

Transformational Government and Electronic Government Adoption Model

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Abstract. Despite the need expressed in the literature for shedding light upon the mechanisms that underpin the transformational process of Government, there is still research to be conducted regarding the critical factors that affect transformational government (t-Gov) and the citizens' adoption of government transformational services. To address this gap, this research reports on the findings of the use of the structured-case approach and suggests a holistic framework to investigate the success factors for t-Gov and a model that integrates the concepts that affect services adoption. The research reveals that t-Gov is not a state, but a process entailing experiential judgment. Existing acceptance theories, hence, need to be complemented by additional variables that affect citizens' adoption of transformational services.

Keywords: information systems, service science, electronic government, transformational government, adoption of electronic services, theory of reasoned action, interpretive and positivistic research.

1. Introduction

The successful delivery of public policy is increasingly dependent upon the effective use and application of new technologies and Information Systems (IS) [1]. However, significant issues are raised when policy conceptualizations travel through the many and often labyrinthine levels of public administration [1][2]. To address these issues and change the way citizens interact and communicate with each other, as well as to enhance the relationship between citizens and government, t-Gov comes to the fore [2][3][4][5][6][7][8].

The objective of the thesis is twofold. It concerns the development of the transformational process holistic model (*holistic t-Gov model*) and the construction of the adoption model (*t-Gov adoption model*) of relevant electronic services [1]. The approach of t-Gov based on three dimensions is proposed, namely organizational, social and technological. The three proposed dimensions are modeled as three submodels and their concepts and correlations are analysed. Based on qualitative research, the proposed submodels are evaluated using documentation techniques, focus groups and personal interviews and the hermeneutic conclusions are presented. The adoption model of t-Gov services is proposed and the research hypotheses are formulated. Based on qualitative research, the fundamental concepts are assessed using the aforementioned interpretive techniques and the proposed model and the conceptual hypotheses are constructed. The measurement of the model is conducted by creating the latent model. The statistic assessment is conducted in two phases, namely exploratory and confirmatory phase and it is based on methods and statistic indicators utilizing the statistic packages of SPSS and LISREL. The empirical assessment of the model is based on the positivistic approach. An assessment instrument has been developed for the data collection. The concepts of the model are operationalized to measurable variables and the measurement scales are created. The reliability and the validity of the measurement instrument are assessed. The data for the theory evaluation comes from the case study of the implementation of a unified platform for the e-services provision to citizens and businesses. The thesis reports on the use of the structured-case approach to investigate the success factors for a massive t-Gov initiative in Local Government Organisations (LGOs) to investigate the parameters that ensure the smooth use of the Local Government Application Framework (LGAF) [9]. The thesis outlines the contribution of the structured-case approach to build t-Gov theory following the interpretivist and positivist approach [6][7][8][10]. The fundament design principles of the platform are presented and the implementation objectives are documented based on the proposed models.

The structure of the article is as follows: after a brief review of t-Gov and the factors that affect its success, the proposed theoretical frameworks are presented. The research methods and context of the study are analysed. It follows the assessment of the proposed theory, the discussion of the research results as well as the presentation of the improved frameworks. The last section concludes the article.

2. Theoretical Frameworks

2.1 Holistic t-Gov Model

It has been stated that service dominates the global economy [5]. To respond to this tendency, organisations have been reconfiguring their business operations, incorporating innovative elements [5] as well as adopting new service philosophy [5]. The new philosophy to service provision has not only been adopted in the private, but in the public

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sector as well, where the successful delivery of public policy is increasingly dependent upon the effective use and application of new technologies and IS [1]. However, human, technical, and organisational issues seem to be arising when policy is translated to new and innovative services, which aim to transform the public administration, that is, transformational government services (t-Gov services). Regardless of the technologies selected and used, t-Gov services involve the adoption of best practices, principles and policies for their successful exploitation; on the other hand, their use creates unique opportunities, challenges and implications [5]. This calls for an analytical, interdisciplinary examination from both a theoretical and practical perspective regarding policy execution and materialization towards t-Gov [1].

The research initially addressed the aforementioned concerns and challenges by using the research-action approach according to the interpretivist approach [10][11][12][13][14][15][16]. The specific context is constituted by a large number of Government Organisations (GOs) which provide a significant number of governmental services to the citizens, visitors, enterprises based within their geographical limits and other governmental bodies. The proposed holistic approach presents the t-Gov process as a dynamic three dimensional system [1]. In this context, the concept of t-Gov is examined by three aspects namely, organizational, social, and technological. The modeling of the t-Gov process is integrated by the three corresponding sub-models t-Gov DO1, t-Gov DS2, and tGov DT3 which include meta-data and meta-information about the organizational, social and technological aspect respectively [1].

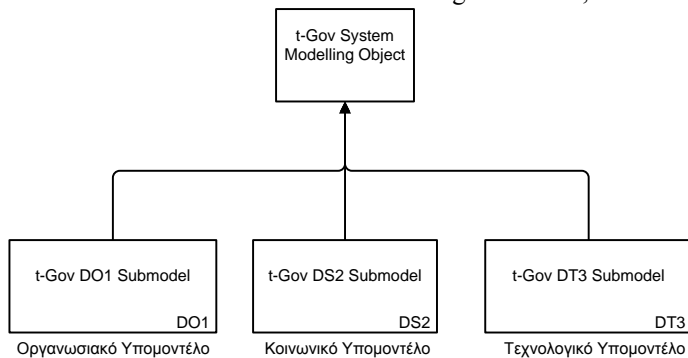


Figure 1. Holistic t-Gov Model

The following sub-models present the meta-data of each one of the three sub-systems that integrate the holistic t-Gov model.

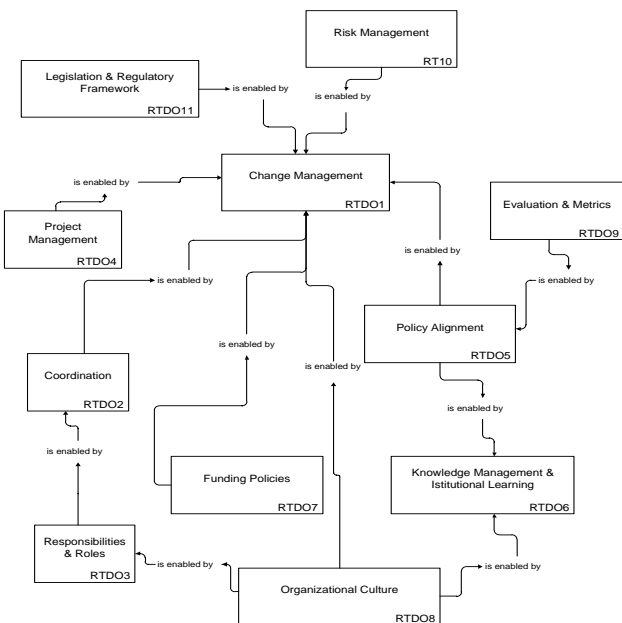


Figure 2. t-Gov DO1 Submodel

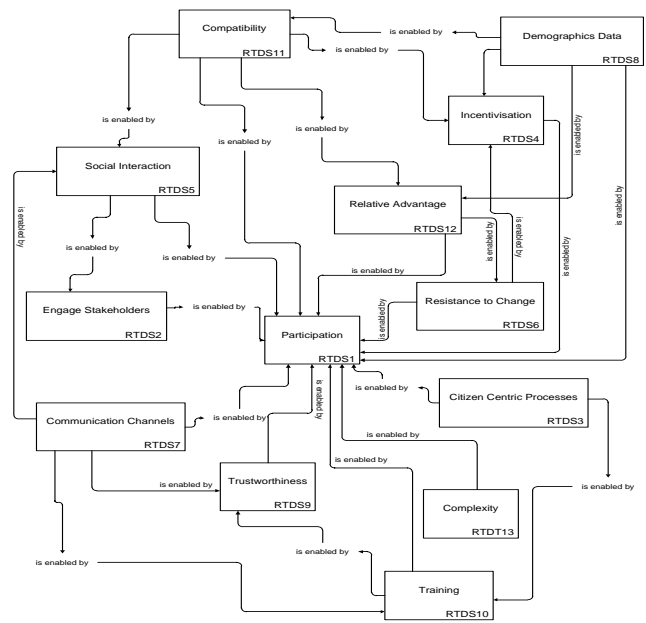


Figure 3. t-Gov DS2 Submodel

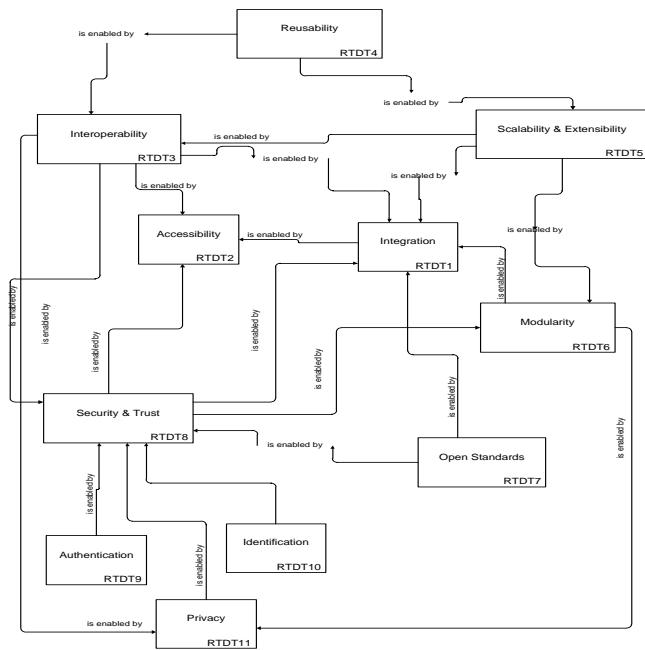


Figure 4. t-Gov DT3 Submodel

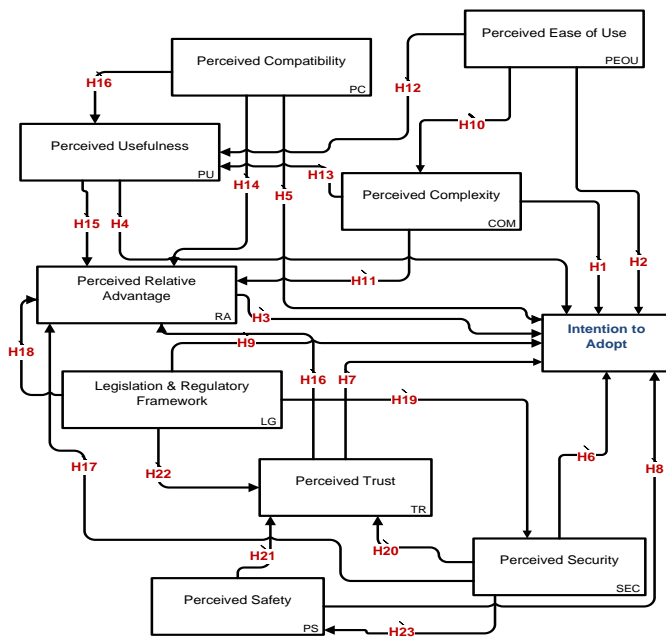
2.2 t-Gov Adoption Model

Past research on e-Gov has focused on implementation by using diffusion models. In particular, research has used Diffusion of Innovation (DOI) Theory [17]. Relevant studies [18][19][20][21] focusing on the role of administration size and professionalism on the adoption of computer technology [22]. Furthermore, literature has referred to the IS Success Model [23] and the Technology Acceptance Model (TAM) [24] as another means for discussing the particularities of the e-Gov implementation by measuring perceived usefulness (PU) and perceived ease of use (PEOU). TAM is based on the Theory of Reasoned Action (TRA). According to TRA, introduced by Martin Fishbein and Icek Ajzen [25], beliefs influence intentions, and intentions influence one's actions. TRA stresses that individual behaviour is driven by behavioural intentions, where behavioural intentions are a function of an individual's attitude toward the behaviour and subjective norms. Attitude toward the behaviour is defined as the individual's feelings about performing the behaviour. It is designated through an evaluation of one's beliefs regarding the consequences arising from a behaviour and an evaluation of the desirability of these consequences. Overall attitude can be assessed as the sum of the individual consequence multiplied by the desirability assessments, for all expected consequences of the behaviour. Subjective norm is defined as an individual's perception of whether people important to the individual think the behaviour should be performed. The contribution of the opinion of any given referent is weighted by the motivation that an individual has to comply with the wishes of that referent. Hence, overall subjective norm can be expressed as the sum of the individual perception multiplied by the motivation assessments, for all relevant referents.

TAM is one of the most well established theoretical frameworks that describe how users accept and use a technology [26]. The factors discussed by the TAM [27][28][29] have been utilised in various studies of acceptance of technology, IS, [30][31] and e-commerce [32][33][34]. Building on these TAM versions, the Unified Theory of Acceptance and Use of Technology (UTAUT) was introduced by [35], consisting of three factors namely performance expectancy, effort expectancy, and social influence and relevant studies have emerged [36] [37]. However, Paul et al. [38] suggest that TAM is not conclusive and suffers from the absence of factors regarding social and human processes. Moreover, PEOU is not consistently linked to adoption [34][39][40][30]. Finally, TAM is criticised for representing subjective user assessments of a system [1][37].

Literature [41][37] suggests that since there are many similarities between e-commerce and e-Gov, TAM factors in e-commerce [32][33][34][42] could be used in the case of e-Gov [37]. However, the use of TAM has not been used extensively in the case of t-Gov, taking under consideration its nature [43] [44]. Therefore, this study aims to understand the factors that affect citizens' adoption and on going usage of provided t-Gov services, and suggest a conceptual model explaining the dynamics of citizens and acceptance of the digital services.

Considering the aforementioned adoption theories, the initial conceptual framework for t-Gov adoption extends the existing theoretical frameworks, as presented in the following diagram.



The Conceptual Framework 1 of the t-Gov Adoption Model consists of nine research constructs, namely:

- PEOU*: the degree to which a person believes that using a system would enhance his job performance
- PU*: the degree to which one person believes that using a particular system would be free of effort
- COM*: the degree to which a person believes that an innovation is being relatively difficult to use and understand. Complexity is comparable to the construct PEOU
- PC*: the degree to which a person believes that an innovation is seen to be compatible with existing values, beliefs, experiences and needs of adopters
- RA*: the degree to which a person believes that an innovation is seen as being superior to its predecessor
- SEC*: the degree to which a person believes that using a particular system would be secure
- TR*: the degree to which a person believes that using a particular system would be trustfulness
- PS*: the degree to which a person believes that using a particular system would be safe
- LG*: the degree to which a person believes that using a particular system would be according to the legislation

Figure 5. Conceptual Framework 1 – t-Gov Adoption Model

The resulting research hypotheses of the theoretical framework are presented below:

Hypothesis	Description
Hypothesis 1 (H1)	Higher levels of COM will reduce intention to adopt t-Gov services
Hypothesis 2 (H2)	Higher levels of PEOU of use will increase intention to adopt t-Gov services
Hypothesis 3 (H3)	Higher levels of RA will increase intention to adopt t-Gov services
Hypothesis 4 (H4)	Higher levels of PU will increase intention to adopt t-Gov services
Hypothesis 5 (H5)	Higher levels of PC will increase intention to adopt t-Gov services
Hypothesis 6 (H6)	Higher levels of SEC will increase intention to adopt t-Gov services
Hypothesis 7 (H7)	Higher levels of TR will increase intention to adopt t-Gov services
Hypothesis 8 (H8)	Higher levels of PS will increase intention to adopt t-Gov services
Hypothesis 9 (H9)	Higher levels of LG will increase intention to adopt t-Gov services
Hypothesis 10 (H10)	Higher levels of PEOU will reduce COM of t-Gov services
Hypothesis 11 (H11)	Higher levels of COM will reduce RA of t-Gov services
Hypothesis 12 (H12)	Higher levels of PEOU will be positively related to higher levels of PU of t-Gov services
Hypothesis 13 (H13)	Higher levels of COM will reduce PU of t-Gov services
Hypothesis 14 (H14)	Higher levels of PC will be positively related to higher levels of RA of t-Gov services
Hypothesis 15 (H15)	Higher levels of PU will be positively related to higher levels of RA of t-Gov services
Hypothesis 16 (H16)	Higher levels of TR will be positively related to higher levels of RA of t-Gov services
Hypothesis 17 (H17)	Higher levels of SEC will be positively related to higher levels of RA of t-Gov services
Hypothesis 18 (H18)	Higher levels of LG will be positively related to higher levels of RA of t-Gov services
Hypothesis 19 (H19)	Higher levels of LG will be positively related to higher levels of SEC of t-Gov services
Hypothesis 20 (H20)	Higher levels of SEC will be positively related to higher levels of TR of t-Gov services
Hypothesis 21 (H21)	Higher levels of PS will be positively related to higher levels of SEC of t-Gov services
Hypothesis 22 (H22)	Higher levels of LG will be positively related to higher levels of TR of t-Gov services
Hypothesis 23 (H23)	Higher levels of SEC will be positively related to higher levels of PS of t-Gov services

3. Research Method and Data Collection

Simon [45] stated that “there are always many ways to tackle a problem - some good some bad, but probably several good ways. There is no single perfect design. A research method for a given problem is not like the solution to problem in algebra. It is more like a recipe of beef stroganoff; there is no one best receipt”. One of the most important stages in this research was choosing the appropriate research philosophy, approach and method for the empirical inquiry. The study is conducted according both to the interpretivist school and the positivist school as figure 6 presents.

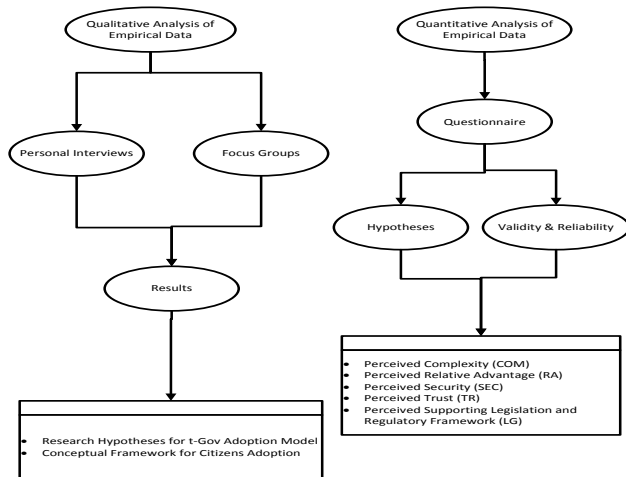


Figure 6. Research Method

The research approach throughout the study was to understand t-Gov process and to build new theory, rather than to test established theories. This was achieved by studying a number of existing theories and adoption perspectives as different theoretical lenses through which a complex phenomenon might be viewed. A methodological approach based on theory and experience about the adoption process of t-Gov was adopted and proceed to propose the holistic model for t-Gov that considers technical, human, social, legal and organizational parameters. The research that has been undertaken involves a series of case studies to a large number of GOs by means of the structured-case research method [46][47]. The application of this approach assured scientific rigor that was otherwise inadequate [7][8]. The approach provided a focused but flexible methodological approach to the field research process, through the following: outcomes integration allowed theory, knowledge and practice to emerge from the data collected; research guidance to follow and ensure accuracy; and ability to record the processes of knowledge and theory-building.

The research proposed theory, which has the form of a system of interconnected ideas that condense and organise knowledge [62][1]. The method explain, predict and provide understanding [8] determining the relationships between concepts in order to build a 'web of meaning' with respect to various issues of users' adoption [46][47]. The development of conceptual frameworks namely, CF1, CF2... CFn was used to present the process of obtaining knowledge and theory building where CFn was the latest version of the theory built. The theory building process was interrelated with practice [46][47]. Applied research led to theory building, which led to further field research and theory building [1][8]. Thus, each research cycle led to changes to the existing CF. As part of the hermeneutic circle each new CF expressed the pre-understanding for the next cycle [63] following the natural human action of interpretation and world understanding. Essentially, a spiral towards understanding was enacted as current knowledge and theory foundations for yet another research cycle, which enhanced, revised and evaluated the research understanding. This was particularly appropriate for the present research, as t-Gov is an area distinguished by rapid changes, which suggests the need for theory and practice to become closely intertwined. The research methodological approach enabled theory to be developed that reflected the concerns, problems and issues facing t-Gov.

3.1 Interpretive Research

It was necessary to understand in depth the adoption process from the point of view of its meaning for the citizens as a social contract. Therefore, the research approach that was initially followed was described as being broadly interpretive. The main reasons behind this choice were the following: (a) interpretive studies attempt to understand phenomena through the meanings that people assign to them. In this research, the interpretivist approach allowed the empirically study of the factors that encourage or hinder the adoption of t-Gov services in a natural setting. These factors were influenced by many research issues and disciplines; such as organizational, managerial, technical and social; and (b) the unit of analysis in this research was the Government which is a complex social structure and is managed and controlled by different people sense-making: that is the t-Gov adoption process influences and is influenced by them. Many data collection methods, under the umbrella of the case study, have been used in the research, as the following sections explain.

Focus Groups

Focus groups referred to the form of group interview that capitalized on communication between research participants in order to generate data. Although group interviews are often used simply as a quick and convenient way to collect data from several people simultaneously, focus groups explicitly used group interaction as part of the method. The research conducted four focus group sessions designed to elicit perceptions from various stakeholder groups. A total of 87 citizens were participated in these sessions. Table 1 summarizes the types of participants at each focus group.

Focus Group	Duration	No of Participants	Role of Participants
FG1	6 h	60	employees of GOs, staff from private IT companies, citizens
FG2	3 h	15	employees from the Ministry of Interior, employees from the private IT company that was implementing LGAF
FG3	3 h	5	the team that was responsible for the implementation of LGAF
FG4	4h	7	potential adopters of LGAF

Table 1. Focus Groups

Focus groups brought together researchers who shared interests in common themes (e.g. public interest, technological and managerial issues, etc). The focus group sessions provided opportunities to explore shared beliefs and goals concerning t-Gov. The research included selected individuals at each focus group session to ensure content rich qualitative data from perspectives that would encompass the range of users and stakeholders beliefs and concerns.

In Depth Interviews: The research made use of unstructured or semi-structured set of issues and topics to guide the discussions during personal interviews. The objective of the exercises was to explore and uncover deep seated emotions, motivations and attitudes. The research attempted to deal with sensitive matters considering that the respondents were likely to give evasive or even misleading answers when directly questioned. The interviewers adhered to the following six fundamental rules [46]: avoid appearing superior or condescending and make use of only familiar words; put question indirectly and informatively; remain detached and objective; avoid questions that encourage 'yes' or 'no' answers; probe until all relevant details, emotions and attitudes are revealed; and provide an atmosphere that encourages the respondent to speak freely, yet keeping the conversation focused on the issues being researched. Totally, twelve (12) personal interviews took place.

Produced Research Model and Hypotheses: Participants interviewed during the interpretive techniques sessions completed a profile sheet which included quantitative and qualitative questions related to t-Gov success factors and t-Gov services adoption. The profile sheet asked respondents to assess, in a quantitative manner, adoption of t-Gov provided services. The participants used a Likert type scale [49] (from '1' to '5' in which '1' indicated 'strong adoption' and '5' indicated 'not adoption') to assess adoption of t-Gov services. Separate profile sheets were developed for each of the session in order to match the information needs with the various stakeholder groups. The profile provided with assessments about participant knowledge of t-gov services characteristics and attitudes, and qualitative information concerning expected user benefits, lessons learned and perceived barriers or threats to the adoption of t-Gov services. A database was created from these summaries and database management software was used to organise the data collected. A set of coding categories based on the actual data had been defined; the coding factors represented content found within the narrative summaries. Specific coding categories included categories for t-Gov services issues and information policy issues. Coding was used as a means of analyzing the data obtained from this data collection technique. Once analysed, the coding scheme provided a data reduction technique for project research. As a result of this analysis, researcher was able to query the database for specific incidents of particular factors without losing the ability to focus on the data content from a holistic perspective.

The aforementioned interpretive techniques regarding the produced conceptual framework of the adoption model, revealed the following significant results:

In the t-Gov adoption Model, the concepts of RA, PC and PU are loaded together. The constructs RA and PC have been loaded together also in other DOI research [37][50]. Moore and Benbasat conducted a thorough study using several judges and sorting rounds to develop reliable measures of diffusion of innovation constructs [18]. Although the items for RA and CT were identified separately by the judges and sorters, they all were loaded together. This may mean that, while conceptually different, they are being viewed identically by respondents, or that there is a causal relationship between the two [50]. For example, 'it is unlikely that respondents would perceive the various advantages of using t-Gov services, if their use were in fact not compatible with the respondents' experience or life style [50].

PU was also loaded with RA and PC. A similar argument to the one used to justify RA and PC loading together was used to explain that PU and RA were loading together. PU refers to the belief that a new technology will help one to accomplish a task, while RA refers to the belief that an innovation will allow one to complete a task more easily than he or she can currently. Conceptually, these two constructs are very similar; they both refer to the use of an innovation to facilitate and ease the attainment of some goal. As RA and PU capture essentially the same concept, we decided to drop PU from further analysis. Similarly, the concepts of PEOU and COM are loaded together. The constructs of PEOU and COM were also loaded together [37]. Although the items for PEOU and COM were identified separately by the judges and sorters, they all were loaded together. This is because it is unlikely that respondents can easily perceive the provided services as ease of use if the governmental gate's use is complex. Finally, the concepts of TR and PS were loaded together. Again, although the items for TR and PS were identified separately, it is unlikely that respondents can perceive the provided services as trustworthy if Government does not provide mechanisms for safe transactions.

Considering the aforementioned issues, the model and the hypotheses tests were conducted with five independent variables – COM, RA, TR, LG and SEC as presented in the following diagram. The produced research hypotheses are H1, H3, H6, H7, H9, H11, H16, H17, H18, H19, H20 and H22 which is depicted in the produced conceptual framework as presented in the figure below.

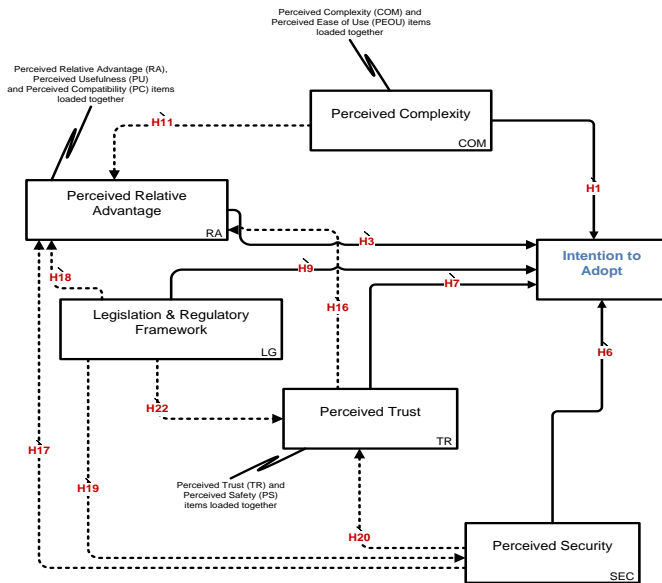


Figure 7. Conceptual Framework 2 – t-Gov Adoption Model

3.2 Positivist Research and Statistic Evaluation

An empirical study has been performed to test the model and the depicted relationships. The study was a laboratory experiment where various data used for the assessment of the conceptual frameworks. The data collection procedure and the development of measures used are shortly described in the following paragraphs.

Sample: Data were collected by administering an online questionnaire to a sample of 250 citizens. There was no information given about the actual purpose of the study. The subjects were first asked to answer to questionnaire items regarding the character of LGAF. Then they were requested to visit LGAF assuming that they were interested in a specific service provision. They were asked to look for the provision of e-services, find information about them and go through the procedure of completing in an electronic manner the transaction they were looking for. Actual running of the services was not required. After that, they were asked to indicate their responses to questionnaire items about using the provided e-service. A total of 227 responses were collected yielding an effective response rate of 90.8%. Questionnaires that were incomplete were discarded resulting in 207 usable responses.

Measures: Each of the five model constructs was operationalised using multiple items scales, based on Churchill's [51] paradigm. New scales were developed for some constructs. Items were generated based on the definition of the constructs and a review of the relevant literature so as to capture their conceptual meaning. For the rest of the constructs, items were borrowed from existing validated measures, as suggested by Straub [52], adapted with slight modifications where necessary to apply for electronic government context. All items, were measured using a 5-point Likert-type scale, ranging from '1' - strongly disagree to '5' - strongly agree, except items for satisfaction from the overall interaction which were measured using a 5-point semantic differential scale. The measurement instrument was pretested with a sample of 12 people. The participants were presented with the list of items and a list of constructs, and were asked to assign each item to the construct that captured it best and to comment on the item's applicability to other constructs. Based on this test, the initial discriminant and convergent validity of the items was assessed to produce a refined set of measures which was used for data collection. The final version of the scales can be found in the following table.

COM	Object	Source
COM1	If something is complicated I do not deal with	Rogers (1995)
COM2	If something it is not easy to use I do not deal	Davis (1986)
COM3	The ease of use of new technological software plays important role in order to I utilize it	Davis (1986)
COM4	If I think that the an electronic service is simpler I will try to avoid the realisation of transaction with natural presence in the public authority	Carter & Bélanger (2004)
COM5	I easily can acquire the essential expertise in order to use the electronic provided services from the LGAF	New Object
COM6	I consider that the electronic transactions through LGAF is easy and evident process	New Object
RA	Object	Source
RA1	In general if something is useful in everyday routine or in work I will adopt it	Davis (1986)
RA2	If something is according to my the experiences my way of living I will adopt it	Rogers (1995)
RA3	I will do something if I believe that it offers me relative advantage	Rogers (1995)
RA4	I consider that LGAF will be useful regarding my transactions with the Public Administration	New Object
RA5	I will use LGAF if the way of running and completing a transaction is conformed with the way that I have learned to deal with the Public Authorities	New Object
SEC	Object	Source
SEC1	In general I have need to feel safety	Gefen (2000)

SEC2	I consider that the Government have the necessary mechanisms for citizens to feel safety	Gefen (2000)
SEC3	The security issue is significant for me	Cheung & Lee (2000)
SEC4	I feel secure to use the Internet for electronic transactions	Cheung & Lee (2000)
SEC5	I am sure that LGAF will provide secure transactions	New Object
TR	Object	Source
TR1	In general I trust people	Gefen (2000)
TR2	I think that in general people are reliable	Gefen (2000)
TR3	I trust Public Administration	Cheung & Lee (2000)
TR4	I trust the new technologies and the Internet	Cheung & Lee (2000)
TR5	LGAF offers trust mechanisms and thus I can entrust it for my electronic transactions with the Public Sector	New Object
TR6	I would execute an online transaction through LGAF that requires money exchange	New Object
LG	Object	Source
LG1	I consider important the existence of a transparent and unambiguous legislation and regulatory framework to support my transactions with the others	Carter & Bélanger (2005)
LG2	I feel confident that the legal framework will protect me in the internet	Carter & Bélanger (2005)
LG3	If the electronic transactions with the Government are imposed by the legislation framework, I will realize them through LGAF	New Object
LG4	I have been informed regarding the legislative framework that covers the electronic transactions in the internet	New Object
LG5	I believe that LGAF covers advanced legal issues in order to complete an electronic transaction with Public Administration	New Object

Table 2. List of items measures

Data Analysis: Data were analyzed with structural equation modeling techniques using SPSS and LISREL. Data analysis was based on the covariance matrix of the observed variables and was performed using maximum likelihood estimation method. The analysis was done in a two-stage procedure [53][54][55] in which the measurement model is first developed and estimated separately from the full structural equation model that models simultaneously measurement and structural relationships [54].

Measurement model: The measurement model, which is described by a set of structural equations representing the relationships between observed and latent variables, was assessed first. The model fit was adequate, with fit indices being within acceptable levels as presented in the following table [56][57][58].

Variable	KMO	Bartlett's Test of Sphericity	Eigenvalue	Correlation Matrix min value	Limits
COM	0.944	χ^2 : 1635.128 P<0,01	7.712	0.832	KMO>0,8 Eigenvalue>1 Correlation Matrix min value>0,3
RA	0.857	χ^2 : 739.336 P<0,01	3.445	0.304	
SEC	0.891	χ^2 : 818.808 P<0,01	3.840	0.538	
TR	0.883	χ^2 : 988.593 P<0,01	4.114	0.243	
LG	0.915	χ^2 : 1149.068 P<0,01	4.310	0.792	

Table 3. Variables fit indices

The goodness-of-fit indices also suggested evidence of convergent and discriminant validity as well as unidimensionality of the model constructs [59][57][58]. The measurement model was further assessed for construct reliability and validity through a Confirmatory Factor Analysis (CFA). All constructs demonstrated adequate reliability, with Cronbach's alpha values being .785 and above [58]. Reliability was assessed by computing the composite reliability of the constructs [34]. Composite reliability scores were .70 or higher, providing evidence of internal consistency [59][62][63]. Thus, all constructs were deemed reliable. Convergent validity was assessed by examining the ratio of factor loadings to their respective standard errors [56]. This ratio, represented by the t statistic value, must be greater than |2.00|, to indicate that each factor loading is greater than twice its associated standard error and should be significant for each factor loading. The model constructs satisfy both criteria for convergent validity. Each factor loading was more than double its standard error, with the lowest item t-value being 6.95. Furthermore, t-values (6.70-17.20) show that all items were loaded well on their assigned constructs. Discriminant validity was assessed with a chi-square difference test [56]. This involves setting the correlation between a pair of constructs to unity and comparing the chi-square of this model to the chi-square of the original unconstrained model. Discriminant validity between the two constructs in question was evidenced if the chi-square difference between the constrained and the unconstrained model was significant, smaller for the unconstrained model [53]. The chi-square difference was estimated for all construct pairs, providing evidence for the discriminant validity of the model constructs.

Structural model: Having tested the measurement model, the full structural model was estimated, to test the hypothesized relationships between the model constructs. The main model fit indices are as follows:

x ² /d.f.	1.40
RMSEA	0.05
CFI	0.98
NFI	0.94

NNFI	0.95
RMSR	0.078

Table 4. Model fit indices

The aforementioned indices were within acceptable levels [56][57][52]. The explanatory power of the proposed model was assessed by observing the squared multiple correlations of the endogenous constructs in the structural model estimation. The squared multiple correlations must be at least 0.10 in order for the latent construct to be judged adequate [60][61]. All model squared multiple correlations values satisfy this recommendation. The model with path coefficients for each endogenous construct is presented in the following figure.

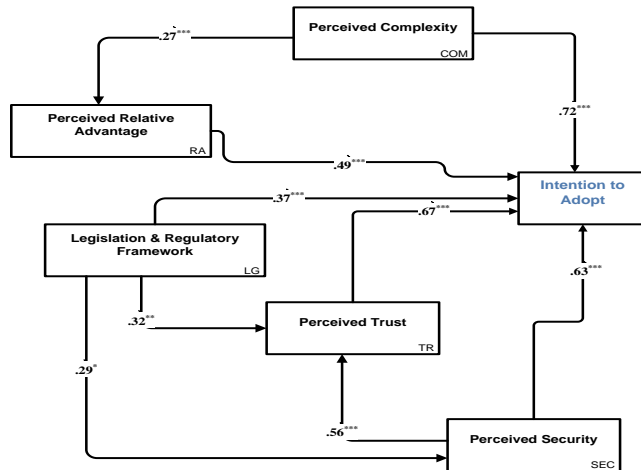


Figure 7. Conceptual Framework 3 – Proposed t-Gov Adoption Model – Structural Model Estimation

- * significant at the .05 level
- ** significant at the .01 level
- *** significant at the .001 level
- n.s. not significant at the .05 level

Hypothesis	Path Coefficient	Description
H1	.72	examined the effect of perceived complexity to intention to adopt
H3	.49	examined the effect of perceived relative advantage to intention to adopt
H6	.63	examined the effect of perceived security to intention to adopt
H7	.67	examined the effect of perceived trust to intention to adopt
H9	.37	examined the effect of the supporting legislation and regulatory framework to intention to adopt
H11	.27	examined the effect of perceived complexity to relative advantage
H19	.29	examined the effect of perceived supporting legislation and regulatory framework to security
H20	.56	examined the effect of perceived security to trust
H22	.32	examined the effect of perceived legislation and regulatory framework to trust

Table 5. Hypotheses testing results

Hypotheses 16, 17 and 18 were not supported as they were not found to be significant. Specifically, there is not significant impact between the concepts of perceived trust and relative advantage, perceived security and relative advantage, and finally between legislation and regulatory framework and relative advantage.

4. Concluding Discussion

This study presents a holistic approach for t-Gov and an integrated model for services adoption. The adoption model incorporates constructs from TAM and DOI and extends previous research. T-Gov initiatives have been identified as significant field for research in IS. Government services adoption raises important political, cultural, organisational, technological and social issues that must be considered carefully [64]. The key adoption factors of t-Gov are proposed which can be used as a tool to determine the roadmap for adoption of a t-Gov initiative. Further research should take place in order to explore the theory applicability to other environments. The next paragraphs reveal some of the research results.

Human and Social Constructs: Compatibility was found to have a significant relationship with use intentions in t-Gov. The theory assessment process strongly suggested that t-Gov services should be produced in a manner that is consistent with individuals' values, beliefs and experiences and provide information and work support in a manner that is consistent with what citizens are used on. Another significant concern was *Trustworthiness*. Citizens, who perceived the reliability and security of the internet to be low, presented obstacles when using t-Gov services [1]. There was a long debate between participants in the focus groups regarding the notion of initial trust to services provided that refers to

“trust in an unfamiliar trustee, a relationship in which the actors do not yet have credible, meaningful information about, or affective bonds with, each other” [1]. Regarding trustworthiness, citizens who perceived Government to be trustworthy consider the introduction of t-Gov system as a welcome initiative. Governmental-based trust was mainly associated with citizens’ perceptions of the governmental environment, such as the structures, regulations and legislation that make an individual feel safe and trustworthy [1]. Another important construct is the motivation or the perceived need for working ‘over the wire’. In demographic terms, the data analysis revealed that a percentage of 76% of the interviewees stated they intend to immediate use LGAF (early LGAF adopters) were people in young age, more educated (80% of them holding a University degree) and with relatively high incomes (40% of them had a net family income more than thirty thousand per year). This indicated that individual demographic characteristics were also influencing the adoption of provided services. The cases analysis proved that a group of individuals were more likely to keep using LGAF than others. Consequently, we examined two factors namely, the level of prior Internet usage and the citizens innovativeness. Individual innovativeness can be defined as ‘consumer acceptance’ of new ideas [1]. The findings supported that higher Internet usage led to LGAF adoption. Domain-specific innovativeness, i.e. innovation linked to certain domains was found to influence LGAF adoption. Finally, there was a group of users persuaded very quickly of the LGAF’s significant advantages compared to prior institutional systems. This proved that individual perceived relative advantage enforced the individual intention to use.

Organizational Constructs: The discussions concerned the coordination and ownership between and across GOs and departments, the political engagement regarding the delivery of technology supported services, the GO capacity including available resources (human, technical, etc.), change and risk management issues as well as the appropriate legal and legislation framework. The nature and mission of GOs were discussed and their relationship with the e-services provided. There was a clear concern regarding potential future developments and change [1]. Clear policies for GOs were seen to be critical. Key issues included sense of ownership and the required organisational transformation. A key concern was about ways to cope with organisational inertia. A particularly important area of risk was the access to governmental services and the issue of community inclusion. Furthermore, it emerged that measurement and evaluation techniques were necessary to realise the learning perspectives of t-Gov. To achieve successful transformational implementations it is necessary to establish coherent legitimacy and establish trust relationships between government and citizens. Since the legal framework regarding the provision of electronic services is ‘still in infancy’, a cohesive legal framework is required to speed the adoption of t-Gov. The research has revealed that four main sets of legislation are considered: personal data protection laws; privacy and security laws; information (provision) laws; and administrative laws.

Technical Constructs: Various technical parameters that might affect LGAF adoption and regular use were revealed. The supporting staff in GOs stressed the need for a less complex framework and more user-friendly in its user interface, and the forms and templates. The majority of interviewees and workshop participants were sceptical about the use of innovative technological tools, by aged users; the authors labelled this attribute ‘computer anxiety’. IT experts identified the need for flexible and scalable technology, privacy and security, shared services and common identity management, standards, coordination and integration between GOs operations and departments, identification and authentication. Regarding the notions of scalability and flexibility of governmental systems, the cases revealed that there is need to create flexible systems that can adapt and change on demand in accordance to the changing nature of t-Gov [1]. There was no definite agreement regarding what constitutes valid and appropriate access to information. Finally, issues of interoperability and standardisation arose, stemming from the way different GO’s departments can be managed, the technical tools needed for integration and the standardisation of certain data and services. To this extend, the notions of open standards and open source software were highlighted.

References

1. Stamati, T. and Martakos, D. Electronic Transformation of Local Government: an exploratory study, *International Journal of Electronic Government Research*, IGI Publishing, 7(1), 2010, 20-37.
2. Stamati, T., Karantjias, A., Martakos, D. Survey of citizens’ perceptions in the adoption of National Governmental Portals, IGI Publishing, 2010, 213-235.
3. Stamati, T., Papadopoulos, T., Martakos, D. Transformational Services: a case study in the Greek public administration. In *Transformational Government through eGov: Socio-economic, Cultural, and Technological issues*, Emerald, 2010.
4. Stamati, T., Papadopoulos, T., Martakos, D.. Transformational Government citizens’ services adoption: a conceptual framework, Volume 6846/2010, pp. 134-143, DOI: 10.1007/978-3-642-22878-0_12, Springer Berlin / Heidelberg, 2010.
5. Stamati, T., Karantjias, A. Inter-sector practices reform for e-Government integration efficacy, *Journal of Cases on Information Technology*, IGI Publishing, 13(3), 2010, 62-83.
6. Janssen, M., Shu, W. S. “Transformational government: basics and key issues”. In *Proceedings of the 2nd International Conference on Theory and Practice of Electronic Governance*, ACM International Conference Proceeding Series 351 (Janowski, T. and Pardo, T. A, Eds), pp 117–122, ACM Publications, Cairo, Egypt, 2008.
7. Irani, Z., Elliman, T., Jackson, P. Electronic Transformation of government in the U.K. a research agenda. *European Journal of Information Systems*, 16, 2008, 327-335.
8. Irani, Z., Love, P.,E.,D., Elliman, T., Jones, S., Themistocleous, M. Evaluationg e-government: learning from the experiences of two UK local authorities, *Information Systems Journal*, 15, 2005, 61-82
9. LGAF project. Local Government Application Framework. 6th Framework Programme <http://wiki.kedke.org/wiki/>
10. Walsham, G. The emergence of interpretivism in IS research. *Information Systems Research* 6(4), 1995, 376-394.

11. Remenyi, D. Doing research in business and management: an introduction to process and method. London; Thousand Oaks, California, Sage Publications, 1998.
12. Denzin, N.K., Lincoln, Y.S. Collecting and interpreting qualitative materials. Thousand Oaks, Calif, Sage Publications, 1989.
13. Hussey, J., Hussey R. Business research: a practical guide for undergraduate and postgraduate students. Basingstoke: Macmillan Business, 1997.
14. Lee, A., Baskerville, R. Generalizing in information systems research. *Information Systems Research* 14(3), 2003, 221-243.
15. Myers, M.D. Qualitative research in information systems. *Management Information Systems Quarterly* 21(2), 1997, 241-242 .
16. Oates, B.J. Researching information systems and computing. London; Thousand Oaks, California: Sage Publications, 2006
17. Grönlund, Å. Ten years of eGovernment: the end of history and a new beginning. In Wimmer, M.A., Chappellet, J-L., Janssen, M., Scholl, H.J. (eds) (2010) Electronic Government. 9th IFIP WG 8.5 International Conference, EGOV 2010, Lausanne, Switzerland, August/September 2010. Proceedings. LNCS 6228, pp. 13-24, Springer. Best paper award
18. Rogers, E. M. Diffusion of Innovations. New York: Free Press, 1995.
19. Moon, M.J. The evolution of e-Government among municipalities: Rhetoric or reality? *Public Administration Review* 62(4), 2002, 424-433.
20. Moon, J., Norris, D. Does managerial orientation matter? The adoption of reinventing government and e-government at the municipal level. *Information Systems Journal* 15, 2005, 43– 60
21. Norris, D.F., Campillo, D. Factors Affecting Innovation Adoption by City Governments: The Case of Leading Edge Information Technologies, Maryland Institute for Policy Analysis and Research. University of Maryland, Baltimore, MD, USA, 2000
22. Angelopoulos, S., Kitsios, F., and Papadopoulos, T. Identifying Critical Success Factors in e-Government: A New service development approach. *Transforming Government: People, Process and Policy* 4(1), 2010, 95-118.
23. DeLone, W.H., McLean, E.R. Information systems success The quest for the dependent variable. *Information Systems Research* 3(1), 1992, 60–95
24. Davis, F. Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quarterly*, 13, 1989, 319–340.
25. Ajzen, I., Fishbein, M. Attitudes and normative beliefs as factors influencing intentions'. *Journal of Personality and Social Psychology*, 21, 1972, 1–9.
26. Davis, F. D., Bagozzi, R. P., Warshaw, P. R. User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003 (1989).
27. Benbasat, I., Barki, H. Quo vadis TAM. *Journal of the Association for Information Systems*, 8(4), 2007, 211–218.
28. King, W. R., He, J.: A meta-analysis of the technology acceptance model. *Information & Management* 43, 740–755 (2006).
29. Schepers, J., Wetzels, M. A meta-analysis of the technology acceptance model: investigating subjective norm and moderation effects. *Information & Management*, 44, 2007, 90-103.
30. Venkatesh, V., Davis, F. A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science* 46, 2000, 186–204.
31. Venkatesh, V., Morris, M. G. Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly* 24(1), 2000, 115–139.
32. Gefen, D., Straub, D. The relative importance of perceived ease of use in IS adoption: a study of e-commerce adoption. *Journal of the Association for Information Systems*, 1, 2000, 1–28.
33. Moon, J., Kim, Y. Extending the TAM for a World-Wide-Web context. *Information & Management*, 38 (4), 2001, 217-230.
34. Gefen, D., Karahanna, E., Straub, D.: Trust and TAM in online shopping: an integrated model. *MIS Quarterly*, 27, 2003, 51–90.
35. Venkatesh, V., Morris, M. G., Davis, G. B., Davis, F. D. User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 2003, 425–478.
36. Shajari, M., Ismail, Z. A comprehensive adoption model of e-Government services in developing countries, *Advanced Management Science*, IEEE International Conference 2, 2010, 548-553.
37. Carter, L., Bélanger, F. The utilization of e-government services: citizen trust, innovation and acceptance factors. *Information Systems Journal* 15, 2005, 5-25.
38. Paul, L., John, I., Pierre, C. Why do people use information technology? A critical review of the technology acceptance model. *Association for Information Systems*, 40 (3), 20003, 191.
39. Ma, Q., Liu, L. The Technology Acceptance Model: A Meta-Analysis of Empirical Findings. *Journal of Organizational and End User Computing*, (16) 1, 2004, 59-72.
40. Taylor, S., Todd, P. A. Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly*, 19(4), 1995, 561-570.
41. Barzilai-Nahon K., Scholl, J. Siblings of a Different Kind: E-Government and E-Commerce", IFIP e-Government Conference, August, 2010.
42. Pavlou, P.: Consumer acceptance of electronic commerce: integrating trust and risk with the technology acceptance model. *International Journal of Electronic Commerce* 7, 69–103 (2003).
43. Sipior, J., Ward. B., Connolly, R. The digital divide and t-government in the United States: using the technology acceptance model to understand usage. *European Journal of Information Systems*, 19(1), 2010, 1-21.
44. Pilling, D., Boletzig, H.: Moving toward egovernment – effective strategies for increasing access and use of the internet among non-internet users in the U.S. and U.K. In Proceedings of the 8th Annual International Conference on Digital Government Research: Bridging Disciplines & Domains Philadelphia, (Cushing, JB and Pardo, TA, Eds) ACM International Conference Proceeding Series 228 Digital Government Research Center 2007, pp 35–46, ACM Publications (2007).
45. Simon, J.L. Basic research methods in social science; the art of empirical investigation. New York: Random House, 1969.
46. Carroll, J., Dawson, L.L., Swatman, P.A. Using Case Studies to Build Theory: Structure and Rigour. At Proceedings of 9th Australasian Conference on Information Systems, University of NSW, Sydney, Australia, 1998.
47. Carroll, J., Swatman, P. Structured-case: a methodological framework for building theory in information systems research. *European Journal of Information Systems*, 9, 2000, 235–242.
48. Dillon, W. R. Madden, T. J., Firtle, N. H. Marketing Research in a Marketing Environment, 3rd edition, 1994, 124-125.
49. Likert R. A Technique for the Measurement of Attitudes, *Archives of Psychology*, 140, 1932.
50. Moore, G., Benbasat, I. Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, 2, 1991, 173–191.
51. Churchill, G. J. A Paradigm for Developing Better Measures of Marketing Constructs. *Journal of Marketing Research*, 16, 1979, 64-73.

52. Straub, D.W. Validating Instruments in MIS Research. *MIS Quarterly*, 13(2), 1989, 147-169.
53. Anderson, J.C., Gerbing, D.W. Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin*, 103, 1988, 411-423.
54. Gerbing, D.W., Anderson, J.C. An Updated Paradigm for Scale Development Incorporating Unidimensionality and its Assessment. *Journal of Marketing Research*, 25, 1988, 186-192.
55. Kline, R.B. Principles and practice of structural equation modeling. The Guilford Press, New York, 1998.
56. Segars, A.H. Assessing the Unidimensionality of Measurement: a Paradigm and Illustration within the Context of Information Systems Research. *Omega*, 25(1), 1997, 107-121.
57. Gefen, D., Karahanna, E., Straub, D. Trust and TAM in online shopping: an integrated model. *MIS Quarterly*, 27, 2003, 51-90.
58. Straub, D., Boudreau M.C., Gefen, D. Validation Guidelines for IS Positivist Research. *Communications of the Association for Information Systems*, 13, 2004, 380-427.
59. J.F. Hair, R.E. Anderson, R. Tatham, W.C. Black, *Multivariate Data Analysis with Readings*, Macmillian, NY, 1992.
60. Fulk, J. Social construction of communication technology. *Academy of Management Journal*, 36, 1993, 921-950.
61. Fulk, J., Schmitz, J., Steinfield, C. W. A social influence model of technology use. Newbury Park, CA: Sage, J. Fulk & C. W. Steinfield Eds., *Organizations and Communication Technology*, 1990.
62. Neuman, W.L. *Social Research Methods: Qualitative and Quantitative Approaches*. Boston, MA, USA, 1991.
63. Gummerson, E. *Qualitative Methods in Management Research*. Newbury Park, CA, Sage, 1991.
64. Stamati, T., Kanellis, P., Martakos, D. Challenges of Complex Information Technology Projects: the MAC Initiative, *Journal of Cases on Information Technology*, IGI Publishing, 7(4), 2005, 41-58.