

An Extended Model of E-Government Adoption by Civil Servants in Greece

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ABSTRACT

E-government in Greece lacks a customer-centric view in its implementation. Government is driving its development agenda and investment on electronic services without measuring what increases customers' willingness to adopt offered services. The study has taken a lead in understanding the factors that affect e-government adoption by teachers in Greece. It uses constructs from the Technology Acceptance Model (TAM), the theoretical extension of the TAM (TAM2), Diffusion of Innovation (DOI) and integrates the constructs of perceived behavioral control, trust in e-government, perceived risk, personal innovativeness and awareness in a model. The validated model offers a starting point for the investigation of factors affecting the adoption of e-government services and can be extended by using domain-specific constructs to fit all Greek governmental organizations.

KEYWORDS

Awareness, DOI, E-Government Services, Perceived Behavioural Control, Perceived Risk, Personal Innovativeness, SEM, TAM, TAM2, Trust in Government

1. INTRODUCTION

Government is an 'institutional superstructure that society uses to translate politics into policies and legislation' (Kettl, 2002). It is actually 'a dynamic mixture of goals, structures and functions' (Pardo, 2000 p.2) and its 'foremost job is to focus society on achieving the public interest' (Riley, 2003). Nowadays, governments worldwide have heavily invested in e-government - the use of information and communication technologies and the internet to support their work processes, to improve the delivery of government services to citizens, businesses, and other government agencies, 24 hours a day, seven days a week and bring better governance (Alruwaie et al., 2012; Panagis et al., 2008). Despite huge investments, not all e-government programs and projects across the globe are successful. Their adoption, in developed and particularly in developing countries, has fallen far below expectations and a systematic discrepancy exists between the offered e-government services and facilities and actual citizens' take up (Al-Zaabi et al., 2012; Akkaya et al., 2012; Odongo, 2009; UN 2010). Up to now governments drive their development agenda and investments on e-government based on their understanding (Mofleh & Wanous 1999). A user-centered e-government strategy is essential in case that e-government is to succeed (Schedler & Summermatter, 2007). By putting people first, governments may improve the quality of their services by making them more usable and useful. The lack of demand for e-government services and the under-estimated adoption of offered services have resulted in the need for research into understanding the factors that are influencing the adoption

of e-government (Dwivedi et al., 2011). As studies in e-government are “increasing in number, related models offered in the academic literature are mainly conceptual; while empirical studies are heavily ignored” noted Ahmed (2013). Thus, empirical research becomes critical in understanding the expectations of citizens; factors affecting adoption and diffusion of e-government services; and customers’ motivations and decision making mechanisms towards using electronic services (Akkaya et al., 2012). Moreover, the factors that are influencing the adoption and diffusion of e-government varies between countries across the globe (Heeks, 2005) and despite the fact that are being explored, “the nature of the use of existing theories and models of technology adoption and diffusion utilized in e-government adoption research has yet to be investigated” (Rana et al., 2012).

Potential users of e-government are also public servants that many times are forgotten and are simply expected to adopt e-government (Baldwin et al., 2012). For the moment, little research effort has been devoted at investigating government public servants attitudes on e-government adoption (Baldwin et al., 2012; Heeks & Bailur 2007), especially in Greece. During the investigation ‘Excluding users can lead to poor design, recalcitrance and refusal to adopt, even subversion, and ultimate user failure’ (Baldwin et al., 2012 p. 106), thus it is important to take into consideration their opinions and attitudes. This paper seeks to address this gap and investigates factors that determine the adoption of e-government services by public servants in Greece.

Teachers of primary and secondary education are internal customers of government as they are public servants and are expected to adopt e-government services. According to the Ministry of culture, education and Religious Affairs (<http://www.minedu.gov.gr/>) 150,798 teachers are permanent civil servants representing a percentage of 40.69% of permanent civil servants. This significant percentage implies that it is interesting to investigate their attitudes towards offered educational e-government services. E-government services are offered through the webpages of Greek Schools Network, the Ministry of Education and Religious affairs, websites of Regional Primary and Secondary Education Administrations, and websites of Primary and Secondary Education Administrations.

The paper uses constructs from the Technology Acceptance Model (TAM), the theoretical extension of the TAM (TAM2), Diffusion of Innovation (DOI) as they are well accepted models and have also been used to predict user acceptance in the field of e-government. Trust is central to daily practices interactions and transactions. Lack of trust brought on by uncertainty of the online environment, novelty, use of technology, security issues and the uncertainty and risk of using open infrastructures has inhibited the widespread acceptance of e-government services. Thus, trust is considered as a crucial enabler in e-government adoption (Al-adawi, et al., 2005; Belanger & Carter, 2008; Colesca, 2009; Hung et al., 2006; Tan, 2008). It is perceived risk that gives the trust dilemma its basic character (Al-adawi et al., 2005). Perceived risk decreases when the individual trusts others that are involved in the transaction (Horst et al., 2007; Johnson-George & Swap, 1982) and has significant impact on electronic service acceptance (Rotchanakitumnuai, 2008). The paper integrates the constructs of trust in e-government, perceived risk, perceived behavioural control, personal innovativeness and awareness in the model. It measures intention-to-use e-government websites. Intention-to-use has been found to be a strong predictor of actual system usage in the IS literature (Colesca & Dobrica, 2008). The study uses an online survey to record Greek teachers’ opinions and attitudes, nationwide. It analyses the data using a refinement procedure, controlling reliability and validity, and validates the proposed model using Structural Equation Modelling.

2. E-GOVERNMENT ADOPTION MODELS

Up to now, well established theories and models in the context of computer technologies have been used to explain and analyze the factors influencing the adoption and diffusion of e-government (Al-adawi et al., 2005; Alomari et al., 2012; Carter & Bélanger, 2005; Colesca & Dobrica, 2008; Dwivedi & Williams, 2008; Jaeger & Matteson, 2009; Patel & Jacobson, 2008; Rehman & Esichaikul, 2012; Sang et al. 2009a; Shareef et al. 2011; 2009; Teo et al., 2009). The technology adoption models

proposed in the literature try to mimic the behavior of individuals when new technologies are introduced (Bwala & Mutula, 2014).

Technology Acceptance Model (TAM) was developed by Davis (1980) and Bagozzi et al. (1992). It attempts to explain and predict user's future behavior after a very brief period of interaction with the system under investigation (Han & Jin, 2009). Davis et al. (1989, p.985) mentioned that TAM intends "to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified".

The major advantage of TAM is that it can be extended when new technologies are introduced by using domain-specific constructs. TAM has been used in previous studies to investigate factors that affect citizens' adoption of e-government services (Al-adawi et al., 2005; Carter & Bélanger, 2005; Chang et al., 2005; Colesca & Dobrica, 2008; Fu et al., 2004; Hung, Chang, & Yu, 2006; Tahinakis et al., 2006; Wang, 2003). TAM alone was not able to explain issues of technology adoption related to e-government. Thus, Colesca & Dobrica (2008) integrated TAM with *trust*, *quality* and *satisfaction* in order to analyze e-government adoption in Romania. Al-adawi et al. (2005) proposed a conceptual model of citizen adoption of e-government which integrates constructs from the TAM, and *trust* and *risk* literature.

The theoretical extension of the TAM (TAM2) proposed by Venkatesh & Davis (2000) was also used in previous studies for the adoption of e-government. TAM2 takes into consideration both social influence processes (*subjective norm*, *voluntariness*, and *image*) and cognitive instrumental processes (*job relevance*, *output quality*, *result demonstrability*, and *perceived ease of use*). Sang et al. (2009a) used constructs from TAM, TAM2, DOI theory, and *trust* and built a parsimonious yet comprehensive model of user adoption of e-government. Alryalat et al. (2013) developed and tested an extended technology acceptance model (TAM) that integrates *social influence* with *perceived usefulness* and *perceived ease of use* in order to investigate factors determining Jordanian citizens' intention to adopt e-government. Two external variables, *perceived e-government value* and *perceived enjoyment* were integrated with TAM by Shyu & Huang (2011) for the prediction of usage of e-government learning. Hussein et al. (2011) proposed an integrated research model of online tax adoption by integrating the TAM, DOI, *perceived characteristics of innovating* (PCI), *web trust* and *perceived risk*, *web service quality*, and *political self-efficacy* dimensions.

3. DETERMINANTS OF ADOPTION

3.1. Perceived Usefulness and Perceived Ease of Use

According to TAM, a person's actual system usage is mostly influenced by his/her behavioral intentions toward usage and are influenced by the *perceived usefulness* and *perceived ease of use* of the system. *Perceived ease of use* is defined as "the degree to which a person believes that using a particular system would be free of physical and mental effort" and *perceived usefulness* of the system as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1980, p. 320). *Perceived usefulness* is influenced by *perceived ease of use* because the easier a system is to use, the more useful it can be (Davis et al., 1989). In the e-government context previous studies have investigated impact of *perceived usefulness* and *perceived ease of use* on *intention-to-use* e-government services. Hung et al. (2006) found that *perceived usefulness* and *perceived ease of use* are important determinants of *intention to use* online tax filing and payment system in Taiwan. Wangpipatwong et al. (2008) suggested that *perceived usefulness* and *perceived ease of use* directly enhances citizens' continuance intention to use e-government. Colesca & Dobrica (2008) investigating e-government adoption in Romania through Romania's national portal www.e-guvernare.ro claimed that the citizen's higher perception of *usefulness* and *ease of use*, enhance the level of adoption of e-government. Almahamid et al. (2010) revealed that *perceived usefulness* and *perceived ease of use* is linked with *intention-to-use* and their presence on e-government websites

encourage Jordanian citizens to use them for gathering information and conducting transactions. Al Khattab et al. (2015) examined and identified the factors that affect citizens' intention to adopt and use e-government services in Jordan. *Perceived ease of use* and *perceived usefulness* were identified as two of the four main factors that affected citizens' intention to engage in e-government services. Thus the present model includes *perceived ease of use* and *perceived usefulness* as two main variables which might have an effect on intention. The following hypotheses are formed:

H1: *Perceived ease of use* has a positive effect on *perceived usefulness*

H2: *Perceived ease of use* has an effect on *intention-to-use*.

H3: *Perceived usefulness* has positive effect on *intention-to-use*.

3.2. Subjective Norm, Job Relevance, Output Quality and Image

Venkatesh & Davis (2000) proposed the Extended Technology Acceptance Model (TAM2). They added to TAM the constructs of *Job relevance*, *Output quality*, *Result demonstrability*, *Subjective norm*, *Image*, *voluntariness* and *experience*. Previous studies that have applied TAM2 to innovative systems have focused primarily on the antecedents of perceived usefulness (Wu et al., 2011).

Image is the degree to which one perceives the use of the technology as a means of enhancing one's status within a social group. Sang et al. (2009a) claim that users who adopt e-government services may impress others who have not adopted it and enhance their social status. A user who has a higher need for social recognition and a clear understanding of e-government services is likely to perceive the usefulness of the system and intent to use it. Al-Zaabi (2013) investigated e-government services in the Abu Dhabi Police and claimed e-government services users are more valued in the organization and considered smarter than non e-government services users, which led to an increased use of e-government services to increase their status in the department. However, contradictory findings exist. Carter & Belanger (2005, p.20) mentioned that 'e-government services might not be image enhancing in the United States; it may not be the case in other countries and cultures. This should be investigated further'. In the present model the following hypotheses are formed to include the effect of image:

H4: *Image* has positive effect on *perceived usefulness*.

H5: *Image* has positive effect on *intention-to-use*.

Job relevance is an individual's perception of the degree to which the technology is applicable to his or her job. If top management provides support and a positive environment that encourages participation in e-government systems and services (Song, 2004), then users will adopt them and take into consideration what tasks a system is capable of doing and how those match to their job (Sang et al., 2009a) and this would have positive effect on perceived usefulness. In this study this argument results to the following hypothesis:

H6: *Job relevance* has a positive effect on *perceived usefulness*.

Subjective norm is defined as a person's perception that people who are important to him/her, think he/she should or should not use the technology. Behavioral *intentions* are the result of both attitudes towards performing the behavior and *subjective norms* related to the behavior (Hale et al., 2002). Venkatesh & Davis (2000) theorized that subjective norms are an important antecedent of perceived usefulness especially in the earlier stages of adoption. When a person has little or no experience with a particular technology, tends to comply with other's views. According to Ajzen & Fishbein, (1980) behavioral *intentions* are determined by whether important referents (that is, people who are important to the person) approve or disapprove of the performance of a behavior and

according to Blue (1995), an individual is more motivated to perform a behavior that will result in an outcome that is highly valued. When one does not believe that an act will lead to a specific outcome or the outcome is not valued, the individual will be less motivated to perform a behavior. Norazah & Ramayah (2010), who investigated user acceptance of the e-government services in Malaysia, mentioned that people have the perception that they should use the e-government services for quality delivery service and the other people they know think that using e-government services is a good idea and strongly influence them to try them out. Also Abied et al. (2015) who proposed a research framework for the factors affecting adoption of e-government services claimed that *subjective norms* would be important effect on *perceived usefulness*. Gracia et al. (2012) who conducted an empirical survey among Spanish potential users of public e-services found that *subjective norms* are significant antecedents of citizens' behavioral intentions. To incorporate the effects of *Subjective norm* the following hypotheses are formed:

H7: *Subjective norm* has a positive effect on *image*.

H8: *Subjective norm* has a positive effect on *perceived usefulness*

H9: *Subjective norm* has a negative effect on *intention-to-use*.

Output quality is an individual's perception of how well a system performs tasks necessary to his or her job. Venkatesh & Davis (2000) suggested that increased *output quality* is likely to improve an individual's job performance, thus influencing his perception of usefulness. Sang et al. (2009a) found that *output quality* is an important determinant of *perceived usefulness* regarding e-government adoption in Cambodia and claimed that public officers perceive the e-government systems to be useful when it does the required tasks adequately or when the quality of the output they get from the systems is high. At another study Sang et al. (2009b) found that *image*, *output quality*, and *perceived ease of use* explain 38.4% of the variance in user perception of the *usefulness* of an electronic approval system. While, recently Hashim et al. (2013) conceptualized evaluation of HRIS one of the pilot projects under the Electronic Government Flagship in Malaysia. In the proposed model they claimed that that *output quality* affects *perceived usefulness*. To test this argument a new hypothesis is examined in this study:

H10: *Output quality* has a positive effect on *perceived usefulness*.

Voluntariness is the extent to which one perceives the adoption decision as non-mandatory. *Experience* and *voluntariness* are moderating factors of subjective norm. In the proposed model in this paper, the constructs *voluntariness* and *experience* were omitted. *Voluntariness* was omitted because use of e-government websites was not being mandated, nor was there any expectation that it would be mandated in the foreseeable future. The construct *experience* is intended to be used for studies after subjects have worked with a system (Chismar & Wiley-Patton, 2002).

Result demonstrability is the tangibility of the results of using the technology. Chismar & Wiley-Patton (2002) found that two of the three cognitive instrumental determinants, namely *job relevance*, *output quality* and *perceived usefulness* were significant. Taken this into consideration Sang & Lee (2009) omitted *result demonstrability* construct in their Conceptual Model of e-government acceptance in Public Sector. Sang & Lee's (2009) approach is adopted in the proposed model.

3.3. Relative Advantage and Compatibility

Rogers (1995) developed the Diffusion of Innovations (DOI) theory in order to explain how an innovation diffuses through a society. 'An innovation is an idea, practice, or a phenomenon perceived to be novel by an individual or a community' (Singh et al., 2008 p.1227) while diffusion is defined

‘as the process by which an innovation is communicated through certain channels over time among the members of a social system’ (Rogers 1995, p.10).

Rogers (1995) identified five attributes *relative advantage*, *compatibility*, *complexity*, *trialability* and *observability* that will each partly determine whether adoption or diffusion of a new activity will occur. E-government services can be considered as an innovation as they are perceived to be novel by citizen, and are delivered via the Internet (communication channel) to citizens, a community of potential adopters (Singh et al., 2008). DOI has been used in previous studies for the investigation of e-government acceptance and it was integrated in other models (Carter & Bélanger, 2005; Patel & Jacobson, 2008; Sang et al., 2009a). Sang et al. (2009a) claimed *complexity* construct in the DOI is often considered as *perceived ease of use* construct in the TAM and *trialability* and *observability* have no strong correlations between them and users’ attitude toward IT adoption. Therefore, they included only *relative advantage* and *compatibility* constructs in their research model. *Relative advantage* is defined as ‘the degree to which an innovation is perceived as better than the idea it supersedes’ (Rogers, 1995). The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption is likely to be. *Compatibility*, is defined as ‘the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopter’ (Rogers, 1995). An idea that is incompatible with someone’s values, norms or practices, will not be adopted as rapidly as an innovation that is compatible (Robinson, 2009). Sang’s et al. (2009a) views were adopted in this paper and the following hypotheses are formed:

H11: *Compatibility* has a positive effect on *intention-to-use*.

H12: *Relative advantage* has a positive effect on *intention-to-use*.

3.4. Trust and Risk in the E-Government Adoption

Trust appears in every aspect of social interactions (Colesca, 2009) and is the foundation of any transaction that takes place between two parties (Schaupp & Carter, 2008). However, definition and operationalization of the concept is difficult and it is often defined in a particular context (Colesca, 2009). *Trust in e-government* is defined as ‘an individual’s (trustor, here is citizen) belief or expectation that another party (trustee, here e-government) will perform a particular action important to trustor in the absence of trustor’s control over trustee’s performance’ (Alsaghier et al., 2009 p.298). Trust ‘makes citizens comfortable sharing personal information, make online government transaction, and acting on e-Government advices’ (Alsaghier, 2009 p. 295) and encompasses the intention of users to receive information, to provide information, and to request e-government services (Sang et al., 2009a). Thus, trust is considered as a crucial enabler in e-government adoption (Al-adawi et al., 2005; Belanger & Carter, 2008; Colesca, 2009; Hung et al., 2006; Warkentin et al., 2002).

In previous studies a connection was found between trust and TAM (Gefen et al., 2003a, 2003b; Pavlou, 2003; Wu & Chen, 2005). Gefen et al. (2003a) found out that trust is an antecedent of *perceived ease of use* and *perceived usefulness* and influences behavioral *intention to use*. Pavlou (2003) claimed that trust is one of the factors that influence perceived usefulness and Wu & Chen (2005) that trust is considered as an important antecedent of intention to use and attitude. Three new hypotheses are formed to test that above:

H13: *Trust to e-government* has a positive effect on *perceived behavioural control*.

H14: *Trust to e-government* has positive effect on *perceived usefulness*.

H15: *Trust to e-government* has positive effect on *intention-to-use*.

Risk is defined as the ‘potential for the realization of unwanted, negative consequences of an event’ (Rowe, 1977; p. 24) while *perceived risk* is defined as ‘the citizen’s subjective expectation of suffering a loss in pursuit of a desired outcome’ (Warkentin, 2002; p. 160). Risks associated with

information technology entail the likelihood that a system is insufficiently protected from various types of damages (Straub & Welke, 1998). Previous studies in the context of e-commerce and later on e-government indicate that *perceived risk* is a main barrier towards acceptance (Belanger & Carter, 2008; Beldad et al., 2011; Bahli & Benslimane, 2004; Pavlou, 2003). Previous research has also discussed the role *perceived risk* in reducing users' intentions to exchange information and complete transactions (Pavlou, 2003; Warkentin et al., 2002). Two hypotheses are formed to test the effect of *Perceived risk*:

H16: *Perceived risk has a negative effect on trust to e-government.*

H17: *Perceived risk has a negative effect on intention-to-use.*

3.5. Perceived Behavioural Control

Perceived Behavioral Control refers to people's perception of the ease or difficulty of performing the behavior of interest (Ajzen, 1991). *Perceived Behavioral Control* was proposed by Ajzen (1991) in the Theory of Planned Behavior (TPB) in order to incorporate perceptions of control over performance of the behavior as an additional predictor and thus extends the applicability of the theory to complex goals behaviors' and outcome that dependent upon performance of a complex series of other behaviors (Conner & Armitage, 1998). Inclusion of *perceived behavioral control* was based on the idea that behavioral performance is determined jointly by motivation (intention) and ability (behavioral control) (Glanz et al., 2008). TPB has served for years in diverse domains to predict and explain human behavior. Ozkan & Kanat (2011) extended and validated TPB in the e-government context. Norazah & Ramayah (2010) claimed that *perceived behavioral control* may have effect on *intention-to-use* and Mahbob et al. (2011) found that *perceived behavioral control* is a crucial factor that influences the intentions and behavior of citizens in accepting government's e-services in Malaysia. Thus, in the present study, the following hypothesis could be tested:

H18: *Perceived behavioural control has positive effect on intention-to-use.*

3.6. Personal Innovativeness and Awareness

Innovativeness is a 'basic dimension of personality relevant to the analysis of organizational change' (Kirton, 1976). A predictive measure of innovativeness was created in the field of communications where innovativeness was defined as 'a normally distributed, underlying personality construct, which may be interpreted as a willingness to change' (Hurt et al., 1977). Later on in the context of information technology *personal innovativeness* was defined as 'the willingness of an individual to try out any new information technology' (Agarwal & Prasad, 1998 p.206). Individuals with high personal innovativeness are likely to be impulsive by nature and may not think through the reasons and implications for their actions. In other words, 'they may 'dive in' and try the technology due to their curious and risk-taking nature, and not necessarily base their decision on the concrete advantages for doing so' (Agarwal & Prasad, 1998 p.204).

Personal innovativeness as a construct is important in directly predicting behavioral intentions (Rosen, 2005). In the context of e-government Hung et al. (2009) integrated *personal innovativeness* in their model for investigating e-government adoption. Hung et al. (2009) views were adopted in this paper to result to testing the following:

H19: *Personal innovativeness has a positive effect on intention-to-use.*

Awareness is defined as 'people's knowledge of e-government project, and the availability of electronic services' (Mofleh & Wanous, 2008). According to Charbaji & Mikdashi (2003) *awareness*

of the existence of e-government services is positively related to the usage of e-government services and according to Adeshara et al. (2004) *awareness* increases the demand on e-government services. Mofleh & Wanous (2008) unified five constructs in their research model to study people’s demand on different levels on e-government services, namely, trust of the Internet, trust in government, awareness, previous experience and compatibility. Thus *awareness* was also integrated in the research model to test the following hypothesis:

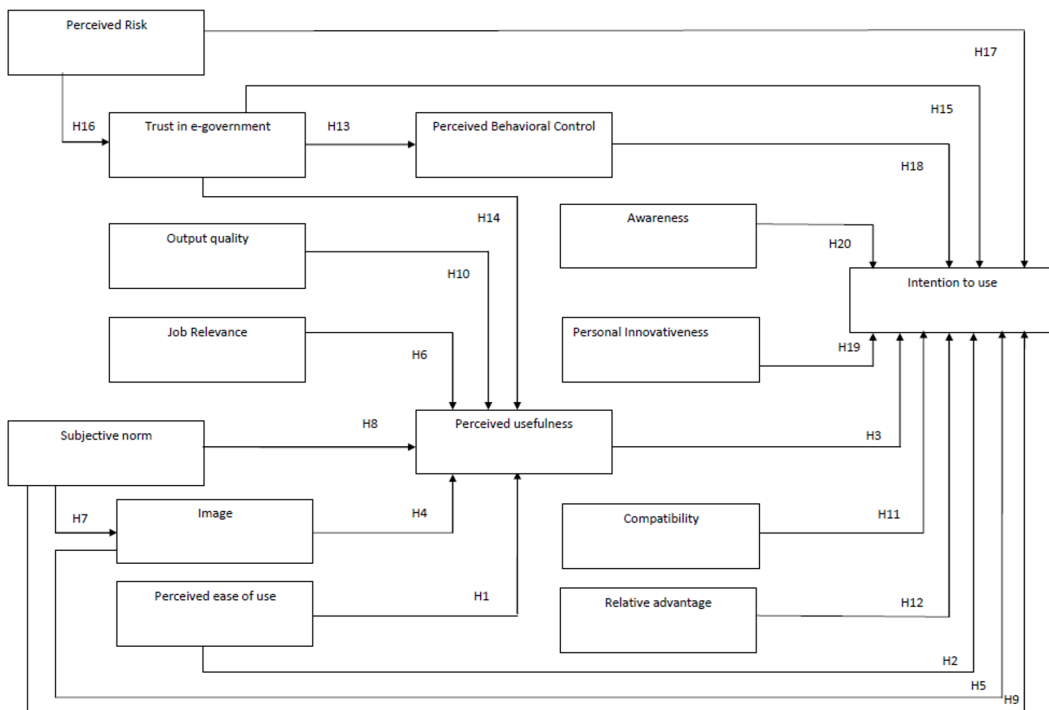
H20: *Awareness* has an effect on *intention-to-use*.

4. METHODOLOGY

Figure 1 presents the research model along with formulated hypotheses to be tested. An empirical research study was conducted using an online survey. Internet users have been chosen to be surveyed as ‘nonusers haven’t favorable attitudes towards the use of electronic services in relation with the governmental agencies’ (Colesca, 2009; p.32). Therefore, the research does not investigate people who are electronically incapable of accessing services.

A link to the main webpage of the Greek Schools Network (<http://www.sch.gr>) notified users of the website about the online questionnaire website. Users willing to participate visited a tailor made website and responded to the questionnaire. The data were recorded to a database. The Greek Schools Network offers e-mail accounts (username@sch.gr) and fully personalized access to education staff. In order to ensure that the responder was actually a teacher, the e-mail of the responder was recorded. From all questionnaires that were received, only those of username@sch.gr form was admitted. Finally, 437 completed and usable questionnaires were received. Nearly 63% of the respondents were men.

Figure 1. The research model along with formulated hypotheses



Primary education teachers reached 56.9%, while the rest were secondary education teachers (43.1%). Regarding age of the respondents, those between 20 and 30 years were 12.5%, those between 31 and 40 years were 27.8%, the respondents between 41 and 50 years were 43.3%, and those 50 years old or more were 16.4%.

The questionnaire used in this study was created by adopting constructs from previous studies. Five-point Likert scales were used ranging from strongly disagree to strongly agree. The questionnaire consists of fourteen parts: 1) Trust in e-government, 2) Perceived Ease of Use, 3) Perceived Usefulness, 4) Perceived risk, 5) Subjective norm, 6) Image, 7) Compatibility, 8) Output quality, 9) Relative Advantage, 10) Job relevance, 11) Perceived behavioral control 12) Personal Innovativeness 13) Awareness and 14) Intention-to-use.

A pilot study using an extended questionnaire containing all the scales proposed in the literature review was conducted by administering the questionnaire to 76 primary and secondary education teachers. Finally, for each construct the scale presenting the largest Cronbach's alpha was decided to be included in the final questionnaire, to maximize reliability (Tables 1 and 2).

5. FINDINGS

LISREL 8.8 was used to analyze the data. Since ordinal scales were used, model estimation was done using the weighted least squares method and polychoric correlations, with the asymptotic covariance matrix used as input.

The measurement model was first examined for validating and refining the research constructs, followed by an analysis of the Structural Equation Model for testing the research hypotheses in the research model.

Confirmatory Factor Analysis was used for model refinement. Testing the measurement model involves examining the convergent validity, discriminant validity, and internal consistency of the constructs. Reliability and convergent validity of the measurements are estimated by the item factor loadings, Composite Reliability, and Average Variance Extracted (Fornell & Larcker, 1981).

Convergent validity refers to the extent to which the items under each construct are actually measuring the same construct. Two methods were applied to assess convergent validity. First, item reliability was examined for each item, which suggested that the factor loading of each item on its corresponding construct must be higher than 0.55 (Teo et al., 2009). As shown in Table 3, all items had a loading above the suggested threshold. Convergent validity was assessed by examining the average variance extracted (AVE) for each construct. The AVE for a construct reflects the ratio of the construct's variance to the total variance among the items of the construct. The average extracted variances are all above the recommended 0.50 level (Hair et al., 1998; Teo et al., 2009).

Discriminant validity refers to the extent to which a given construct differs from other constructs. As all items loaded more heavily on their corresponding constructs rather than on other constructs, discriminant validity was satisfied. Further, the square roots of all AVEs were larger than correlations among constructs, thereby satisfying discriminant validity. All the inter-construct correlations are below 0.9. Also the estimated correlation between all construct pairs is below the suggested cutoff of 0.9 and this implies distinctness in construct content or discriminant validity (Gold et al., 2001; Teo et al., 2009).

Compared to Cronbach's alpha, which assumes equal weights of all the items of a construct and is influenced by the number of items, Composite Reliability relies on actual loadings to compute the factor scores and thus provides a better indicator for measuring internal consistency (Teo et al., 2009). As shown in Table 3, Composite Reliabilities are above the threshold of 0.7. Overall, the measures in this study are reliable and valid.

Table 1. Items used, along with CFA loadings and responses percentages (part 1)

| Scales and items | Factor loadings | Responses percentages 1 strongly disagree .. 5 strongly agree | | | | |
|--|-----------------|--|------|------|------|------|
| | | 1 | 2 | 3 | 4 | 5 |
| Trust in e-governance websites Adopted by Teo et al. (2009). Constructs also tested in pilot study: Colesca and Dobrica's (2008), Sang's et al. (2009a). | | | | | | |
| 1 e-government Web sites are trustworthy | 0.88 | .9 | 4.6 | 29.8 | 58.8 | 5.9 |
| 2 e-government Web sites are seem to be honest and truthful to me | 0.88 | 1.1 | 4.3 | 37.8 | 51.0 | 5.7 |
| 3 e-government Web sites can be trusted | 0.94 | 1.4 | 5.0 | 31.4 | 54.9 | 7.3 |
| Perceived Risk Adopted from Belanger and Carter (2008) | | | | | | |
| 1 The decision of whether to use a state e-government service is risky | 0.97 | 21.0 | 47.6 | 26.4 | 3.6 | 1.4 |
| 2 In general, I believe using state government services over the Internet is risky | 0.85 | 24.8 | 46.2 | 23.7 | 3.6 | 1.6 |
| Subjective norms Adapted from Hung et al. (2006). Constructs also tested in pilot study: Sang et al. (2009a). | | | | | | |
| 1 People (peers and experts) important to me supported my use of online systems. | 0.81 | 3.6 | 9.3 | 42.1 | 36.2 | 8.7 |
| 2 People who influenced my behavior wanted me to use online systems instead of any alternative means. | 0.94 | 2.7 | 8.9 | 43.5 | 36.2 | 8.7 |
| 3 People whose opinions I valued preferred that I use online system. | 0.87 | 2.7 | 10.7 | 43.1 | 36.4 | 7.1 |
| Image Adopted from Sang et al. (2009a). Constructs also tested in pilot study: Carter and Belanger (2005) | | | | | | |
| 1 People in my organization who use e-Government systems would have more prestige than those who do not. | 0.89 | 7.3 | 14.8 | 32.3 | 37.4 | 8.2 |
| 2 People in my organization who use e-Governments system would have a high profile. | 0.92 | 5.5 | 13.2 | 31.7 | 39.2 | 10.5 |
| 3 Having the e-Government systems would be a status symbol in my organization | 0.77 | 7.7 | 17.3 | 38.5 | 28.9 | 7.5 |
| Job Relevance Adapted from Sang et al. (2009a). | | | | | | |
| 1 In my job, usage e-Government systems would be important. | 0.97 | .5 | 3.2 | 15.0 | 51.0 | 30.3 |
| 2 In my job, usage e-Government systems would be relevant. | 0.72 | 1.1 | 7.5 | 18.9 | 45.8 | 26.7 |
| Compatibility Adopted from Sang et al. (2009a). Constructs also tested in pilot study: Carter and Belanger (2005) | | | | | | |
| 1 I think using e-Government systems would fit well with the way that I like to gather information from government agencies. | 0.8 | .2 | .7 | 15.5 | 57.6 | 26.0 |
| 2 I think using e-Government systems would fit well with the way that I like to interact with government agencies. | 0.89 | .7 | 2.3 | 22.6 | 54.0 | 20.5 |
| 3 Using e-Government systems to interact with government agencies would fit into my lifestyle. | 0.91 | .7 | 3.0 | 24.6 | 49.0 | 22.8 |
| 4 Using e-Government systems to interact with government agencies would be compatible with how I like to do things. | 0.89 | .5 | 2.1 | 24.1 | 50.1 | 23.2 |
| Output Quality Adopted from Sang et al (2009a) | | | | | | |
| 1 The quality of the output I get from e-Government systems would be high. | 0.88 | .7 | 4.3 | 38.7 | 47.6 | 8.7 |
| 2 I would have no problem with the quality of e-Government systems' output | 0.61 | 4.6 | 14.6 | 35.8 | 36.9 | 8.2 |

5.1. The Model Testing

The first step in model testing is to estimate the goodness-of-fit of the research model. Recommended fits are suggested from previous studies (Bagozzi & Yi, 1988; Hair et al., 1988): goodness-of-fit index (GFI), normed fit index (NFI), non-normed fit index (NNFI), comparative fit index (CFI), and the root-mean-square error of approximation (RMSEA) as the indices for evaluating the overall model fitness. The chi-square test provides a statistical test for the null hypothesis that the model fits the data, but it is too sensitive to sample size differences, especially where the sample sizes exceed 200 respondents (Fornell & Larcker, 1981). Bagozzi & Yi (1988) suggested a chi-square per degrees of freedom instead. All of the fit indexes indicate that the structural model has a good fit (Table 4).

Table 2. Items used, along with CFA loadings and responses percentages (part 2)

| | | Responses percentages | | | | |
|---|------|-----------------------|------|------|------|------------------|
| | | 1 strongly disagree | 2 | 3 | 4 | 5 strongly agree |
| Relative advantage Adopted from Sang et al. (2009a). Constructs also tested in pilot study: Carter & Belanger (2005) | | | | | | |
| 1 Using e-Government systems would enhance my efficiency in gathering information from government agencies. | 0.75 | | 1.4 | 15.3 | 60.1 | 23.2 |
| 2 Using e-Government systems would enhance my efficiency in interacting with government agencies. | 0.91 | .2 | 2.5 | 26.2 | 53.3 | 17.8 |
| 3 Using e-Government systems would make it easier to interact with government agencies. | 0.88 | .7 | 3.0 | 21.6 | 54.9 | 19.8 |
| 4 Using e-Government systems would give me greater control over my interaction with government agencies. | 0.79 | .9 | 5.5 | 31.4 | 48.1 | 14.1 |
| Perceived Ease of Use Adopted from Carter & Belanger (2004) . Constructs also tested in pilot study: Teo's et al. (2009), Colesca & Dobrica's (2008), Sang's et al.(2009a), Shih's (2004). | | | | | | |
| 1 Learning to interact with a state government Website would be easy for me. | 0.8 | .2 | .2 | .7 | | .2 |
| 2 I believe interacting with a state government Website would be a clear and understandable process. | 0.88 | 1.6 | 2.7 | 5.2 | .7 | 1.6 |
| 3 I would find most state government Websites to be flexible to interact with. | 0.74 | 20.0 | 25.3 | 31.9 | 9.6 | 20.0 |
| 4 It would be easy for me to become skilful at using a state government Website. | 0.74 | 52.6 | 51.7 | 47.4 | 53.5 | 52.6 |
| Perceived Usefulness Adopted from Wangpipatwong et al. (2008). Constructs also tested in pilot study: Teo's et al. (2009), Colesca & Dobrica's (2008), Sang's et al.(2009a) and Shih's (2004). | | | | | | |
| 1 Using e-Government websites enables me to do business with the government anytime not limited to regular business hours. | 0.88 | .2 | .7 | 7.1 | 46.7 | 45.3 |
| 2 Using e-Government websites enables me to accomplish tasks more quickly. | 0.9 | .2 | .5 | 8.2 | 46.9 | 44.2 |
| 3 The results of using e-Government websites are apparent to me. | 0.72 | .2 | 1.4 | 15.9 | 52.8 | 29.6 |
| 4 Using e-Government websites can cut travelling expense. | 0.88 | | .2 | 4.8 | 46.7 | 48.3 |
| 5 Using e-Government websites can lower travelling and queuing time. | 0.87 | .5 | .2 | 3.6 | 42.4 | 53.3 |
| Perceived behavioral control Adapted from Hung et al. (2006) | | | | | | |
| 1 I would be able to use an e-government website. | 0.81 | .2 | .2 | 11.4 | 56.5 | 31.7 |
| 2 Using an e-government website was entirely within my control. | 0.67 | 2.5 | 12.8 | 39.0 | 32.3 | 13.4 |
| 3 I had the resources, knowledge, and ability to use an e-government website | 0.83 | 1.4 | 2.7 | 21.0 | 46.5 | 28.5 |
| Personal Innovativeness Adapted from Hung et al. (2006) | | | | | | |
| 1 I find it stimulating to be original in my thinking and behavior. | 0.75 | .2 | .9 | 11.8 | 57.2 | 29.8 |
| 2 I am challenged by ambiguities and un-solved problems. | 0.8 | .2 | 2.5 | 19.1 | 53.8 | 24.4 |
| Awareness Adapted from Mofleh & Wanous (2008) | | | | | | |
| 1 I am aware of the services offered on e-government websites | 0.71 | 1.4 | 10.7 | 33.9 | 47.2 | 6.8 |
| 2 I am aware how to find easily e-government websites (via a portal or a search engine) | 0.74 | .9 | 4.3 | 21.0 | 56.9 | 16.9 |
| Intention to use Adopted from Carter & Belanger (2004). Constructs also tested in pilot study: Al-adawi's et al. (2005), Belanger & Carter's (2008), Hung's et al. (2006) and Sang's et al.(2009a). | | | | | | |
| 1 I would use the Web for gathering state government information. | 0.88 | | 1.1 | 6.2 | 52.2 | 40.5 |
| 2 I would use state government services provided over the Web. | 0.9 | | .7 | 5.7 | 54.2 | 39.4 |
| 3 Interacting with the state government over the Web is something that I would do. | 0.86 | .2 | 1.4 | 13.2 | 52.6 | 32.6 |
| 4 I would use the Web to inquire about state government services. | 0.89 | | 1.4 | 9.1 | 53.5 | 36.0 |

The second step in model estimation is to examine the significance of each hypothesized effect in the research model and variance explained (R^2). The standardized path coefficients, and explained variances of the structure model are shown in Figure 2. It also presents the research model after validation along with the hypotheses. Non-Significant estimates ($p > 0.05$) are presented with dotted lines.

Table 3. CR and AVE of the constructs

| Construct | CR | AVE |
|-------------------------------|------|------|
| Perceived Behavioural Control | 0.81 | 0.59 |
| Image | 0.89 | 0.74 |
| Perceived usefulness | 0.92 | 0.72 |
| Intention-to-use | 0.93 | 0.77 |
| Personal innovativeness | 0.92 | 0.81 |
| Perceived risk | 0.75 | 0.60 |
| Awareness | 0.90 | 0.83 |
| Trust to e-government | 0.68 | 0.52 |
| Subjective norm | 0.90 | 0.76 |
| Job relevance | 0.84 | 0.72 |
| Perceived ease of use | 0.87 | 0.62 |
| Compatibility | 0.92 | 0.76 |
| Output quality | 0.72 | 0.57 |
| Relative advantage | 0.90 | 0.69 |

Table 4. Analysis of the goodness-of-fit of the overall model

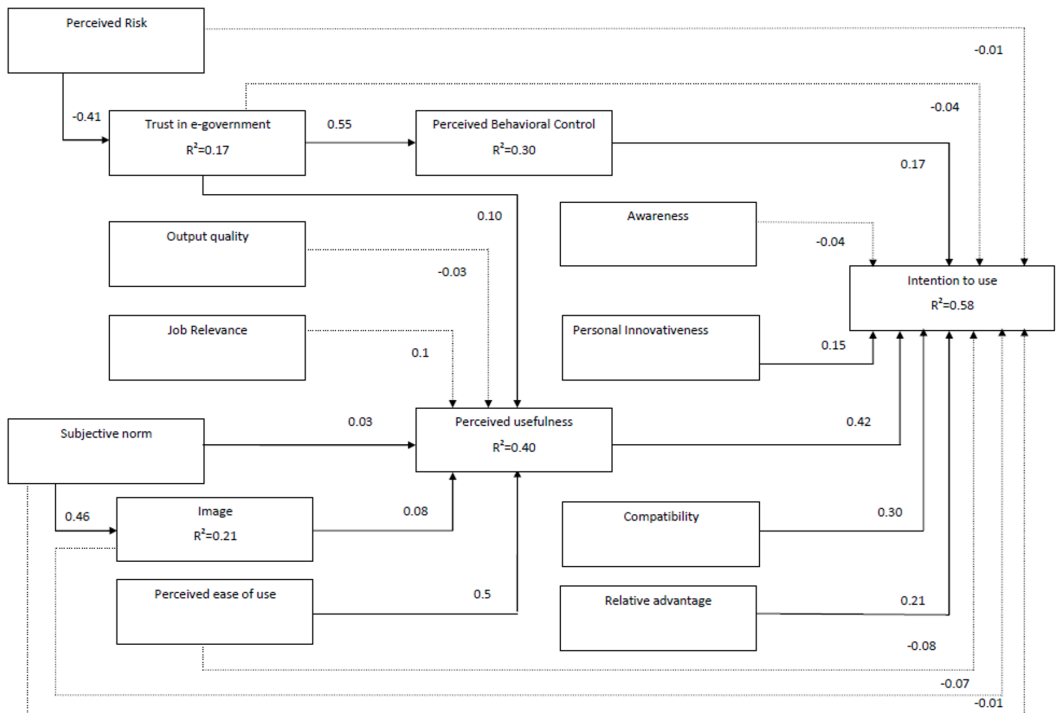
| Fit index compared to the Recommended value | Measurement Model | Research model |
|---|-------------------|----------------|
| Chi-square/d.f. ≤ 3.0 | 2.19 | 2.04 |
| GFI ≥ 0.80 | 0.84 | 0.81 |
| AGFI ≥ 0.80 | 0.80 | 0.80 |
| NFI ≥ 0.90 | 0.97 | 0.96 |
| NNFI ≥ 0.90 | 0.98 | 0.97 |
| RMSEA ≤ 0.08 | 0.056 | 0.063 |
| CFI ≥ 0.90 | 0.98 | 0.97 |

6. DISCUSSION

The study has identified ten factors that directly or indirectly influence the adoption of e-government services in Greece. These factors are *Perceived ease of use*, *Perceived usefulness*, *Image*, *Subjective norm*, *Compatibility*, *Relative advantage*, *Trust to e-government*, *Perceived risk*, *Perceived behavioral control* and *Personal innovativeness*.

Findings support the role of *perceived usefulness* as a fundamental factor in the adoption of e-government as it has a direct positive effect on *Intention to use* ($\beta=0.42$, $p<0.05$), so H3 is supported). An increase in perceived usefulness positively influences users' intention to use e-government services. This finding is in accordance with the findings of Sang et al. (2009a), Hung et al. (2006), Almahamid et al. (2010), and Horst et al. (2007). Perceived usefulness was the strongest predictor of continuance intention according to Wangpipatwong et al. (2008). Our finding provides evidence that indeed it has the largest direct effect on *Intention-to-use* in the present study.

Figure 2. The research model after validation



Perceived ease of use has a positive direct effect on *Perceived usefulness* ($\gamma=0.5$, $p<0.05$) hence H1 is supported. This finding is in accordance with the findings of Wangpipatwong et al. (2008) and consistent with the TAM framework.

Perceived ease of use of e-government services indirectly enhances users' intention through perceived usefulness although it is not significantly directly associated with increased use intentions to use of e-government services ($\gamma=-0.08$, $p>0.05$). H2 is partially supported since *perceived ease of use* influences indirectly *intention to use* through *perceived usefulness*. This finding is in accordance with the findings of Carter & Belanger (2004) and Sang et al. (2009a). Developing e-government websites that are easy to use will enhance the usefulness of the websites and indirectly increase the *intention-to-use* them. From the analysis of the complementary items of the questionnaire of this survey, it is known that information inquiry is the main reason that internal customers are visiting educational e-government websites in Greece. Most online interactions between teachers and the government are still one-way. Teachers do not provide personal information through websites, or if it is done, it is on a voluntary basis (e.g. monitoring payroll). If internal customers find useful information, which exempts them from visits to governmental organizations and waiting in queues, a relationship of trust may be developed and teachers will be ready in the future to complete transactions on-line. Thus policy makers should campaign usefulness of e-government services. In Singapore, for example, e-government leaders used the slogan YQ [Why Queue] to communicate to citizens that use of e-government websites saves a lot of time (Teo et al., 2008).

Image has a small positive effect on *perceived usefulness* ($\beta=0.08$, $p<0.05$) so H4 is supported. This is consistent with the research by Sang et al. (2009a), Abied et al. (2015) and Ramayah et al. (2005). A person, who needs social recognition, perceives adoption of e-government services as a

vehicle to demonstrate to others his/her technical expertise and/or how innovative he/she is. So it is likely that he/she understands usefulness of the system more quickly.

Image does not have a direct effect on *Intention to use* ($\beta=-0.07$, $p>0.05$), but it does have an indirect effect through *Perceived usefulness*, thus H5 is partially supported. Findings of the paper are partially in accordance with Carter & Belanger (2004), Sang et al. (2009a) and Hussein et al. (2011), who claimed that higher levels of perceived image enhancing value of e-government increase citizens' intention to use e-government service. This does not necessarily constitute a discrepancy from previous results, since not only an indirect effect exists, but also we could argue that results are conditioned to using multivariate models with many variables. Coefficients may change conditional to the existence of other complementary variables used in the models. This means that direct effects may be masked by other indirect effects, when more other variables are present in the model.

Job relevance was not found to be significant in predicting *perceived usefulness*, so H6 is not supported. This find is consistent with Sang et al. (2009a) findings.

Subjective norm has a large direct positive effect on *image* ($\gamma=0.46$, $p<0.05$). H7 is supported. If a person believes that most of the others, who are important to her, think that she should adopt e-government, the person is likely to adopt it, aiming at improving the social status and gaining recognition within the team. According to Rogers (1995), one of the most important incentives, for almost all people, to the adoption of an innovation comes from the desire to enhance his/her status in the social system. Moreover, increased power and influence resulting from elevated status provides a general basis for greater productivity (Ramayah et al., 2005). Possibly, the person realizes that by using e-government services his/her performance at work is increasing.

Subjective norm does not have a direct effect on *Perceived usefulness* ($\gamma=0.03$, $p>0.05$). However it does have an indirect effect through *image*. So H8 is partially supported. Horst et al. (2007) found that *subjective norm* has no significant effect on perceived usefulness in one of the two samples in their study.

Subjective norm was not found to have a significant effect on *intention-to-use*. This finding adds the ambiguity presented by previous studies. Chu & Wu (2005) and also Lu et al. (2010) found that subjective norm has significant influence on intention-to-use. Rana et al. (2013) found a relatively weak though significant influence of subjective norm on intentions. Hung's et al. (2006) based on their findings, claimed that subjective norms are significant for non-adopters and has little effect on adopters' adoption intention.

Sang et al. (2009a) found that *output quality* has a direct effect on *perceived usefulness*. The findings of the paper are not in accordance with them since H10 is not supported. Possibly, context related issues justify this discrepancy.

Compatibility has also a direct positive effect on *intention-to-use* ($\gamma=0.30$, $p<0.05$) and H11 is supported. Higher levels of perceived compatibility are associated with increased intentions to use e-government initiatives. Carter & Belanger (2004), Mofleh & Wanous (2008) and Hussein et al. (2011) arrived to similar findings. Users who consider that e-government is compatible with their values, norms or practices will adopt e-government faster. In a remarkably short period of time, internet, mobile technology and use of social media have become a part of everyday life for people in developed and in some developing countries. Nowadays, in Greece 50% of the population uses the internet regularly and there is an increasing tendency in Internet use. People who have adopted Internet-supported initiatives are also likely to adopt e-government services as it is expected to view e-government compatible with their lifestyle. Government agencies in their efforts to convince people to use e-government services may use practices compatible with existing values in order to lead potential customers to a new culture. For example, many people tend to assume a paper proof as a verification of a transaction. Lack of this tangible record may make some people reluctant to engage in electronic transactions. Agencies could still make paper receipts available to citizens through an email or fax (Carter & Bélanger, 2005). This may lead to adoption of the service as it is compatible with the existing values of Greek society.

Relative advantage also directly affects *intention-to-use* ($\gamma = 0.21, p < 0.05$); H12 is supported. Higher levels of perceived relative advantage increase employees' intentions to use e-government services. This result is consistent with the findings of Carter & Belanger (2004), Sang et al. (2009), Carter & Belanger (2005) and Sang et al. (2009a). Teachers believe that using e-government websites would enhance their efficiency in gathering information and in interacting with government agencies. Thus, government should identify and communicate to citizens the advantages of using online services, as opposed to the existing ones. Government agencies should, for example, communicate speed in retrieving information and completing transactions with state government agencies, more convenient services, and better quality and reduced turnaround times.

Trust to e-government has a strong direct effect on *perceived behavioral control* ($\beta = 0.55, p < 0.05$) and an effect on *Perceived usefulness* ($\beta = 0.10, p < 0.05$). Thus H13 and H14 are supported. High perceived trust on an e-government service will lead to increased perceived usefulness. This is consistent with the findings of Colesca & Dobrica (2008) and Horst et al. (2007). Given that trust describes confidence in the behavior of the other party, it should give customers of e-government services a perception of control by reducing behavioral uncertainty about government actions (Warkentin et al., 2002).

Sang et al. (2009a) and Carter & Bélanger (2005) found that trust to e-government has a direct positive effect on intention-to-use. The findings of the paper are partially in accordance with them since H15 is partially supported. There are only indirect effects of *Trust to e-government* to *Intention-to-use* through perceived *behavioural control* and *perceived usefulness*. *Trust to e-government* does not have a direct effect on *Intention to use* ($\beta = -0.04, p > 0.05$).

Perceived risk has a direct negative effect on *Trust in e-government* ($\gamma = -0.41, p < 0.05$). H16 is supported. Perceived risk was found to have a direct effect on trust to e-government. *Risk* perceptions are high when trust in e-government is low. This was also found by Horst et al. (2007).

Perceived risk does not have a direct effect on *Intention to use* ($\gamma = -0.01, p > 0.05$), but it does have an indirect effect on it through *Trust*. H17 is partially supported. The higher the risk citizens perceive the less they tend to trust e-government. In Belanger & Carter (2008), higher levels of perceived risk did not found to decrease intention-to-use, while Khattab et al. (2015) found that perceived risk affects citizens' intention. In order to adopt e-government services customers should be willing to 'participate in e-government', in the sense to obtain information and to provide if requested. Without trust in the processes of e-government, vision of fully electronic services will continue to be simply an ambitious plan. Government should make efforts to reduce the *perceived risk* and increase *trust* in the offered electronic services. Citizens must be confident that mechanisms exist to ensure safe transactions. Thus, governmental organizations should use confidence-building mechanisms used in electronic commerce such as the use of secure environment by using specific protocols and data encryption, and use of procedures to ensure privacy of personal data. Brochures and posters can also be used on establishments of government agencies to emphasize on safety, cryptographic mechanisms that ensure privacy and offered services. Government agencies should also communicate best practices of electronic services, along with statistics showing citizens' satisfaction. Communication causes positive impact on citizens' perception of the credibility of government services.

Perceived behavioral control has a positive effect on *intent-to-use* ($\beta = 0.17, p < 0.05$). H18 is supported. Perceived behavioral control was found to have a positive effect on intention-to-use. This is consistent with findings of Chu & Wu (2005), Lu et al. (2010), and Rana et al. (2015). Hung et al. (2006) found that perceived behavior control has significant effect on adopters' intention and has little effect on non-adopters' intent to adopt. *Perceived behavioral control* should facilitate information acquisition and provision as customers have a sense of control.

Personal innovativeness directly affects *intention-to-use* e-government. ($\gamma = 0.15, p < 0.05$) so H19 is supported. This is consistent with the findings of Doong (2011), who found that personal innovativeness affects both intention to use e-government software and intention to purchase e-government software. Teachers, who are highly innovative hold more positive beliefs about using

e-government and are relatively earlier in adopting offered electronic services compared to others who are more hesitant to change their practices. If these teachers can be identified, they can act as change agents and opinion leaders for e-government initiatives in organizational settings. When considering e-government, these people could help champion e-government technology project implementation, leading to fewer project failures. It is therefore important for public bodies to targeted early marketing campaigns to highly innovative people leading them to try offered electronic services. This may have a multiplier effect, as they can pass on their positive experiences to others and improved word of mouth advertising to those who are less innovative. In addition, governments can train their teachers to raise the level of their own innovation.

Awareness was not found to have significant effect on intention-to-use. This is consistent with the findings of Mofleh & Wanous (2008).

7. CONCLUSION

This research proposes and validates a model for investigating the factors affecting the adoption of e-government in Greece. The model can serve as a starting point for future e-government research. It may be extended by using new constructs in order to fit other Greek government agencies taking into consideration specific characteristics of each organization. However, it raises fundamental issues that should be taken into account and manipulated by decision-makers, policymakers and IT specialists, to increase citizens' acceptance and use of e-government services. On the other hand, it replicates previous studies and locates effects and interactions that are also significant within the specific context, while others are not. In most cases, effects which are suggested in the literature to exist between determining factors and intention-to-use are also verified in this study. The study provides some proof that *output quality*, *awareness*, and *job relevance* do not affect directly or indirectly *intention-to-use*, while other constructs affect intention only indirectly. *Output quality* and *job relevance* are cognitive instrumental processes. There is no support from the findings that Greek teachers' *intention-to-use* is influenced by these two factors. Probably, teachers use the e-government sites to collect information without rating it as good or bad; it is good enough as it covers their need to be informed. On the other hand, the target group of this study is Greek teachers, which is a special occupational group. Teachers are indeed informed of what the available e-government sources and projects for them and their profession. In this sense, *awareness* may not be a crucial factor since it may not differentiate across teachers; all of them may have similar knowledge of the offered e-government services. Some further analysis, including qualitative research could shed some light on these findings.

Regarding the significant effects and the relative variables, *perceived usefulness*, *compatibility*, *relative advantage* and personal *innovativeness*, have the strongest direct effects on *intention-to-use*, while *perceived usefulness* also serves as a mediator for indirect effects from *Trust*, *Image*, *subjective norm* and *perceived ease of use*. It is in many aspects the most important determining variable for *intention-to-use*.

Customers' behavior towards e-government differs among countries (Colesca, 2009) and use of offered electronic services is influenced by culture, welfare state, and political system (Patel & Jacobson, 2008). Therefore, it is important to identify factors that determine acceptance under specific circumstances prevailing in each country and give strategic insight to increase the usage of e-government services.

In Greece, for the successful implementation of e-government and given the limited resources, government has to put priorities based on the relative importance of factors that influence users' intention to adopted offered e-services. An ICT investment strategy, which is fundamentally not a customer-focused one, has inevitably resulted in low levels of take-up of electronic services (Borras, 2012). Thus customers (citizens, businesses, government organizations, public servants) should be placed at the center of the e-government strategy. Government has to record customers' needs and expectations and move to a more customer-centric service delivery model, meeting their expectations.

An e-government strategy should place emphasis on the needs and cultural aspects of all stakeholders rather than solely on the technology issues.

The paper is moving towards this direction and conducts an empirical study to identify determinants of internal customers' (teachers in this case) acceptance of e-government services. The study has taken a lead in understanding e-government adoption in Greece, as no other studies exist. *Perceived usefulness* and *compatibility* are the factors that seem to exert significant influence on intention to use. Policy makers should give more emphasis on the development of an e-government marketing strategy that focuses on these issues in order users-employees realize the usefulness of the offered e-services, compatibility with their own values and the advantages of using e-government websites to retrieve information and complete transactions with public services versus other media. Friendly services meeting international usability standards should be developed. Development of e-government services should also be compatible, as possible, with the working style of the user.

At the next step, e-government solutions must include improved user interface and upgrade security mechanisms. These should be communicated to customers to increase trust in e-government. Good practices of electronic services should also be communicated along with statistics confirming the satisfaction of citizens. Communication causes positive impact on citizens' perception of the credibility of e-government services. Finally, people who interact in online environments over a long period of time tend to trust one another. Thus, development of online communities for teachers (blogs, forum discussions, etc.) may enhance sharing of their experiences and trust.

The present research has two main limitations; findings are context sensitive and they depend on the set of variables and the model used. The paper reports on the acceptance of e-government services by Greek teachers, so findings concern Greek citizens and particularly Greek public servants. One could argue that since teachers are almost half of the total number of Greek civil servants, the findings probably are indicative of all the civil servants in Greece. Even if so, this is far from claiming that they are indicative of all the Greek citizens. More surveys and analyses could be conducted using samples of Greek citizens. These could shed light on this investigation. The second limitation is about using the particular set of variables which measure adoption of and intention-to-use e-government services. The analysis results to the proposition and validation of a model that indeed describes and measures how the particular variables associate to each other. The final validated model is not however the best or the only one; it is just an adequate or proper model which describes associations among preselected variables in a fashion that is suggested by the relative literature. By including or using other variables, other appropriate models could also be calculated. All these models describe and measure different sides or aspects of the phenomenon. They may be equally important and correct, and they may be used in order to describe the big picture and to understand how behavioral, social and context characteristics affect each other, and finally how they affect intention to use e-government services.

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