



UNIVERSIDADE ESTADUAL DE CAMPINAS
SISTEMA DE BIBLIOTECAS DA UNICAMP
REPOSITÓRIO DA PRODUÇÃO CIENTÍFICA E INTELLECTUAL DA UNICAMP

Versão do arquivo anexado / Version of attached file:

Versão do Editor / Published Version

Mais informações no site da editora / Further information on publisher's website:

<https://periodicos.utfpr.edu.br/rts/article/view/5598>

DOI: 10.3895/rts.v14n30.5598

Direitos autorais / Publisher's copyright statement:

©2018.0 by Universidade Tecnológica Federal do Paraná. All rights reserved.

DIRETORIA DE TRATAMENTO DA INFORMAÇÃO

Cidade Universitária Zeferino Vaz Barão Geraldo

CEP 13083-970 – Campinas SP

Fone: (19) 3521-6493

<http://www.repositorio.unicamp.br>

The use of electronic government in the State of São Paulo by senior citizens

ABSTRACT

The elderly are already 13% of the Brazilian population, and the use of technology may increase the quality of life of these people. Senior citizens tend to be more cautious and seek greater certainty before they act towards younger individuals. The objective of the research was to study the factors that influence the elderly in the use of an e-government initiative in the State of São Paulo. We interviewed 137 elderly people who used the program. The methodology used was quantitative with the use of structural equation modeling. The study presented a robust model with high explanatory power, in which the influencing factors were: Performance Expectation, Facilitating Conditions, and Habit. The research assists in the participation and involvement of the elderly in the current development phase of e-government in the state, exposing their perceptions.

KEYWORDS: Electronic Government. Information Technology. Elderly.

**Gustavo Hermínio Salati
Marcondes de Moraes**
gustavo.salati@fca.unicamp.br
Universidade Estadual de Campinas -
Limeira, São Paulo, Brasil.

Fernando de Souza Meirelles
fernando.meirelles@fgv.br
Fundação Getúlio Vargas – São Paulo,
São Paulo, Brasil.

INTRODUÇÃO

Information and communication technology (ICT) permeates human actions, and the effects arising from this can be observed in various social segments.

This intensive use of information technology (IT) in all sectors has also been spread to the Public Administration, becoming indispensable in this area (BARBOSA; POZZEBON; DINIZ, 2013). The use of IT combined with the Internet as a public management tool is called electronic government (e-government) and aims to better qualify the provision of services and maximize the Public Administration efficiency, thus enabling citizens to have the so desired effective participation in the political process (CHADWICK, 2009).

Concepts and theories on e-government are in a process of definition, as it is a recent area of study, still in development (SHAREEF et al., 2011).

The movement originated because the growing development and popularization of technologies has highlighted the need for understanding the adoption of both products and services that they provide (ROGERS, 2003).

This understanding would allow governments to benefit society through public policies of inclusion and services for the quality of life of their citizens, including the elderly. At the same time, individuals would accept and use such technologies (BENBASAT; BARKI, 2007; GOODHUE, 2007; VENKATESH; BALA, 2008; VENKATESH; DAVIS; MORRIS, 2007).

In the e-government concept, IT is a tool by which, through e-Services, the interaction between citizen and government occurs.

We can infer that the implementation of e-gov is linked to the desire of citizens (EVANS; YEN, 2005; SHAREEF et al., 2009; SHAREEF et al., 2011), with its accession depending on the acceptance, dissemination and success of propositions and policies inherent to e-gov.

There are several studies in different countries studying the adoption of e-gov, as in Canada (SHAREEF et al., 2011), the United States (CARTER; BÉLANGER, 2005), Netherlands (HORST; KUTTSCHEUTER; GUTTELING, 2007), Romania (COLESCA; LILIANA, 2008), Turkey (OZKAN; KANAT, 2011) and Brazil (MORAES; MEIRELLES, 2014; MORAES; MEIRELLES; CAPPELLOZZA, 2016; MORAES; MEIRELLES, 2017), among others.

Those studies have shown different results; however, all the suggested models are based or adapted from current theories of technology acceptance, such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT).

These differences in the models indicate a difficulty in the generalization of one context to another, because of cultural differences and different stages of the development of e-gov in these countries. Thus, it is becoming more relevant to study specific contexts of adoption of e-government.

In the last years, the interest in the elderly (defined as adults aged 65 and older) has burgeoned because this demographic segment has expanded in size and spending power.

In Brazil, the population is estimated at 201.5 million individuals, and the tendency is the reduction in the number of children and the increase in the

number of elderly individuals. According to IBGE (2013) data, the elderly are already 13% of population. The National Household Sample Survey (PNAD) of 2013, released by the Brazilian Institute of Geography and Statistics (IBGE), shows the aging trend of the country (IBGE, 2013).

The IBGE study investigates data on population, migration, education, labor, families, households and income. Approximately 362,555 individuals were heard in 1,100 municipalities.

The elderly tend to be more cautious and seek greater certitude before they act when compared to younger individuals (BOTWINICK, 2007; YAO; MURPHY, 2007). As consumers, older adults have been shown to be among the last to adopt an innovative product, service or idea (Robertson, 1971; UHL; ANDRUS; POULSON, 1970; VENKATESH et al., 2003). Kerschner, Kathleen and Chelsvig found that age is related to attitudes toward and the adoption of technology: the older the consumer, the more negative the view towards technology and the lower the use of various technologies (KERSCHNER; KATHLEEN; CHELSVIG, 1981).

Therefore, the studying and researching of the resistance and adhesion of the elderly to e-government technologies in Brazil is an opportunity to collaborate on a model development for the reality of the country, and the identification of its factors can enable its more effective administration, thus increasing opportunities for positive results.

Thus, the objective of this work is to study what factors influence the elderly in the use of e-government in Brazil. The focus of the study is to investigate an initiative of the Brazilian government to computerize fiscal control mechanisms.

From a practical point of view, the findings could help in the faster implementation of e-Gov programs in other administrative contexts, generating useful information for the main points to consider in order to increase the adhesion of the elderly.

From the theoretical point of view, the work is relevant for the studies in technological adoption and for reflections about a model of e-Gov adoption in Brazil. The models in the literature are not based on a strong theoretical framework, and the generalization aspect is ignored, mainly due to differences in the contexts studied (Heeks & Bailur, 2007).

E-Gov can impact public administration, organizations, individuals and society as a whole, and there are few systematic and meticulous studies on its adoption (Heeks & Bailur, 2007; Jaeger, 2003).

LITERATURE REVIEW

The literature review addresses four main points: models of technological adoption, e-government in Brazil, models of e-government adoption and technological acceptance by the elderly.

Models of technological adoption

Contemporary theorists have examined the study of the acceptance and adoption of technology by individuals, proposing theoretical models based on

social psychology; the diversity of such models lies on determinants for such adoption.

In order to explain and increase the acceptance of individuals with regard to the technologies, it is necessary to understand the reasons that lead them to adopt or reject information technology (DAVIS; BAGOZZI; WARSHAW, 1989).

Models intending to predict the acceptance and use of technology have emerged with the Technology Acceptance Model (TAM) (DAVIS, 1989).

Several other researchers have conducted studies, using TAM as a main reference, deepening the knowledge on acceptance and technological adoption in some areas of knowledge related to information technology.

In 2003 some authors proposed a theory named Unified Theory of Acceptance and Use of Technology (UTAUT). It is the most highlighted article of technological adoption, which features one of the most widespread models in the literature on IT.

The model is based in eight prominent models in the area, and it empirically compares their dimensions, seeking convergence to its integrated model. Venkatesh's model was presented as a way for administrators to assess the probability of success in the introduction of new technologies, assisting in understanding the initiative.

The UTAUT has led to significant progress in understanding the adoption and use of technology, although its focus has been primarily on individual processes at a psychological level and contingencies that arise as related technology perceptions and situational factors, respectively (VENKATESH; DAVIS; MORRIS, 2007; VENKATESH et al., 2003).

The UTAUT was initially developed for the organizational context. Some years later, other researchers developed the UTAUT2, extending the acceptance model and use of technology to the consumer context (VENKATESH; THONG; XU, 2012).

E-government in Brazil

The use of information by the Brazilian government started before the 1950s, but the use of the term e-government is from 1996, with e-services provided by the Brazilian federal government (FERRER; SANTOS, 2004).

Services such as the delivery of income tax declaration, information on social security and government procurement are available on the Internet since 1998, and in 2000 the Electronic Government Policy was defined and established and the Information Society Program was launched, consolidating and spreading e-government and the social importance of digital inclusion strategies, as well as actions related to information technology in the country, implementing the e-government in the country through structures and legal guidelines (SCARTEZINI, 2004).

The authors of e-gov in Brazil could prove the success of the e-government program until 2003, when there was the transition of the federal government and the program was no longer a priority, because of four factors: change in political leadership, with different involvement of new employees; absence of

inter-bureaucratic coordination, with no individuals responsible for the program in several Ministries; problems in connecting with society, thus causing discontinuation of partnerships and withdrawal of companies that provided technological services; and, lack of resources for the e-gov program, with subsisting projects of specific sectors, yet isolated from an aligned policy development (PINTO; FERNANDES, 2005).

Brazil stands out in specific initiatives such as the Open Government and Open Data, mentioned in the UN report as an example of good practices for having a single goal of access to public data.

Currently, the Brazilian government offers to its citizens several e-gov systems. Among the most important, we can highlight:

a) IRS – income tax collection services; fiscal status of taxpayers; social security and national register of legal entities; statements; among others.

b) Poupa Tempo (a state of São Paulo program) – access to public service information, such as documents request, and opening and closing of businesses.

c) Federal Police – services such as passport application, statements of criminal records, support for international adoptions, among others.

d) Public Digital Bookkeeping System (SPED, in Portuguese) – tax information, rationalization and standardization of ancillary obligations of taxpayers.

e) Integrated System of Financial Administration of the Federal Government (SIAFI, in Portuguese) – interests linked to the national treasury, as availability of public spending.

f) OntoJuris Project – provision of legislation information on intellectual property, consumer rights and electronic rights.

g) Compras Net – shopping website of the federal government, with related websites in most states and in many municipalities.

Models of e-government adoption

Being a new and still growing field of study, the concepts and theories of e-government are at an early stage (SHAREEF; KUMAR; KUMAR, 2011).

Some studies have been identified and are presented below.

In a study conducted in the United States in 2005, the authors integrated constructs of TAM, the Theory of Diffusion of Innovation and reliable models on the web to form a comprehensive model of the factors influencing the adoption of e-government initiatives by the citizens. The results indicate that Perceived Ease of Use, Compatibility and Reliability are significant predictors of the intention of citizens to use an electronic government service (CARTER; BÉLANGER, 2005).

In a study of the personal income tax in Taiwan, the tested model explained more than 72% of the variance in the adoption of behavioral intention of e-gov. The model used the following constructs: Perceived Usefulness, Ease of Use,

Perceived Risk, Reliability, Compatibility, External Influence, Interpersonal Influence, Facilitating Conditions and Self Efficacy (HUNG; CHANG; YU, 2006).

In a survey conducted in the Netherlands, the authors sought to identify the role of risk perception and confidence in the intention to adopt e-government services. A sample of 238 individuals was used. The study was based on the theories of technological acceptance, containing the following constructs: Perceived Usefulness, Risk Perception, Concern, Perceived Behavior Control, Subjective Norm, Trust and Experience with e-services (HORST; KUTTSCHEUTER; GUTTELING, 2007).

In order to identify factors that could affect the adoption of e-gov by citizens of Romania, Colesca and Liliana proposed an adapted model of the Technology Acceptance Model (TAM). The proposed model was validated using data collected from 481 citizens (COLESCA; LILIANA, 2008).

In 2008, researchers used an adaptation of the Unified Theory of Acceptance and Use of Technology (UTAUT) to explore the factors that determine the adoption of e-government services in Kuwait, interviewing 880 students. According to the survey, the constructs of Performance Expectancy, Effort Expectancy and Social Influence are the main determinants of Intention to Adoption of the students. Moreover, Facilitating Conditions and Behavioral Intentions also act directly in the adoption of these services (ALAWADHI; MORRIS, 2008).

Some authors conducted a survey identifying the critical factors of approval of e-government by the citizens of developing countries. The authors developed a model that was tested in Bangladesh (SHAREEF et al, 2009).

In 2011, researchers sought to identify the critical factors for the acceptance of e-gov by citizens at different stages of maturity of e-gov. The study was conducted in Canada, which is a leader in maturity of e-gov services. The result of the study was the E-government Adoption Model – GAM (SHAREEF; KUMAR; KUMAR, 2011).

Ozkan and Kanat conducted a study in 2011 on a service of loans for university students from a pool of accommodation in Turkey, with a questionnaire completed by more than 400 students. The constructs used in the model were: Trust, Perceived Behavior Control, Attitude and Intention to Use (OZKAN; KANAT, 2011).

Despite the potential impacts of e-gov in public administration, organizations, individuals and society in general, the authors have failed to develop a standard e-government model. Each study uses variables according to the context studied.

Technology acceptance by the elderly

Many researchers argue that elderly individuals are often more reluctant to accept a specific technology (MORRIS; VENKATESH, 2000; VENKATESH et al., 2003; YAO; MURPHY, 2007).

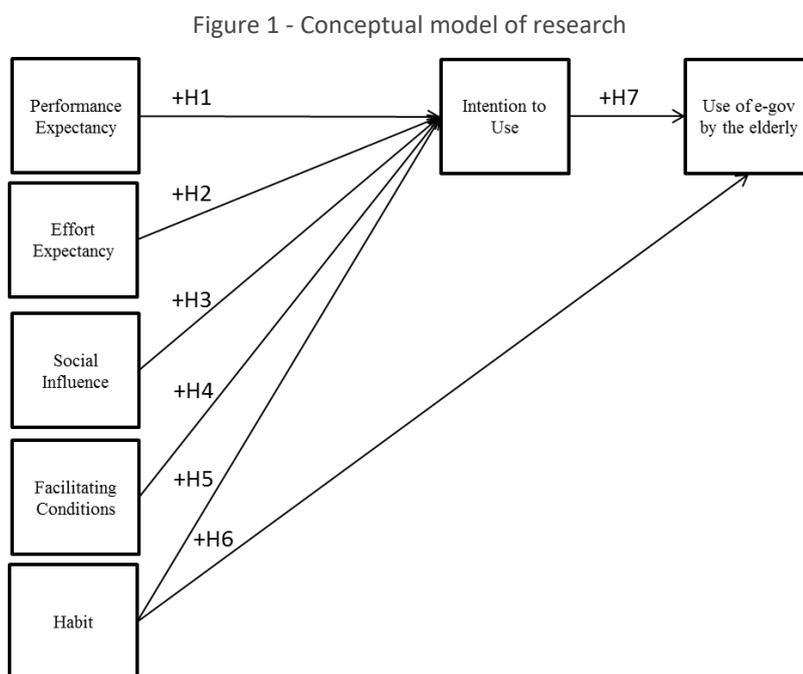
The use of IT can increase the quality of life of senior citizens (CZAJA; LEE, 2007; MITZNER, 2010). The elderly can reduce social isolation using IT, communicating with friends and family and having an active participation in an increasingly computerized healthcare system (CZAJA; LEE, 2007). Elderly individuals are less likely to adopt the Internet (Hill; Beynon-Davies; Williams, 2008; LAM; LEE, 2006).

This age-related digital divide prevents many elderly individuals from using IT to enhance their quality of life through tools, such as electronic government and Internet-based service delivery.

In the case of the e-government program chosen for this study, the population can voluntarily use it. Thus, this study intends to increase the understanding about the perception of the elderly in this e-government initiative.

PROPOSED MODEL

According to the literature review, Figure 1 presents a model which best serves the purpose of this study, which aims to identify what are the elements that determine the adoption of e-government by the elderly in Brazil. The visual representation facilitates the understanding of the theoretical model (WHETTEN, 1989).



The models present many generalization difficulties, because of cultural differences, phases of e-government implementation and the economic development of countries. Thus, we have decided to develop a model according to the Brazilian context. The proposed model was based on the theories of IT adoption and e-gov. Table 1 shows the explanation of the constructs.

Table 1 - Explanation of the constructs

Constructs	Definition
Performance Expectancy	The degree to which an elderly believes that using the e-gov program will help him/her to attain gains in performance. In this case, performance is related to financial aspects, accessibility, availability, convenience, and also social aspects, in which the individual works with the society and the government.
Effort Expectancy	The degree of easy associated with the use of e-government initiatives
Social Influence	The degree to which the elderly considers important if others believe he/she should use a new system; the importance of the opinion of individuals who influence his/her behavior
Facilitating Conditions	The degree to which an elderly believes that an organization and technical infrastructure exist to support the use of the system. In this case, this means the ease of computer access, Internet and governmental infrastructure (call centers and cyber cafes, for example).
Habit	It is defined as the extent to which the elderly tend to behave automatically because of learning. Thus, elderly individuals who are used to use the e-gov program tend to increase the Intention to Use and effective program use.
Intentions to Use	It is defined as the intention of the elderly to use the program in the future.
Use of e-gov by the elderly	It is defined as the effective use of the program by the elderly.

Table 2 summarizes the hypotheses of this study, with their theoretical bases.

Table 2 – Hypotheses of the study

Constructs	Description	Theoretical basis
H1	Performance Expectancy positively influences the Intention to Use e-government by the elderly.	Venkatesh et al. (2003); Venkatesh et al. (2012)
H2	Effort Expectancy positively influences the Intention to Use e-government by the elderly.	Carter and Bélanger (2005); Shareef et al. (2009); Venkatesh et al. (2012).
H3	Social Influence positively influences the Intention to Use e-government by the elderly.	Venkatesh et al. (2003); Hu, Chang and Yu (2006); AlAwadhi and Morris (2008); Venkatesh et al. (2012).
H4	Facilitating Conditions positively influence the Intention to Use e-government by the elderly.	Venkatesh et al. (2003); Hu, Chang and Yu (2006); AlAwadhi and Morris (2008); Venkatesh et al. (2012).
H5	Habit positively influences the Intention to Use e-government by the elderly.	Kim and Malhotra (2005); Limayem et al. (2007); Venkatesh et al. (2012).
H6	Habit positively influences the Use of e-government by the elderly.	Venkatesh et al. (2012).
H7	Intention to Use influences the Use of e-government by the elderly.	Venkatesh et al. (2003); Venkatesh et al. (2012).

METHODOLOGICAL ASPECTS

This study was developed under a positivist paradigm with empiricist epistemological positioning. To do so, the study was conducted by a single cross-sectional quantitative approach and carried out by means of a survey, which aims, among other objectives, to identify specific group opinions and the distribution of the phenomenon in the population (PINSONNEAULT; KRAEMER, 1993) using of multivariate data analysis techniques.

Given the characteristics of this research, in which theories on the adoption of e-government are poorly developed, the objectives are the prediction and explanation of the proposed constructs, and as the structural model is complex, we chose to use the Partial Least Squares Path Modeling (PLS-SEM) (HAIR; RINGLE; SARSTEDT, 2011).

We conducted interviews with elderly individuals to obtain data to use the PLS-SEM, using a survey for data collection according to the suggestions of authors (HEEKS; BAILUR, 2007).

The program chosen for this study was the Nota Fiscal Paulista (NFP), which is a pioneering initiative developed in the state of São Paulo, and is gradually being replicated for the rest of the country. The program is the initiative of computerization of fiscal controls of greater size in number of resources involved, registered users and accesses. The southeastern region presents the majority of the initiatives awarded in Brazil, according to research conducted by Prado, Souza, Ramalho, Cunha and Reinhard (2011).

The preliminary questionnaire was validated by a group composed of nine specialists, including: academics who study e-gov; academics who study models of technological adoption and managers directly involved in e-government programs. The scales were adapted from previous studies realized by Venkatesh et al. (2003) and Venkatesh et al. (2012).

We interviewed 137 elderly individuals who have used the program. The interviews were conducted in the city of São Paulo, in Praça da Sé, which is a public space located in the Sé neighborhood, in the center of the city of São Paulo, Brazil, and is considered the geographical center of the city. The elderly were approached by the researchers who were identified and were consulted about the willingness to participate in the research. An explanation of the research was carried out, the compromise term was presented, as well as the approval of the questionnaire in the Ethics Committee of the Brazil Platform. The mean age of respondents was 69 years, 55% female and 45% male. All respondents lived in the city of São Paulo.

To verify if the sample size was adequate, we performed the test using the G*Power 3 software, which is a statistical analysis program commonly used in social, behavioral and biomedical sciences (FAUL et al., 2007; FAUL et al., 2009).

We performed post hoc analysis test to verify the probability of rejecting H_0 when it is not true ($1-\beta$). Placing the values of this study in the G*Power 3 software, with effect size (f^2) of 0.10, we obtained 0.99 as a result for the power test ($1-\beta$), a value considered appropriate for the sample size (COHEN, 1988).

All questions were measured using a Likert scale of seven points, which is similar to studies that used similar models for IT adoption.

For calculation and validation of statistical tests, developed by multivariate analysis technique of structural equation modeling, we used the SmartPLS 3.1.6 software (RINGLE; WENDE; BECKER, 2014).

DESCRIPTIONS AND ANALYSIS OF RESULTS

According to Hair et al. (2014), the evaluation criteria of reflective measurement models are: internal consistency (composite reliability), reliability of the indicator, convergent validity (average variance extracted) and discriminant validity.

To examine the convergent and discriminant validity of the constructs used in the structural model, we performed the Confirmatory Factor Analysis (HAIR et al., 2005).

All constructs showed indicators with high loads in their latent variables, above 0.70, and low loads in the other latent variables, indicating reasonable discriminant and convergent validity (CHIN, 1998).

A key measure used to assess the measurement model, in addition to the tests for each indicator, is the composite reliability of each construct (HAIR et al., 2014). The composite reliability describes the degree to which the indicators represent the latent construct in common. A standard commonly used for acceptable trust is 0.70.

For the convergent validity of the model, another indicator used is the average variance extracted (AVE), value that, as a criterion for validation, should have a value greater than 0.5 (HAIR; RINGLE; SARSTEDT, 2011).

The verification of the internal consistency was another indicator used to analyze the convergent validity. A high internal consistency value in the construct indicates that all variables represent the same latent construct. The internal consistency is evaluated by means of Cronbach's alpha, ranging from 0 to 1, with higher values indicating a high consistency level. For exploratory studies, values between 0.60 and 0.70 are considered acceptable (HAIR et al., 2014; NUNALLY; BERNSTEIN, 2011).

To verify the discriminant validity between constructs, we used: the estimated correlation matrix and the square root of the average variance extracted (AVE) of the constructs. The square root of the AVE of the constructs should be greater than the correlation between the latent variables; this is displayed prominently on the diagonal (HAIR et al., 2014).

Table 3 shows all the mentioned indicators.

Table 3 – Synthesis of the evaluation of measurement models

	PE	EE	SI	FC	HAB	IU	USE
Performance Expectancy (PE)	0.792						
Effort Expectancy (EE)	0.606	0.849					
Social Influence (SI)	0.322	0.348	0.835				
Facilitating Conditions (FC)	0.419	0.481	0.685	0.854			
Habit (HAB)	0.364	0.299	0.658	0.651	0.807		
Intention of Use (IU)	0.208	0.104	0.423	0.319	0.550	0.787	
Use	0.446	0.421	0.746	0.721	0.517	0.634	0.785
AVE	0.627	0.720	0.697	0.729	0.651	0.619	0.616
Composite Reliability	0.834	0.884	0.902	0.890	0.848	0.867	0.865
Cronbachs Alpha	0.703	0.799	0.855	0.814	0.736	0.795	0.794

The values of all indicators are within those established by the authors.

The analysis of the indicators of significance was carried out with the values calculated by the bootstrapping technique (EFRON; TIBSHIRANI, 1998). The use of the bootstrapping technique to analyze the load significance obtained for the observable variables is not based only on one model estimation; nevertheless, it calculates parameter estimates and their confidence intervals based on multiple estimates (HAIR et al., 2005; HAIR et al., 2014).

In this research, there was a resampling of 5,000 samples, with replacement of 137 cases, according to recommendations (HAIR et al., 2014).

Student's t-test analyzes the hypothesis that the correlation coefficients are equal to zero. If the results of this test show values higher than 1.96, the hypothesis is rejected and the correlation is significant (EFRON; TIBSHIRANI, 1998; HAIR et al., 2014).

Table 4 presents the coefficient values between the constructs and their respective Student's t-test. The values were estimated by the bootstrapping technique. All relation values, except for Effort Expectancy and Social Influence regarding Intention to Use, presented Student's t-test higher than 1.96 (significance level = 5%). The t-test value for Effort Expectancy with Intention to Use was 0.677, with a p-value of 0.498, and the t-test value for Social Influence with Intention to Use was 0,854, with p-value of 0.393. These values mean that the constructs of Effort Expectancy and Social Influence do no influence the Intent for Adoption of the program, thus not confirming Hypothesis 2 and 3.

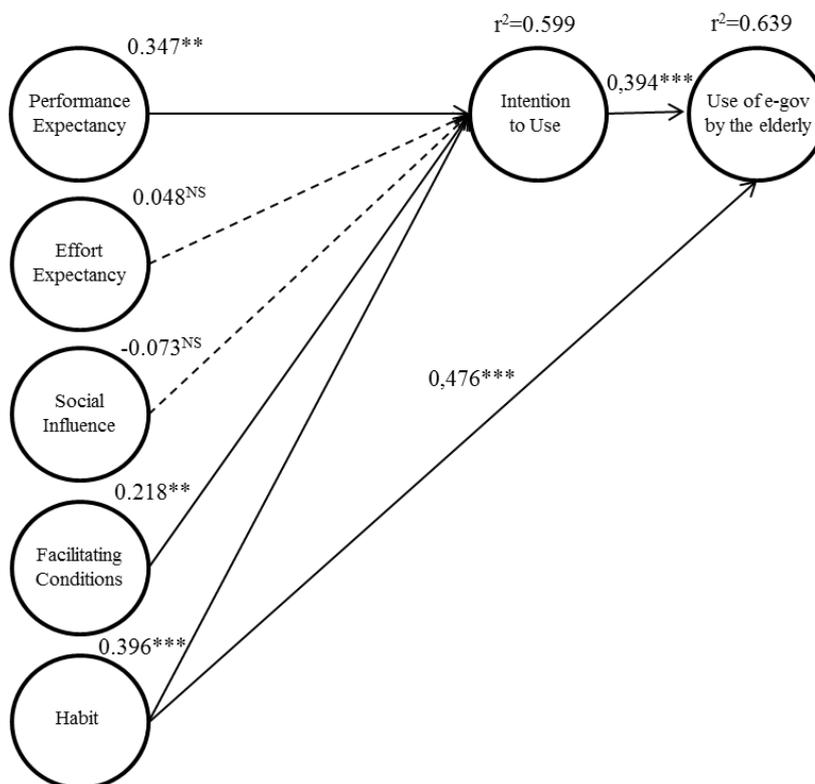
Table 4 – Structural model coefficients – between constructs

	Sample Mean (M)	Standard Error (STERR)	T-test	P-value
PE -> IU	0.337	0.116	3.002	0.003
EE -> IU	0.044	0.072	0.677	0.498
SI -> IU	0.053	0.085	0.854	0.393
FC -> IU	0.215	0.078	2.800	0.005
HAB -> IU	0.393	0.104	3.810	0.000
HAB -> USE	0.485	0.119	3.980	0.000
IU -> USE	0.389	0.124	3.198	0.001

Figure 2 shows the resulting model with a synthesis of the validation of the hypotheses.

Analyzing the coefficient of determination (r^2), according to Cohen's scale, the model has high value for both Intention to Use and Effective Use of the Nota Fiscal Paulista, and the amounts are 0.599 and 0.639, respectively (COHEN, 1988). However, according to the scale of others authors, the values are considered moderate, though adequate (HAIR; RINGLE; SARSTEDT, 2011; HENSELER; RINGLE; SINKOVICS, 2009; HAIR et al., 2014).

Figure 2 – Synthesis of validation of the hypotheses according to the conceptual model.



Notes: NS=not significant *= $p < 0.05$; **= $p < 0.01$; ***= $p < 0.001$

Table 5 presents a synthesis of the tests of the hypotheses of this study.

Table 5 – Synthesis of tests of the hypotheses of this study

Constructs	Description	Results
H1	Performance Expectancy positively influences the Intention to Use e-government by the elderly.	Confirmed
H2	Effort Expectancy positively influences the Intention to Use e-government by the elderly.	Not Confirmed
H3	Social Influence positively influences the Intention to Use e-government by the elderly.	Not Confirmed
H4	Facilitating Conditions positively influence the Intention to Use e-government by the elderly.	Confirmed
H5	Habit positively influences the Intention to Use e-government by the elderly.	Confirmed
H6	Habit positively influences the Use of e-government by the elderly.	Confirmed
H7	Intention to Use influences the Use of e-government by the elderly.	Confirmed

CONCLUSIONS

This study presented a robust model with a high explanatory power ($r^2 = 63.9\%$) in which the influencing factors are: Performance Expectancy; Effort Expectancy; Social Influence; Facilitating Conditions and Habit.

The model has unique characteristics because it was developed in an unexplored area with the elderly. However, the results are at the convergence of several other models developed by IT researchers related to the individual use of technology.

The results contribute to IT research studies, with a model that reinforces and extends previous studies on technological adoption and e-government, adding a model in a new context yet to be explored.

There are no studies on the adoption of e-government in Brazil for the elderly and the existing models in the literature cannot represent all the dimensions addressed in the model presented in this study.

According to this research, the main factors for Intention to Use are Habit and Performance Expectancy, positively influencing the Intention to Use.

Performance Expectancy can be consider performance in terms of financial aspects, accessibility, availability, convenience and also social aspects, in which the individual works with society and government, being aware that the requirement of the invoice should bring increased revenue for the government and possible improvements for the citizens. Thus, the elderly population has an increased intention to use the program if they realize the benefit of this use.

Habit positively influences the Intention to Use and directly influences the Use in the e-government context for the elderly. The more the elderly are accustomed to using the program, the greater the intention of using it.

The third factor that influences Intention to Use is the construct of Facilitating Conditions. The construct is related to technical knowledge on the use

of the program, the support availability and the similarity with other operations already carried out by the user.

As the public of the research were elderly individuals, it makes sense that facilitating conditions are an influence in this case.

In relation to the effective Use of the NFP program, the selected and tested factors were: Intention to Use and Habit.

In this case, both constructs showed positive results and positively influence the Use of the program.

According to the model, Effort Expectancy and Social Influence have no influence on Intention to Use.

Effort Expectancy is related to the ability to use technology to access the necessary information available. As respondents were elderly individuals who have used the program before, they were probably elderly individuals that had no difficulty in using technology.

Regarding Social Influence, we have observed that individuals who are important in the social circle of the elderly person do not exert influence on the use of the e-gov program.

In relation to the research of Venkatesh et al. (2012), the results present some similarities and some differences. The Performance Expectation and Habit constructs were the factors that most influenced the Intention and Use in both surveys. However, in the present research, Effort Expectation and Social Influence did not present significant results of Influence, whereas in the studies of Venkatesh presented. Another difference was in relation to the Facilitating Conditions, which did not influence Venkatesh's research and influenced this research. These differences must have occurred because the respondents were elderly people who were already using the program, and probably had people who helped them. Thus, as the Facilitating Conditions presented significance, the difficulty in using the platform (Effort Expectation) would be minimal even. And the fact that they already use it, would minimize the influence of other people for this use (Social Influence).

In practical terms, the research assists in the participation and involvement of elderly individuals in the current e-government development phase in Brazil, exposing their perceptions. Such participation is important in order to maximize the potential benefits for the government and for the elderly population that is growing in Brazil.

By understanding the factors that positively influence the adoption of this e-government program and clarifying the influence of this technology in the personal and professional lives of elderly individuals it is possible to improve the quality of service to meet the demands of the society. Thus, they can also allow an increase in the adoption of Brazilian e-government initiatives.

The findings also support the faster implementation of the program in other administrative contexts for e-government, generating useful information for the main points to be considered in order to increase the use by the elderly and the chances of successful implementation.

Among the limitations of the study, we can highlight: the representativeness of the sample, which obtained 137 respondents from a single state in Brazil; the

possibility of measurement errors due to inaccuracy in the measurement of actual values by the application of the questionnaire; the use of a single cross-sectional survey; the perception and ability of the researchers to develop the questionnaire and analyze their results.

The recommendations for future research are: to add new constructs to the presented model; test the model presented in new e-government programs and in other states; test other moderators and conduct longitudinal studies with qualitative methodologies.

Uso do governo eletrônico no Estado de São Paulo por idosos

RESUMO

O público idoso já totaliza 13% da população brasileira, e a utilização da tecnologia pode aumentar a qualidade de vida dessas pessoas. Os idosos tendem a ser mais cautelosos e buscar maior certeza antes de agir em relação aos indivíduos mais jovens. O objetivo da pesquisa foi estudar quais os fatores que influenciam os idosos no uso de uma iniciativa de governo eletrônico no Estado de São Paulo. Foram entrevistados 137 idosos que utilizaram o programa. A metodologia utilizada foi quantitativa com a utilização de modelos de equações estruturais. O estudo apresentou um modelo robusto com alto poder explicativo, no qual os fatores influenciadores foram: Expectativa de Desempenho, Condições Facilitadoras e Hábito. A pesquisa auxilia na participação e envolvimento dos idosos na atual fase de desenvolvimento do governo eletrônico no Estado, expondo suas percepções.

PALAVRAS-CHAVE: Governo eletrônico. Tecnologia da Informação. Idoso.

ACKNOWLEDGMENTS

This research was supported by Espaço da Escrita/Coordenadoria Geral da UNICAMP.

REFERENCES

ALAWADHI, S.; MORRIS, A. The Use of the UTAUT Model in the Adoption of E-Government Services in Kuwait. **Paper presented at the Proceedings of the 41st Annual Hawaii International Conference on System Sciences**, 2008.

BARBOSA, A.; POZZEBON, M.; DINIZ, E. Rethinking E-government Performance Assessment from a Citizen Perspective. **Public Management** (Accepted for publication: forthcoming), 2013.

BENBASAT, I.; BARKI, H. Quo vadis, TAM? [Article]. **Journal of the Association for Information Systems**, 8(4), 212-218, 2007.

BOTWINICK, J. **Aging and Behavior**, New York: Springer, 2007.

CARTER, L.; BÉLANGER, F. The utilization of e-government services: citizen trust, innovation and acceptance factors. [Article]. **Information Systems Journal**, 15(1), 5-25, 2005.

CHADWICK, A. Web 2.0: New challenges for the study of e-democracy in an era of informational exuberance. I/S: **A Journal of law and policy for the Information Society**, vol.5, 2009.

CHIN, W. W. The Partial Least Squares Approach to Structural Equation Modeling. In G. A. Marcoulides (Ed.). **Modern Methods for Business Research** (pp. 295-358). Mahwah, NJ: Lawrence Erlbaum, 1998.

COHEN, J.: **Statistical power analysis for the behavioral sciences** (2nd ed.). Hillsdale, NJ: Erlbaum, 1988.

COLESCA, S. E.; LILIANA, D. E-government Adoption in Romania. **Paper presented at the World Academy of Science Engineering and Technology**, 2008.

CZAJA, S. J.; LEE C. C. The impact of aging on access to technology. **Universal Access in the Information Society** 5(4), 341-349, 2007.

DAVIS, F. D. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. [Article]. **MIS Quarterly**, 13(3), 319-340, 1989.

DAVIS, F. D.; BAGOZZI, R. P.; WARSHAW, P. R. User Acceptance of Computer Technology: A Comparison of two Theoretical Models. [Article]. **Management Science**, 35(8), 982-1003, 1989.

EFRON, B.; TIBSHIRANI, R. J. **An introduction to the bootstrap**. Chapman & Hall / CRC Press, 1998.

EVANS, D.; YEN, D. C. E-government: An analysis for implementation: Framework for understanding cultural and social impact. **Government Information Quarterly**, 22(3), 354-373, 2005.

FAUL, F.; ERDFELDER, E.; BUCHNER, A.; LANG, A.-G. Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. **Behavior Research Methods**, 41, 1149-1160, 2009.

FAUL, F.; ERDFELDER, E.; LANG, A.-G.; BUCHNER, A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. **Behavior Research Methods**, 39, 175-191, 2007.

FERRER, F.; SANTOS, P. **E-Government: O Governo Eletrônico no Brasil**. São Paulo: Saraiva, 2004.

GOODHUE, D. L. Comment on Benbasat and Barki's "Quo Vadis TAM" article, Editorial. **Journal of the Association for Information Systems**, pp. 220-222, 2007.

HAIR, J. F.; ANDERSON, R. E.; TATHAM, R. L.; BLACK, W. C. **Análise multivariada de dados**. 5ª Ed. Porto Alegre: Bookman, 2005.

HAIR, J. F.; HULT, G. T. M.; RINGLE, C. M.; SARSTEDT, M. **A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)**. Thousand Oaks: SAGE Publications, 2014.

HAIR, J. F.; RINGLE, C. M.; SARSTEDT, M. PLS-SEM: Indeed a Silver Bullet. **Journal of Marketing Theory and Practice**, 19, 139-151, 2011.

HEEKS, R.; BAILUR, S. Analyzing e-Government Research: Perspectives, Philosophies, Theories, Methods, and Practice. **Government Information Quarterly**, 24(2), 243-265, 2007.

HENSELER, J.; RINGLE, C. M.; SINKOVICS, R. R. The Use of Partial Least Squares Path Modeling in International Marketing. **Advances in International Marketing**, 20, 277-320, 2009.

HILL, R.; BEYNON-DAVIES P.; WILLIAMS, M. D. Older people and internet engagement: acknowledging social moderators of internet adoption, access and use. **Information Technology & People**, 21(3), 244–266, 2008.

HORST, M.; KUTTSCHREUTER, M.; GUTTELING, J. M. Perceived usefulness, personal experiences, risk perception and trust as determinants of adoption of e-government services in The Netherlands. **Computers in Human Behavior**, 23, 2007.

HUNG, S.; CHANG, C.; YU, T. Determinants of User Acceptance of the e-Government Services: The Case of online Tax Filing and Payment System. **Government Information Quarterly**, 23, 97-122, 2006.

IBGE – Instituto Brasileiro de Geografia e Estatística: **Pesquisa Nacional por Amostra de Domicílios 2013**, 2013.

JAEGER, P. T. The endless wire: E-government as global phenomenon. [Article]. **Government Information Quarterly**, 20(4), 323-331, 2003.

KERSCHNER, P. A.; KATHLEEN A. C. **The Aged User and Technology, paper presented at the Conference on Communications Technology and the Elderly: Issues and Forecasts**, Cleveland, OH, 1981.

KIM, S. S.; MALHOTRA, N. K. A Longitudinal Model of Continued IS Use: An Integrative View of Four Mechanisms Underlying Post-Adoption Phenomena. **Management Science**, (51:5), pp. 741-755, 2005.

LAM J. C. Y.; LEE, M. K. O. Digital inclusiveness – longitudinal study of internet adoption by older adults. **Journal of Management Information Systems**, 22(4), 177–206, 2006.

LIMAYEM, M.; HIRT, S. G.; CHEUNG, C. M. K. How Habit Limits the Predictive Power of Intention: the Case of Information Systems Continuance. [Article]. **MIS Quarterly**, 31(4), 705-737, 2007.

MITZNER, T. L. et al. Older adults talk technology: technology usage and attitudes. **Computers in Human Behavior** 26(6), 1710–1721, 2010.

MORAES, G. H. S. M.; MEIRELLES, F. S. Adoção de Governo Eletrônico no Brasil: A perspectiva do usuário do programa Nota Fiscal Paulista. In: **EnANPAD 2014**, 2014, Rio de Janeiro. XXXVIII Encontro da ANPAD, 2014. v. 38. p. 1-16, 2014.

MORAES, G. H. S. M.; MEIRELLES, F. S. User's Perspective of Electronic Government Adoption in Brazil. **Journal of Technology Management & Innovation**. V12, p. 1-10, 2017.

MORAES, G. H. S. M.; MEIRELLES F. S.; CAPPELLOZZA, A. Information technology and e-government in Brazil: A single case study in the State of São Paulo. **Espacios (Caracas)**, v. 37, p. 25-43, 2016.

MORRIS, M. G.; VENKATESH V. Age differences in technology adoption decisions: implications for a changing work force. **Personnel Psychology** 53(2), 375–403, 2000.

NUNALLY, J. C.; BERNSTEIN, I. **Psychometric theory**. New York: McGraw-Hill, 1994.

OZKAN, S.; KANAT, I. E. **E-Government Adoption Model based on Theory of Planned Behavior**: Empirical Validation. *Government Information Quarterly*, 2011.

PINSONNEAULT, A.; KRAEMER K. L. Survey research methodology in management information systems: an assessment. **Journal of Management Information Systems**. v.10, n.2, 1993.

PINTO, S.; FERNANDES, C. Institucionalização do governo eletrônico no Brasil. **Paper presented at the Congreso Internacional del Clad sobre La Reforma del Estado y de La Administración Pública**, Santiago, Chile, 2005.

PRADO, E. P. V.; SOUZA, C. A.; RAMALHO, N. C. L.; CUNHA, M. A.; REINHARD, N. Iniciativas de governo eletrônico: análise das relações entre nível de governo e características dos projetos em casos de sucesso. **Revista Eletrônica de Sistemas de Informação**, 10(1), 1-22, 2011.

RINGLE, C. M.; WENDE, S.; BECKER, J. M. **SmartPLS 3**. Hamburg: SmartPLS. Retrieved from: <<http://www.smartpls.com>>. 2014.

ROBERTSON, T. S. **Innovative Behavior and Communication**, New York: Holt, Rinehart and Winston, 1971.

ROGERS, E. M. **Diffusion of innovations**. (5 ed.). New York: Free Press, 2003.

SCARTEZINI, V. Governo e comércio eletrônico nos países em desenvolvimento. In F. Ferrer & P. Santos (Eds.), **E-government: o Governo Eletrônico no Brasil**. São Paulo: Editora Saraiva, 2004.

SHAREEF, M. A.; KUMAR, V.; KUMAR, U.; DWIVEDI, Y. Identifying Critical Factors for Adoption of E-government. **Electronic Government: An International Journal**, 6(1), 70-96, 2009.

SHAREEF, M. A.; KUMAR, V.; KUMAR, U.; DWIVEDI, Y. e-Government Adoption Model (GAM): Differing service maturity levels. [Article]. **Government Information Quarterly**, 28(1), 17-35, 2011.

UHL, K., R.; ANDRUS, L. P. How Are Laggards Different? An Empirical Inquiry, **Journal of Marketing Research**, 7 (February), 51-54, 1970.

VENKATESH, V.; BALA, H. Technology Acceptance Model 3 and a Research Agenda on Interventions. [Article]. **Decision Sciences**, 39(2), 273-315, 2008.

VENKATESH, V.; DAVIS, F. D.; MORRIS, M. G. Dead Or Alive? The Development, Trajectory And Future Of Technology Adoption Research. [Article]. **Journal of the Association for Information Systems**, 8(4), 268-286, 2007.

VENKATESH, V.; MORRIS, M. G.; DAVIS, G. B.; DAVIS, F. D. User Acceptance of Information Technology: Toward a Unified View. [Article]. **MIS Quarterly**, 27(3), 425-478, 2003.

VENKATESH, V.; THONG, J. Y. L.; XU, X. Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. **MIS Quarterly**, 36(1), 157-178, 2012.

WHETTEN, D. A. What Constitutes a Theoretical Contribution? [Article]. **Academy of Management Review**, 14(4), 490-495. doi: 10.5465/amr.1989.4308371, 1989.

YAO, Y.; MURPHY, L. Remote electronic voting systems: an exploration of voters' perceptions and intention to use. **European Journal of Information Systems** 16(2), 106-120, 2007.

Recebido: 25 fev. 2017.

Aprovado: 18 jul. 2017.

DOI: 10.3895/rts.v14n30.5598

Como citar: MORAES, G. H. S. M. de; MEIRELLES, F. de S. M. The use of electronic government in the State of São Paulo by senior citizens. **R. Technol. Soc.** v. 14, n. 30, p. 154-175, jan./abr. 2018. Disponível em: <<https://periodicos.utfpr.edu.br/rts/article/view/5598>>. Acesso em: XXX.

Correspondência:

Gustavo Hermínio Salati Marcondes de Moraes
R. Pedro Zaccaria, 1300 - Jardim Santa Luiza - CEP 13484-350 - Limeira - São Paulo.

Direito autorial: Este artigo está licenciado sob os termos da Licença Creative Commons-Atribuição 4.0 Internacional.

