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# A MATTER OF TRUST AND EMOTIONS: A COMPLEXITY THEORY APPROACH TO EXPLAIN THE ADOPTION OF EGOVERNMENT SERVICES

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# A MATTER OF TRUST AND EMOTIONS: A COMPLEXITY THEORY APPROACH TO EXPLAIN THE ADOPTION OF E-GOVERNMENT SERVICES

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## Abstract

This research uses complexity theory to offer a deeper insight on the causal patterns of factors explaining the adoption of e-government services. To this end, we propose a conceptual model comprising of affective factors (positive and negative emotions) and cognitive factors (trust of the government, trust of the service, and perceived net benefits of e-government services) along with research propositions. Our propositions are validated by employing a fuzzy-set qualitative comparative analysis (fsQCA) on a sample of 502 users of e-government services. Findings indicate five configurations of cognitive and affective perceptions that lead to high intention to use an e-government service. Of paramount importance are affective values and trust values since their mandatory presence or absence is incorporated in all configurations. The study has both theoretical and practical implications for academic scholars pertaining the development of new e-government adoption theories and the provision of e-government services.

*Keywords: trust, emotions, e-government, fsQCA*

## 1 Introduction

Research on information systems (IS) adoption has followed a dyadic pathway. On the one hand, researchers have highlighted the importance of cognitive values, such as perceived usefulness, usability, and overall benefits for the adoption of information technology (IT) innovations. On the other hand, scholars have begun to transcend these cognitive perspectives of information systems adoption to also consider specific affective qualities, such as enjoyment and satisfaction. Interestingly, this interplay of adoption values has been examined under competitive scrutiny; predominant models and theories (such as the Unified Theory of Acceptance – UTAUT - and Use of Technology and variations of the Expectation-Confirmation Model) almost uniformly employ variance-based statistical approaches (e.g. regression-based Structural Equation Modelling) that rank the hypothesized predictive adoption factors based on their regression 'weights', suggesting that information systems adoption may be explained through a single hierarchy (or configuration) of these factors.

This research posits that there is a synergy between affective and cognitive values on the adoption of information systems. In particular, we theorize that there is not one single, optimal, configuration of such values. Instead, multiple and equally effective configurations of causal individual adoption factors may exist, which may include different combinations of adoption perceptions (i.e. combinations of high and low perceptions). To investigate our theoretical propositions we used electronic government (e-government) services as our application context. The adoption and use of government-to-

citizen services has already received significant attention by information systems scholars, primarily through cognitive-based inquiry lenses and adaptation of extant IS adoption models in the e-government context [e.g. Wang and Liao (2008); Ozkan and Kanat (2011); Lean et al. (2009)]. This research emphasizes on two critical cognitive adoption values for e-government, namely trust and net benefits. Trust is an umbrella term that encompasses such dimensions as trust in electronic government services and trust in the government. Both dimensions have been reported to have a direct influence to e-government services adoption (Bélanger and Carter 2008; Srivastava and Teo 2009). Likewise, adoption of e-government services is influenced by utilitarian perceptions regarding the net benefits that citizens receive when using the service (Scott et al. 2011).

However, as in IT adoption (Beaudry and Pinsonneault 2010), the use of e-government services also breeds affective qualities, which also influence citizens' adoption behaviour. Affect is a multidimensional term that includes a wide range of psychological concepts, such as emotions, moods, and feelings (Russell 2009; Zhang 2013). Affect is conceptualized and measured through a circumplex mode that uses distinct emotions. In this research, emotional values are measured through the formulation of positive and negative emotions from using the e-government services. Emotions are considered 'situational' predictors of e-government usage behaviour (Ebbers et al. 2008) and their influence on e-government services adoption remains largely understudied.

Based on the above, citizens consider both cognitive and affective values before interacting with an e-government service, suggesting that these values coexist and are likely to be interrelated. Extant studies on e-government adoption focus only on the main effects of specific predictors (e.g., trust, performance expectancy, and effort expectancy) on usage intention [e.g. Srivastava and Teo ; Venkatesh et al. (2011)] and ignore to examine the combined effects of cognitive and affective perceptions on the intention to use e-government services. We build on complexity theory and implement a fuzzy-set qualitative comparative analysis (fsQCA) (Ragin 2008), to identify pertinent configurations leading to increased adoption of e-government services. fsQCA has received increased attention during the last years in various fields, because it allows researchers to gain a deeper understanding of the phenomenon under scrutiny (Ordanini et al. 2014; Wu et al. 2014). The contribution of the paper is two-fold. On the one hand, we provide empirical evidence pertaining the role of emotions on the adoption of e-government services. On the other hand, we explore the combined influence of extant cognitive and affective e-government adoption values (i.e., trust in the system, trust in the government, net benefits, positive and negative emotions) to the propensity of e-government adoption. To our knowledge, this is the first research that adopts this investigation stance in the context of e-government.

The structure of the paper is as follows. Section 2 presents the theoretical grounding of this research and articulates the research propositions. Section 3 outlines the research methodology and sampling process. Section 4 presents the research findings. Finally, section 5 concludes the paper with a summary of the theoretical and practical implications of our research.

# 2 Theoretical Grounding

## 2.1 Perspectives on e-government adoption

E-government encompasses a wide array of technology-enabled applications and services that support public administration operations, enhance government transparency, and create better public value to citizens and businesses (Al-Hujran et al. 2015). It should be noted that the success of e-government services is highly dependent to their adoption and use (Rose and Grant 2010). Indeed, for most countries e-government represents an alternative way of citizens to interact with public authorities in which usage of the electronic service is voluntary. Moreover, e-government users vary in terms of their information technology and information processing skills, which introduces technology challenges in the design and interaction modality of the service (Bélanger and Carter 2009). Driven by these observations, the vast majority of studies investigating the adoption of government-to-citizen services [e.g.

Carter et al. (2005), Fu et al. (2006), Hung et al. (2006), Van Dijk et al. (2008), and Venkatesh et al. (2011) to name but a few indicative studies] attempt to examine whether extant IS adoption theories, such as the Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003) and the Diffusion of Innovations theory (Rogers 1995), still hold in the e-government context. Rana et al. (2015) provide an extensive meta-analysis on the factors that influence e-government services adoption by citizens. The common denominator of these studies refers to the assumption that the adoption (and use) of an e-government service is solely the end-product of individuals' *cognitive processing*; they rely on the accumulated knowledge of technical or functional features of the service to inform their usage behaviour towards the service.

However, this assumption is not always true. Citizens may use e-government services under turbulent socio-political environments, such as the effects of the economic recession, which led to budget cuts, or frequent changes to public administrations. This state of uncertainty reinforces the importance of *affective values* when studying the adoption of e-government services. For example, many countries employ e-government as a cornerstone implementation strategy for achieving the government's austerity goals and consequent economic reform (Ubaldi 2011). In these countries, the adoption of e-government services will logically be influenced by emotional responses towards the service itself (as a means of implementing austerity measures) or the government (as the actual implementer of the austerity measures).

Nevertheless, these emotional responses are likely to be affected by *trust beliefs*. Indeed, citizens' perceptions on government performance may be influenced by their trusting beliefs towards the government (Van de Walle and Bouckaert 2003). Hence, trust may act as a regulator to the development of positive or negative emotions by increasing individuals' confidence to the service provider (Johnson and Grayson 2005). Notably, the emotional aspects of trust have been well grounded to social psychology literature, which conceptualizes trust as a multidimensional factor that has cognitive, affective, and behavioural properties (Lewis and Weigert 1985). The influence of trust on emotions has also been documented in the context of electronic services [e.g. Pappas et al. (2013), Hwang and Kim (2007)] however, literature does not exhibit any studies yet that relate both trust and emotions with electronic government adoption. To better articulate the theoretical constructs of this research, the following section outlines the core determinants of emotions and trust and further discusses their relation with the adoption of e-government services.

## 2.2 The role of emotions on e-government adoption

Emotions are induced affective states which are activated through responses to specific stimuli (Russell 2009). These responses are subjective in nature and encompass a wide spectrum of feelings that vary in terms of their arousal and valence (Scherer et al. 2013). Arousal reflects the power of the response, while valence refers to the direct emotional response ranging from positive to negative (Russell 2009). In the context of information systems, scholars have shown a positive association between specific types of emotions (e.g. enjoyment, pleasure, and anger) and behaviour formulation [e.g. Beaudry et al. (2010), Hong et al. (2006), Kourouthanassis et al. (2015), and many others]. Recently, scholars showcased that emotions should be studied holistically since individuals may formulate both positive and negative emotions at the same time while using an information system (Pappas et al. 2014; Pappas et al. 2016).

Interestingly, the role of emotions on e-government adoption remains largely understudied. Extant studies relate emotions with e-government services adoption only indirectly through individuals' perceptions of overall satisfaction with the service (Verdegem and Verleye 2009; Welch et al. 2005). In effect, Ebbers et al. (2008) consider emotions as a situational factor to the decision making process of individuals for selecting and using an e-government service. However, emotions play a deeper role on formulating usage intentions.

First, e-government services represent the front-end communication tools of public administrations therefore, *political sentiments* would also be associated, to a certain degree, with them. Second, e-

government services usually instrument reform choices of public administrations (Bertot et al. 2010; Torres et al. 2005). Whilst such choices may represent new and more efficient ways to deliver public services, sometimes e-government services are the means of enforcing austerity measures (Ubaldi 2011). Finally, e-government services usually presuppose a certain degree of change management for end-users who will have to familiarize themselves with the new way of interacting with the government (Andersen and Henriksen 2006). Especially in the early stages of adoption, this change is likely to evoke negative emotions especially if the service suffers from shortcomings related to technical fidelity and overall usability. For example, the deployment of the national electronic prescribing system in Greece generated an extensive debate to the medical community and the public (Krania et al. 2013). On the one hand, medical doctors and pharmacies were generally satisfied from the overall functionality and resulting benefits of the system (minimization of bureaucracy over prescriptions, streamlining of financial transactions between pharmacies and the government). On the other hand, the system was treated with high scepticism because the medical community perceived it as a driver of implementing budget cuts to public health. Moreover, issues related with system unavailability for extensive time periods, insufficient IT skills by the user base, and change management issues contributed to the development of negative emotions which, in turn, affected the adoption and use of the service.

## 2.3 The role of trust on e-government adoption

Trust has been a predominant factor of models and theories exploring e-government services adoption (Carter and Bélanger 2005; Welch et al. 2005). Extant studies decompose trust into two interweaving perspectives: trust in the entity providing the service (i.e., trust of the government or institution-based trust) and trust in the reliability of the enabling technology (i.e., trust of the electronic service). *Trust of the government* reflects as citizens' perceptions pertaining the integrity and capability of political authorities and institutions to providing services that are of their best interests (Bélanger and Carter 2008). Likewise, *trust of the electronic service* echoes citizens' beliefs that the e-government website will fulfil its obligations as the user understands them (Kim et al. 2008).

The aforementioned definitions of both trust dimensions are consistent with the basic notions of cognition. Trust is knowledge-driven; it arises from the accumulated knowledge stemming from repeated interactions between focal parties (i.e., the citizen and the government). Johnson and Grayson (2005) define this dimension of trust as *cognitive trust*. However, trust may also have strong affective properties. For example, in service relationships the development of strong connections between the focal parties may evoke emotional responses, which will in turn strengthen trust in a partner beyond a degree that is justified by available knowledge (Johnson and Grayson 2005). The latter denotes the interplay between emotions and trust; using an electronic service may evoke emotional responses, which depending on their valence and intensity, will form the basis for trusting bonds and elicit commitment to the service. In the context of electronic government this interplay becomes even more challenging, since high trust beliefs may alleviate the intensity of negative emotions stemming from poor implementation of the electronic service, or from misjudging the electronic service as a metaphor of the government's austerity measures.

## 2.4 Research propositions

Based on the above, scholars need to study the adoption of electronic government services through both cognitive and affective lenses. Following the discussion in the previous sections, the cognitive angle of this study examines the relation of trust values with e-government services adoption. Trust is decomposed into two distinct dimensions that measure the reliability of the e-government service (i.e., trust of the service) and the belief that the government behaves ethically (i.e., trust of the government). Both dimensions have been confirmed to positively influence the intention of using electronic services in past studies [e.g. Bélanger and Carter (2008); Srivastava and Teo (2009)]. Moreover, in order to address the utilitarian drivers of using e-government services, our research model also incorporates

citizens' perceived net benefits of e-government services as an inherent cognitive value. Net benefits reflect the efficiency and performance welfares for citizens deriving from the usage of an e-government service (Prybutok et al. 2008) and have been shown to influence usage behaviour (Scott et al. 2011). The affective angle of this research examines the emotional cues of citizens when using e-government services. Emotions are distinguished to positive and negative based on their valence (Scherer et al. 2013). Positive emotions are defined as the extent to which a citizen feels such emotions as pleasure, joy or pride when using the service, while negative emotions refer to the extent to which a citizen feels emotions related to anger, disappointment, or sadness. Both emotion categories have been reported to influence adoption behaviour in the context of electronic services (Pappas et al. 2013; Pappas et al. 2016).

However, our analysis suggests that there is an interaction between affective and cognitive factors, which makes it unclear whether we can assume that a particular factor may dominate adoption behaviour and, more importantly, whether there are combinations of these factors that better explain e-government services adoption and use. To this end, we posit that although the aforementioned drivers of e-government adoption also matter individually, the synergetic nature between them creates a complex, multidimensional phenomenon, in which the configuration of the adoption drivers is more important than the individual drivers. This line of reasoning leads to a conceptual framework in order to explain and better understand citizens' adoption behaviour in e-government settings based on complexity theory.

Complexity theory incorporates the principle of *equifinality*, based on which the outcome of interest can be explained equally by alternative sets of causal conditions that combine in sufficient configurations for the outcome (Fiss 2011; Woodside 2013). In our case, the adoption of e-government services involves the combination and co-alignment of cognitive adoption values and affective adoption values (i.e., emotions) with no specific form of co-alignment available as an a priori benchmark. Instead, high adoption of e-government services may be achieved through different combinations of the causal factors. For example, emotional factors may affect users when they choose a channel to interact with the government (Ebbers et al., 2008). In addition, mixed evidence exists regarding the effects of emotional processing on trust in government organizations (Grimmelikhuijsen 2012), which in turn may affect the adoption of e-government services. However, the existence of positive or negative emotions may not always have an equivalent effect on citizens' intention to interact with government services (Zavattaro et al. 2015), indicating that various factors may combine together with emotions in order to explain citizens' behaviour. In addition, emotions have been found to have a positive effect on citizens' trust beliefs and perceived benefits towards the service provider, in the context of electronic mediated environment (Dai et al. 2015). However, the multidimensional nature of emotions indicates that they may have both positive and negative effects on factors such as trust, net benefits or behaviour (Beaudry & Pinsonneault, 2010; Pappas et al., 2013). Such complex interactions between affective and cognitive perceptions and their combined influence to adoption behaviour may not be fully captured and examined through the employment of traditional variance-based analysis methods, such as regression analysis and SEM (Pappas et al., 2016).

Indeed, complexity theory proposes the occurrence of causal asymmetry. Causal asymmetry means that for an outcome to occur, the presence and absence of a causal condition depend on how this condition combines with one or more others (Fiss, 2011; Woodside 2013). In this case, causal asymmetry implies that different values of the same causal condition (i.e., positive beliefs and negative beliefs) may appear in the combinations that explain e-government services adoption depending on how causal conditions combine with themselves. For example, high perceptions of e-government adoption may be achieved through both high and low perceptions of trust in the government depending on citizens' perceptions on the remaining causal factors. A variance-based analysis approach would reveal only one optimal configuration of outcomes that would explain adoption behaviour. Such configuration might discard one or more hypothesized causal factors, even if theory suggests an association of the causal factors with the outcome of interest, due to insufficient statistical loadings. Complexity theory sur-

passes this limitation and provides additional depth to the analysis by revealing multiple recipes (i.e., combination of causal factors) that equally explain the outcome of interest. The following Venn diagram (Figure 1) reflects the conceptual framework of the study, which depicts the relations between the examined factors.
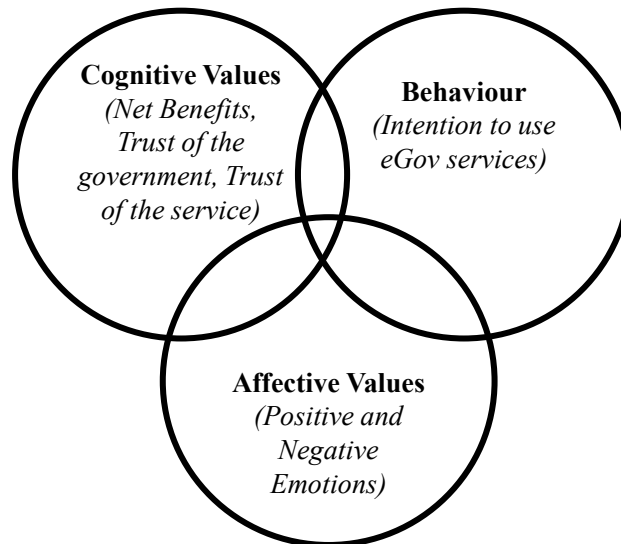


*Figure 1.        Conceptual model*

Based, on the above, we formulate the following research propositions:

**Proposition 1.** *No single best configuration of citizens' cognitive and affective perceptions leads to high intention to use e-government services; instead, multiple, equally effective configurations of causal factors exist, which commonly lead to high usage intentions.*

**Proposition 2.** *Single causal adoption values may be present or absent within configurations for citizens' high intention to use e-government services, depending on how they combine with other causal conditions.*

# 3        Research Methodology

## 3.1        Data Collection

The survey was conducted in May-June 2015. A snowball sampling methodology was used to recruit participants, as it gives access to a representative sample with an interconnected network of people. The research instrument controls the prospective participants for their experience with e-government services. The researchers contacted people with established experience with e-government services. Similarly, the latter turned to their personal or business contacts (e.g., friends, relatives, colleagues etc.) with established e-government experience. The participants were asked to answer based on evaluations created after using of e-government services.  It was made clear that there was no reward for the respondents, the participation was voluntary and that the study was confidential. Data were collected by means of an online questionnaire. Respondents with no previous experience with e-government services were excluded from the study. Finally, 613 responses were collected out of which 502 had previous experience with e-government services and comprise our analysis sample.

## 3.2     Sample

The sample of respondents consists of more women (58.4%) than men (41.6%). The majority of the respondents (41%) belonged to the age group 18-28. Further, 12.5% belonged to the age group 29-35, and 16.5% belonged to the age group 36-45. Almost 29.9% were 46 years old or older. Regarding their occupation, the sample consists of almost equally (27%) freelance professionals and students, with the rest working for the private (18.7%) or public (17.9%) sector, and 8.4% are retired. Finally, regarding experience with e-government services almost half (51%) of the sample uses e-government services at least once per month.

## 3.3     Measures

The questionnaire consisted of two parts. The first part included questions on the demographics of the sample (age, gender, occupation). The second part included measures of the various constructs identified in the literature review section. For testing our propositions, the survey included reflective scales for the constructs of our conceptual model. Table 1 lists the operational definitions of the constructs in this theoretical model as well as the studies from which the measures were adopted. Regarding emotions, we adopt the work of Scherer et al. (2013), who attempt to understand emotions semantics. In this study emotions were divided based on valence, following the work of Scherer et al. (2013) and verified with an exploratory factor analysis, into positive and negative emotions. The appendix lists the questionnaire items used to measure each construct, along with descriptive statistics and loadings.

| Construct | Operational Definition | Source |
|---|---|---|
| Trust of the service | Users' affective beliefs regarding the reliability of the e-government services. | Kim et al. (2008) |
| Trust of the government | Users' affective beliefs that the government will behave ethically. | Bélanger and Carter (2008) |
| Net Benefits | Users' beliefs regarding the benefits receiving by using e-government services. | Prybutok et al. (2008) |
| Emotions | Measuring users' emotions, based on valence, when using e-government services. | Scherer et al. (2013) |
| Intention to use | Users' intention to use e-government services. | Wang (2008) |

*Table 1.          Constructs definition*

## 3.4     Analysis methodology

Previous studies on e-government and IS adoption employ symmetric test to investigate their hypotheses and calculate on the net effects on the desired outcomes. The main focus of tests such as multiple regression analysis is to estimate the significance of the effects between variables or to compare the effects among the variables between two or more models. However, focusing on net effects may be misleading, usually because the observed net effects do not apply to all of the cases in a dataset (Woodside 2014). Thus, we suggest quite a different approach from the commonly used structural equation modeling in order to show the various combinations that may occur among the variables, thereby increasing the contribution of the research.

This research employs the prescriptions of the fuzzy-set qualitative comparative analysis methodology (fsQCA) to explore how affective and cognitive factors combine to explain the adoption of e-government services. Opposed to variance-based statistical methods (e.g. structural equation modelling or partial-least squares based regression models) in which the independent variables 'compete' with each other to explain one or more dependent variables, fsQCA treats the hypothesized causal fac-

tors as conditions that may be related to the phenomenon under investigation either by themselves or in combination with one another (El Sawy et al. 2010). Hence, fsQCA does not compute a single, optimal, solution that attributes weights to the independent variables; instead, the methodology proposes multiple alternative solutions, which require the presence or absence of each hypothesized causal factor (Rihoux and Ragin 2009). This is a fundamental difference from variance-based statistical methods and calls for operationalization of the variables in the dataset.

In effect, fsQCA employs fuzzy set theory and Boolean algebra to evaluate whether the cases in the dataset belong or not in a certain conceptual state. For example, in this research cases may be evaluated in order to assess whether an individual feels positive and negative emotions, believes that the government behaves ethically, perceives that e-government services are reliable, and perceives that he/she receives concrete benefits from using the e-government services. Such operationalizations are captured through fuzzy set membership scores ranging from 0 (non-membership to the set) to 1 (full membership to the set). In-between scores indicate the distance of each case from the outbound scores. The researcher may transform the cases' original values to fuzzy-set membership scores by using specialized fs/qca software. This process is coined with the term 'calibration'. In this research we used fsQCA 2.0 developed by the University of Arizona and followed the calibration procedure employed by Ordanini et al. (2014). With this method, the three qualitative anchors for the calibration were based on the survey scale (seven-point Likert scale). The full membership threshold was fixed at the rating of 6; the full non-membership threshold was fixed at 2; and the crossover point was fixed at 4. The values of every variable were calibrated based on a linear function to fit into the three aforementioned thresholds. The software was also employed throughout the remaining methodology stages.

Fuzzy-set QCA identifies conditions or combinations of conditions that are necessary or sufficient to explain an outcome (Ragin, 2008). Necessity of a condition implies that an outcome may not derive without the presence of the condition; nevertheless, the condition alone is not able to produce the outcome. Sufficiency of a condition implies that the condition alone is capable of producing the outcome. In practice, if a solution includes the presence of only one condition, then this condition is sufficient to produce the outcome. The necessary and the sufficient conditions lead to a distinction between core and peripheral elements (Fiss, 2011). Core elements are the ones with a strong causal condition with the outcome; peripheral elements are those with a weaker one. To estimate the sufficiency and/ or necessity of hypothesized conditions, fsQCA follows a Boolean minimization process based on truth table analysis. The outcome of this process includes the generic combinations of conditions that are sufficient for the outcome whilst remaining logically true. These are encapsulated in three solutions that differ based on their complexity, named as complex, intermediate, and parsimonious. Of interest is the parsimonious solution, which reduces the causal recipes to the smallest number of conditions possible (Ragin, 2008). However, for purposes of results' clarity and completeness, scholars report a combination of the parsimonious and intermediate solutions and distinguish between core and peripheral conditions that lead to the outcome of interest (Fiss, 2011; Pappas et al., 2016).

# 4 Findings

## 4.1 Measurements

A confirmatory factor analysis is performed to verify the factor structure of the reflective constructs. The constructs used in this research are evaluated in terms of reliability and validity. Reliability testing, based on the Cronbach alpha indicator, shows acceptable indices of internal consistency since all constructs exceed the cut-off threshold of 0.70. Establishing validity requires that average variance extracted (AVE) is greater than 0.50, the correlation between the different variables in the confirmatory models does not exceed 0.8 points, as this suggests low discrimination and that the square root of each factor's average variance extracted (AVE) is larger than its correlations with other factors (Fornell & Larcker, 1981). The AVE for all constructs ranges between 0.59 and 0.77, all correlations are

lower than 0.80, and square root AVEs for all constructs are larger than their correlations. The findings are illustrated in Table 2.

| Construct | Mean (SD) | CR | AVE | Construct | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 1.Trust of the service | 4.09 (1.68) | 0.91 | 0.77 | **0.88** | | | | | |
| 2.Trust of the government | 3.81 (1.47) | 0.88 | 0.65 | 0.69 | **0.81** | | | | |
| 3.Net Benefits | 4.26 (1.57) | 0.87 | 0.69 | 0.66 | 0.59 | **0.83** | | | |
| 4.Positive Emotions | 2.43 (1.19) | 0.90 | 0.75 | 0.19 | 0.21 | 0.24 | **0.87** | | |
| 5.Negative Emotions | 2.05 (1.17) | 0.94 | 0.63 | -0.29 | -0.26 | -0.27 | 0.06 | **0.79** | |
| 6.Intention to use | 4.62 (1.67) | 0.92 | 0.59 | 0.63 | 0.59 | 0.67 | 0.22 | -0.29 | **0.77** |

Note: Diagonal elements (in bold) are the square root of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs (all correlations are significant, p< 0.01). For discriminant validity, diagonal elements should be larger than off-diagonal elements.

*Table 2.         Descriptive statistics and correlations of latent variables*

## 4.2     fsQCA Results

Outcomes of the fuzzy set analysis for high intention to use e-government services are presented in the following table (Table 3). The black circles (●) denote the presence of a condition, while the crossed-out circles (⊗) indicate the absence of it (Fiss 2011). Core elements of a configuration are marked with large circles, peripheral elements with small ones, and blank spaces are an indication of a do not care situation in which the causal condition may be either present or absent. The solution table includes values of set-theoretic consistency for each configuration as well as for the overall solution, with all values being above threshold (>0.75). Consistency measures the degree to which a subset relation has been approximated, whereas coverage assesses the empirical relevance of a consistent subset (Ragin 2006). The overall solution coverage provides an indication as to what extent high intention to use e-government services can be determined based on the set of configurations, and is comparable to the R-square value reported in correlational methods (Woodside 2013). The results indicate an overall solution coverage of 0.785, which suggests that a substantial proportion of the outcome is covered by these five solutions.

For high intentions to use e-government services the solutions 1-5 presented in table 3 reflect combinations of the presence and absence cognitive and affective values. All five factors examined appear both as core and peripheral conditions in the solutions, suggesting their importance, which varies depending on how one factor is combined with the others. In detail, the absence of both types of emotions, along with the absence of trust of the government lead to high intention to use e-government services regardless of the net benefits of the users (solution 1). Further, when emotions are absent, then the presence of trust of the government leads to high intentions regardless of both trusting beliefs and net benefits (solution 2). Next, the combination of trust of the service, trust of the government, and net benefits coupled with low negative emotions will lead to high intention to use e-government services, no matter the presence of absence of positive emotions (solution 3). On the other hand, when both trust dimensions and net benefits are low, and negative emotions are low as well, then high positive emotions are able to predict high intention to use e-government services (solution 4). Finally, when trusting beliefs, trust of the government, and positive emotions are low (i.e., absent), and users experience high negative emotions then, only their combination with net benefits will be able to lead to high intention to use e-government services (solution 5).

| | Solution | | | | |
|---|---|---|---|---|---|
| **Configuration** | **1** | **2** | **3** | **4** | **5** |
| **Adoption Values of e-Government Services** | | | | | |
| **Affective Values** | | | | | |
| Positive Emotions | ⊗ | ⊗ | | ● | ⊗ |
| Negative Emotions | ⊗ | ⊗ | ⊗ | ⊗ | ● |
| **Cognitive Values** | | | | | |
| Trust of the service | ● | | ● | ⊗ | ⊗ |
| Trust of the government | ⊗ | ● | ● | ⊗ | ⊗ |
| Net Benefits | | | • | ⊗ | ● |
| | | | | | |
| Consistency | 0.943 | 0.951 | 0.987 | 0.903 | 0.912 |
| Raw Coverage | 0.643 | 0.607 | 0.611 | 0.114 | 0.111 |
| Unique Coverage | 0.069 | 0.035 | 0.074 | 0.012 | 0.008 |
| | | | | | |
| Overall solution consistency | 0.921 | | | | |
| Overall solution coverage | 0.785 | | | | |

Note: Black circles (●) indicate the presence of a condition, and circles with an "x" (⊗) indicate its absence. Large circles indicate core conditions; small ones indicate peripheral conditions. Blank space indicate a "do not care" condition.

*Table 3.        fsQCA Results for high intention to use e-government services*

# 5        Discussion and Conclusions

This work suggests that in e-government, cognitive and affective values combine to form configurations for predicting intention to use e-government services. Towards this end, a conceptual model is constructed that serves as the basis to identify the aforementioned configurations. The model includes five predominant values of e-government adoption, namely trust of the government, trust of the service, positive and negative emotions, and net benefits of using the e-government service. The findings indicate that there are multiple recipes leading to adoption of e-government services, which incorporate alternative combinations of the causal conditions thus, confirming both our research propositions. Interestingly, the results highlight the importance of both affective and trust values for the adoption and use of e-government services.

Indeed, adoption behaviour seems to be highly dependent to the (mandatory) absence of negative emotions although in such cases where negative emotions are present, positive perceptions regarding the derived net benefits from using the service are sufficient to warrant usage intention. Moreover, in case e-government services do not also evoke positive emotions to citizens, trust values (either each factor independently or both factors together) are the sole contributors of formulating positive adoption behaviour. On the contrary, in cases where trust perceptions are low, positive emotions or net benefits comprise the determinant factors that certify high usage intention. These findings provide deeper understanding on the role of trust on e-government adoption since extant studies attribute equivalent weight to institution-based trust and trust of the service (Bélanger and Carter 2008; Teo et al. 2008). Instead, our study suggests that even one of these trust values may be required to be present in the absence of the other, provided that citizens do not feel any type of emotions towards the electronic service.

The present study reveals a marginal influence of utilitarian drivers to e-government adoption behaviour, since they appear to be highly influential to user adoption in only one solution. We attribute this observation to the increased familiarity of citizens with e-government services over the years. Indeed, several e-government services are deeply integrated in everyday interactions of citizens with the government. For example, online tax filing is considered the de facto method of submitting tax declarations. Therefore, the utilitarian value of the service blurs and more affective cues emerge that influ-

ence the overall adoption behaviour. Nevertheless, utilitarian drivers seem to still hold strong in the presence of negative emotions and when both trust values are low. In these cases, the net benefits of the service take over the leading role to explain usage intention. This observation indicates the importance of designing and delivering high quality e-government services, in terms of meeting citizens' needs and goals. Specifically, the derived value of the service for citizens (e.g. improved convenience, better customer service, increased access to information, to name but a few reported benefits) seems to outweigh any feelings of mistrust towards the service and/ or the government as well as the inducement of negative emotions when using the service.

This research has both theoretical and practical implications pertaining the adoption of information systems and the design of e-government services in particular. First, we empirically demonstrate the importance and synergetic nature of affective values, when combined with cognitive ones. This finding paves the ground for the development of emotion-centric theories that explain the adoption of information systems in general and e-government services in particular. Furthermore, we highlight alternative paths that lead to high adoption behaviour when specific conditions are absent. These paths may be used by public administrations for the design of e-government services. Indeed, public administrations should minimize the development of negative emotions while users are visiting e-government services. For example, e-government websites may sometimes suffer from poor information quality which, in turn, may lead to frustrated citizens (Welch et al. 2005). Likewise, the design of e-government services has received criticism for being guided by technological capabilities rather than the actual needs of the users resulting to poor satisfaction and adoption (Bertot and Jaeger 2006). Public administrations may employ user-centered strategies for the design of public websites in order to better address user needs, evoke positive emotions and mitigate the formulation of negative emotions. Verdegem and Verleye (2009) further support this argument by providing a starting discussion point for such user-centered e-government strategies.

Finally, our study pinpoints the need for holistically examining the role of emotions on adoption behaviour since extant studies primarily conceptualize emotions uni-dimensionally through a single feeling of particular valence and arousal. As with all empirical studies, there are some limitations. First, the generalization of the findings should be performed with caution, since the sample comprises of only Greek users of e-government services. Further, findings are based on self-reported data; for an interdepended approach semi-structured interviews, observations and actual usage data may be used. This paper differs from previous studies in IS and e-government adoption which focus on the net effects among variables, and adopts on complexity theory and employs fsQCA to better explain adoption of e-government services. However, future studies should follow a similar approach to verify and extend our findings, and also to extend theory in different contexts. Finally, although emotions in this study are measured as a multidimensional concept, they are grouped only based on valence (i.e., positive and negative emotions) because, (i) no previous study takes this approach in the context of e-government and, (ii) this research aims to serve as a precursor for future studies focusing on emotions in e-government.

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# Appendix

Scale items with mean, standard deviation and standardized loading

| Construct and scale items | Mean | S.D. | Loading |
|---|---|---|---|
| **Trust of the service, CA = 0.95** | | | |
| 1. Government websites are trustworthy in general | 4.25 | 1.62 | 0.87 |
| 2. Government websites give the impression that they keep their promises and commitments. | 4.09 | 1.78 | 0.89 |
| 3. I believe that Government websites have my best interests in mind. | 3.93 | 1.86 | 0.87 |
| **Trust of the government, CA = 0.94** | | | |
| 1. I think I can trust state government agencies | 3.74 | 1.57 | 0.79 |
| 2. State government agencies can be trusted to carry out online transactions faithfully | 4.07 | 1.69 | 0.85 |
| 3. I trust state government agencies keep my best interests in mind | 3.70 | 1.57 | 0.81 |
| 4. In my opinion, state government agencies are trustworthy | 3.75 | 1.53 | 0.78 |
| **Net Benefits, CA = 0.92** | | | |
| 1. Overall, I am satisfied with the information technologies of e-government services. | 4.11 | 1.65 | 0.85 |
| 2. Overall, there has been a positive impact as to how much my performance was improved by the aid of the information technologies of e-government services. | 4.11 | 1.79 | 0.83 |
| 3. Overall, there has been a positive impact as to how much the performance of e-government services was improved by the aid of information technologies. | 4.57 | 1.64 | 0.81 |

| Intention to use, CA = 0.97 | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Assuming that you have access to the e-government service, you intend to reuse it. | | | | | 4.57 | 1.71 | 0.87 |
| 2. You will reuse the e-government service in the future. | | | | | 4.70 | 1.69 | 0.86 |
| 3. You will frequently use the e-government service in the future. | | | | | 4.59 | 1.76 | 0.87 |
| **Emotions** | | | | | | | |
| | Mean | SD | Loading | | Mean | SD | Loading |
| **Positive Emotions, CA = 0.92** | | | | | | | |
| 1. Pleasure | 2.53 | 1.54 | 0.88 | 6. Contentment | 2.75 | 1.57 | 0.82 |
| 2. Joy | 2.28 | 1.45 | 0.88 | 7. Admiration | 2.32 | 1.52 | 0.86 |
| 3. Pride | 2.20 | 1.44 | 0.83 | 8. Love | 1.79 | 1.26 | 0.74 |
| 4. Amusement | 2.30 | 1.61 | 0.76 | 9. Relief | 2.57 | 1.56 | 0.69 |
| 5. Interest | 3.09 | 1.74 | 0.63 | | | | |
| **Negative Emotions, CA = 0.93** | | | | | | | |
| 1. Anger | 2.29 | 1.67 | 0.83 | 6. Disappointment | 2.83 | 1.88 | 0.75 |
| 2. Hate | 1.84 | 1.47 | 0.83 | 7. Shame | 2.16 | 1.62 | 0.81 |
| 3. Contempt | 2.28 | 1.66 | 0.82 | 8. Regret | 1.75 | 1.26 | 0.75 |
| 4. Disgust | 2.00 | 1.62 | 0.85 | 9. Guilt | 1.58 | 1.14 | 0.72 |
| 5. Fear | 2.06 | 1.59 | 0.65 | 10. Sadness | 2.09 | 1.56 | 0.75 |
| | | | | 11. Compassion | 1.75 | 1.24 | 0.65 |
| *CA; Cronbach alpha* | | | | | | | |