e-government country [50].

As a consequence, the analysis of the influencers of e-government related research is bound to be addressed by different types of theories (theory used interchangeably with model) including; Technology Acceptance Model (TAM) [11]. Others include the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB) [4]. Some studies outside of South Africa have lately incorporated Hofstede cultural theory (HCT) with mixed results [36, 56].

### *A. TAM, privacy calculus, Hofstede cultural theory and other theories interconnectedness with current research*

As noted in the background, institutional logic theory both in the 1990s and early 2000s have been considered and proposed to expand the body of knowledge with regards to cultural settings [49], suggesting different theories are being used for e-government for various purposes [36, 11, 14, 31 40, 28, 29]. For instance, TPB has been used to examine behavioural control and social norms, both TRA and TAM2 were used to examine subjective norms [55]. Nevertheless, these are considered unsuitable for examining how to model determinants of e-government, because these are subjective norm-based [42, 4], which is similar to the unified perspective of the unified theory of acceptance and use of technology (UTAUT) [55]. Others include diffusion of innovation (DOI), motivational model (MM), social cognitive theory (SCT), model of PC utilisation (MPCU) and a combined TPB-TAM model. For example, UTAUT examines only social influence constructs which in part are deemed inappropriate and insufficient for e-government. It is important to note though that previous research [43] has shown that TAM is "…overruled on the basis of confidentiality and trustworthiness, though largely considered utilitarian, hence the introduction of Hofstede cultural theory, institutional logic theories as well privacy calculus." For instance, some [61] have exploited other issues of security but skewed towards how "…trustworthiness and regulatory framework…" as a set of variables that influence mobile payment systems, which does not address how authentication, non-repudiation, confidentiality, and anonymity are reliable in predicting and explaining e-government.

### *B. Use of Privacy calculus and TAM in e-government*

Privacy calculus was first mentioned in the 1970s [60, 35] and referred to as "calculus of behaviour." The theory could be used to evaluate how "… individuals determine their disclosures by assessing whether they could manage the

information to be shared while minimizing the negative consequences of these self-disclosures." In response to the potential value of modelling e-government (to be explained), a definition [49] regarding "privacy calculus concept is adopted and implies that e-government users' disclosures are a result of balancing the risks of their disclosures with the gratifications gained." For the present study and due to the criticism (to be explained further) of both privacy calculus and cultural dimensions, the modelling of e-government could adopt e*xtended* privacy calculus model [12]. The extended privacy calculus theory is a criticism of some author's [26] suggestion regarding evaluation of privacy that "…prior research has predominantly regarded privacy-related decision making as a rational process guided by an internal cognitive assessment of (1) the anticipated costs (or risks) and (2) the perceived benefits connected to the provision of personal data". What is meant is that use of e-government is based on "…anticipatory, rational weighing of risks and benefits …" [26]. While the assessment appears intuitive, it has received various criticisms such as the thought that "… rational considerations are bounded by limited resources or heuristic thinking" [26].

### C. *Use of institutional logic theory and Hofstede cultural theory in the current study*

"Institutional logics theory are sets of material practices and symbolic constructions that constitute a field's organizing principles and that are available to organizations and individuals to elaborate" [15]. To this effect, "…users may not be able to weigh all the risks and benefits due to lack of information, situational constraints, or cognitive abilities" [49: 2]. Hence the application of both institutional logic theory and Hofstede's cultural dimension [19]. Following previous literature, as noted in the background too, there is an indication from privacy calculus that with information systems (IS), customers behave reasonably when they choose to use IS. However, a position held is that users are guided by institutional logics which "…shape rational, mindful behaviour and individual and organisational actors have some hand in shaping and changing institutional logic" [48]. Thus, as suggested and backed by both Hofstede cultural theory and institutional logic theory in modelling e-government could endeavour to assess how culture, perceived ease of use, appropriate regulatory and institutional framework, and language positively affect e-government services.

## IV. CONCLUSION AND POTENTIAL VALUE CHAIN PROPOSITION

Even though both the background and theories do not entirely give an exhaustive account of determinants of e-government in developing countries; report from different sources and contexts have all alluded to the potential value chain that e-government could bring to citizens particularly in developing nations, where there has been a rising demand for prompt and quality service. While the authors of the research do not wish to inundate readers with unrealistic challenges or determinants, a concerted effort has been made to derive the propositions from the discussion, framed by the theories and background thus far. The authors thus propose among others that; It is thus hypothesised South Africa's e-government and other developing countries is significantly

influenced by privacy and security issues and infrastructure, in both urban but rural. From the literature as well as the theoretical framework, it could also be theorized that e-government is a function of perceived risk. However, most importantly, it is hypothesized that cultural dimensions are significant influencers of e-government in developing countries.

### A. *Recommendations*

Based on the conclusion and thus the potential value chain in the form of responding to the propositions, there may possibly be four potential recommendations. These have been summarized as Citizen (end-user support)- Potentially, developing countries citizens shall be well informed with context-based results in terms of; privacy and security risks, infrastructure in both urban and rural context, perceived risks, and cultural values. Government– Since e-government is principally categorized into different types, these categories may suitably be applied to examine determinants of e-government use in developing countries. A community of stakeholders - The research could potentially contribute to understanding determinants of e-government services. Given that acceptance methodology is potentially dependent on factors such as; privacy and security risks, infrastructure in both urban and rural, perceived risks, and cultural values, it is as a consequence recommended that acceptance methodology should include not only TAM, but juxtaposing with - privacy calculus, Hofstede cultural theory and institutional cultural theory interconnectedness.

TABLE II. ACCEPTANCE METHODOLOGY

| ***Methodology*** | ***Constructs/ variables*** | ***Theory/model type*** |
|---|---|---|
| Acceptance methodology | Privacy and security risks, infrastructure; urban and rural, perceived usefulness, ease of use, perceived risks, cultural values. | TAM |
| | | Privacy calculus, |
| | | Hofstede cultural theory |
| | | Institutional cultural theory |

## REFERENCES


[1] P. Alexander,. "A rebellion of the poor: South Africa's service delivery protests–A preliminary analysis." Review of African Political Economy, vol. 37, pp 25–40, 2010

[2] A.. Ali, "A study of security in wireless and mobile payments," Master's Thesis, ISY, Linköping Institute of Technology. 2010.

[3] N. Alharbi, M. Papadaki, & P. Dowland, "Security Factors Influencing End Users' Adoption of E-Government," Journal of Internet Technology and Secured Transactions, vol 3, pp 320- 328, 2014.

[4] I. Ajzen, "The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes, vol 50, pp 179-211, 1991.

[5] L. Avivah, "Best Practices in Mobile User Authentication and Layered Fraud Prevention," NJ, Pearson Education, 2011.

[6] Z. Bezhovski, "The Future of the Mobile Payment as Electronic Payment System," European Journal of Business and Management, vol 8. pp 127 -132, 2016.

[7] C. Carlsson, “Mobile commerce: core issues, products, and services,” Paper at the Bled Electronic Commerce Conference, Bled, Slovenia. Clemons. 2001.

[8] Y. Chou, C. Lee, & J. Chung, “Understanding m-commerce payment systems through the analytic hierarchy process,” Journal of Business Research, vol 57, pp 1423-1430, 2004.

[9] F. Cloete, “E-government lessons from South Africa 2001-2011: Institutions, state of progress and measurement: Section II: Country perspectives on e-government emergence,” The African Journal of information and communication, vol 12, pp 128–142, 2012.

[10] K. Daştan, & C. Gürler, “Factors Affecting the Adoption of Mobile Payment Systems: An Empirical Analysis,” Emerging Markets Journal. vol 6, pp 15 -24, 2016.

[11] F.D. Davis, “Perceived usefulness, perceived ease of use, and consumer acceptance of information technology,” MIS Quarterly, vol 13, pp. 319–340, 1989.

[12] T. Dinev, & P. Hart, “Extended Privacy Calculus Model for E-Commerce Transactions,” Information Systems Research, vol 17, 61–80, 2006.

[13] Economist Intelligence Unit, Digital economy rankings 2010: Beyond e-readiness. A report from the Economist Intelligence Unit, written in co-operation with the IBM Institute for Business Value, 2010

[14] M. Ervasti, & H. Helaakoski, “Case study of application-based mobile service acceptance and development in Finland,” International Journal of Information Technology and Management,vol 9, 243–259, 2010

[15] R., Friedland, & R. R. Alford. “Bringing Society Back in: Symbols, Practices, and Institutional Contradictions,” pp. 232-266, 1991, in The New Institutionalism in Organizational Analysis, edited by Walter W. Powell and Paul J. DiMaggio. Chicago: University of Chicago Press.

[16] R. Heeks,. “e-Government in Africa: Promise and practice,” Information Polity, vol 72, pp 97–114, 2002.

[17] A. Herzberg, “Payments and Banking with Mobile Personal Devices,” Communications of the ACM, vol 46, pp 53–58, 2003.

[18] G. H. Hofstede, G. J. Hofstede, & M. Minkov, “Cultures and organizations: Software of the mind: Intercultural cooperation and its importance for survival,” (Rev. expanded 3rd ed.). New York, NY: McGraw-Hill, 2010.

[19] G. H. Hofstede, & R. R. McCrae, “Personality and culture revisited: Linking traits and dimensions of culture. Cross-Cultural Research,” The Journal of Comparative Social Science, vol 38, pp 52–88, 2004

[20] G. Hofstede, “Motivation, leadership, and organization: Do American theories apply abroad?” Organizational Dynamics, 9, pp 42–63, 1980b.

[21] G. Hofstede, “Management scientists are human,” Management Science, vol 40, pp 4–14, 1994.

[22] J. Y. Hu, C. C. Sueng, & W. H. Liao, “Android-based mobile payment service protected by 3-factor authentication and virtually private,” Available at Ad hoc networking[C]//Computing, Communications, and Applications Conference (ComComAp), IEEE, pp 111-116. 2012, Accessed on June 2017.

[23] A. Jackson, “Analysis of Security Issues in Electronic Payment Systems Nigeria,” International Journal of Computer Applications, vol 108, 2014

[24] C. Jayawardhena, & P. Foley “Overcoming constraints on electronic commerce: Internet payment systems,” Journal of General Management, vol 24, pp 19-35, 1998

[25] J. Kaminsky, “Cultured Construction: Global Evidence of the Impact of National Values on Renewable Electricity Infrastructure Choice,” Environ. Sci. Technol, 50, pp 2108−2116, 2016.

[26] F. Kehr, D. Wentzel, & P Mayer, “Rethinking the privacy calculus: on the role of dispositional factors and affect,” Thirty-Fourth International Conference on Information Systems, Milan 2013, Accessed on 20 July 2018.

[27] C. Kim, M. Mirusmonov, & I. Lee, “An empirical examination of factor,” NJ, Pearson Education, 2010.

[28] F. Liebana-Cabanillas, “El paper de los sistemas de pago en los nuevos entornos electrónicos [The role of payment systems in the new electronic environments] (Doctoral Thesis), Department of Marketing and Market Research. Universidad de Granada, 2012.

[29] I. R. Luna, F. Montoro-Rios, & F. Liebana-Cabanillas, “Determinants of the intention to use NFC technology as a payment system: an acceptance model approach,” Information Systems and e-Business Management, vol 14, pp 293–314, 2016

[30] M. Mbogo, “The Impact of Mobile Payments on the Success and Growth of Micro-Business: The Case of M-Pesa in Kenya,” The Journal of Language, Technology & Entrepreneurship in Africa, vol 2, pp 182 -203, 2010.

[31] N. Mallat, M. Rossi, V. K. Tuunainen, & A. Oorni, “The impact of use context on mobile services acceptance: The case of mobile ticketing,” Information & Management, vol 46, pp 190–195, 2009

[32] M.I Manda,. & J. Backhouse, "Addressing trust, security and privacy concerns in e-government integration, interoperability and information sharing through policy: a case of South Africa" CONF-IRM 2016 Proceedings. 67. http://aisel.aisnet.org/confirm2016/67. 2016. Available on 20 June 2018.

[33] T. Mawela, N.M. Ochara, & H. Twinomurinzi, “E-Government Implementation: A Reflection on South African Municipalities,” South African Computer Journal, vol 29, 147–171, 2017

[34] T. Mawela, N. M. Ochara, & H. Twinomurinzi, “e-Government implementation: Lessons from South African municipalities,” In Proceedings of the Annual Conference of the South African Institute of Computer Scientists and Information Technologists (SAICSIT ’16), 2016, Johannesburg, South Africa. ACM.

[35] A. J. McLeod, & S. E Pippin,. “Security and privacy trust in e-government: Understanding system and relationship trust antecedents,” 2009, In System Sciences, HICSS'09. 42nd Hawaii International Conference on (pp. 1-10). IEEE.

[36] K. Montoro-Ríos, “Intention to use new mobile payment systems: a comparative analysis of SMS and NFC payments,” Economic Research-Ekonomska Istraživanja, vol 30, pp 892-910, 2017.

[37] G. Naidoo, Implementation of E-government in South Africa - successes and challenges: the way forward. International. Journal of Advances in Computing and Management, vol 1, pp. 62-66, 2012.

[38] M.M Ndii,. “the effect of mobile phone technology innovations on financial deepening within the banking industry in Kenya,” (Unpublished MBA Project). The University of Nairobi, 2013.

[39] M. Nkosi, & F. Mekuria, “Mobile government for improved public service provision in South Africa. In IST-Africa,” 2010 (pp. 1–8). IEEE,

[40] F. Y. Pai, & K. I. Huang, “Applying the technology acceptance model to the introduction of healthcare information systems,” Technological Forecasting and Social Change, vol 78, 650–660, 2011

[41] V. Pegueros, “Security of Mobile Banking and Payments. GIAC (GSEC) Gold Certification,” SANS Institute InfoSec Reading Room. NY, 2014

[42] K. Pousttchi, & D. G Wiedemann,. “What Influences Consumers’ Intention to Use Mobile Payments?” Mobile Commerce Working Group, Chair of Business Informatics and Systems Engineering, University of Augsburg, 86135 Augsburg, Germany, pp 1-16, 2008.

[43] Republic of South Africa, “Cybercrimes and Cybersecurity Bill,” Pretoria, Creda Communications, 1-88, 2017.

[44] P. G. Schierz, O. Schilke, & B. W. Wirtz, “Understanding consumer acceptance of mobile payment services: An empirical analysis,” Electronic Commerce Research and Applications, vol 9, 209-216, 2010.

[45] Science and Technology Options Assessment, “Security of eGovernment Systems,” Conference Report. Brussels, European Union, 2013.

[46] T. H Shon,. & P. M. C. Swatman, “Effectiveness criteria for internet payment systems,” 1997, Paper at the First Pacifica-Asia workshop on electronic commerce, Brisbane, Australia. Accessed on June 2018.

[47] P. H. Thornton, & W. Ocasio, “Institutional Logics and the Historical Contingency of Power in Organizations,” Executive Succession in the Higher Education Publishing Industry, 1958-1990. American Journal of Sociology, vol 105, pp 801-843, 1999.

[48] P. H. Thornton, & W. Ocasio, “Institutional Logics,” In R. Greenwood, C. Oliver, K. Sahlin and R. Suddaby (eds.) The SAGE Handbook of Organizational Institutionalism, CA: SAGE, 2008.

[49] S. Trepte, L. Reinecke, N. B. Ellison, O. Quiring, M. Z. Yao, & M. Ziegele, “A Cross-Cultural Perspective on the Privacy Calculus,” Social Media + Society, pp 1-13, 2017.

[50] United Nations Secretariat Department of Economic and Social Affairs, United Nations E-Government Survey 2014: E-Government

for the Future We Want. https:// publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2014-Survey/EGov_ Complete_Survey-2014.pdf. 2014, Retrieve on 20 October 2018, 512- 943

[51] Department of Electronics and Information Technology, "Interoperability Framework for e-Governance (IFEG)," The government of India, Ministry of Communications and Information Technology, New Delhi, pp 1-54, 2015.

[52] L. C. Schaupp, L. Carter, & J. Hobbs, "Electronic Tax Filing: The Impact of Reputation and Security on Adoption," 2010. Proceedings of the 43rd Hawaii International Conference on System Sciences. Hawaii.

[53] Transformation Towards Sustainable and Resilient Societies. United Nations. New York, Department of Economic and Social Affairs, pp,1 -300, 2010.

[54] V. Venkatesh, & F.D. Davis, "A theoretical extension of the technology acceptance model: four longitudinal field studies," Management Science, vol 46, pp 186–204, 2000.

[55] V. Venkatesh, M. G. Morris, G. B. Davis, & F. D. Davis, "User Acceptance of Information Technology: Toward A Unified View," MIS Quarterly, vol 27, pp 425-478, 2003.

[56] D. Yang, Y. Wang., J Ren, & J.J. Wang, "Mobile Payment Pattern Based on Multiple Trusted Platforms," 2010, Paper at Ninth International Conference on, ‖ Mobile Business and 2010 Ninth Global Mobility Roundtable (ICMB-GMR), China. 2010 2010, pp. 353-362.

[57] S. Yang, Y. Lu, S. Gupta, Y. Cao, & R. Zhang, "Mobile payment services adoption across time: An empirical study of the effects of behavioral beliefs, social influences, and personal traits," Computers in Human Behavior, vol 28, pp 129–142, 2012.

[58] T. Zhou, "An empirical examination of continuance intention of mobile payment services," Decision Support Systems, vol 54, pp 1085-1091, 2013

[59] K.. I.. Zafiropoulos, 1. Karavasilis, & V. Vrana, "Assessing the Adoption of e-Government Services by Teachers in Greece," Future Internet, vol 4, pp. 528-544, 2012.

[60] R. S. Laufer, & M. Wolfe, Privacy as a Concept and a Social Issue: Multidimensional Developmental Theory," Journal of Social Issues, vol 33, pp. 22-42, 1977.

[61] Hans van der Heijden, "Factors Affecting the Successful Introduction of Mobile Payment Systems," 2002, The 15th Bled Electronic Commerce Conference eReality: Constructing the eEconomy Bled, Slovenia, June 17 - 19, pp 430- 443

[62] E. Farcas, M., Menarini, C. Farcas, W. G. Griswold, K. Patrick, I. Krueger, B. Demchak, B. Raab, Y. Yan, C. Ziftci,. "Influences of architectural and implementation choices on CyberInfrastructure quality—a case study," 2016 In Mistrik, I., Soley, R., Ali, N., Grundy, J., Tekinerdogan, B. (Eds.), Software Quality Assurance, 279-332. Morgan: Kaufmann.