

Factors that influence the use of E-Government monitoring systems in Brazil

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Abstract

Objective: To understand the factors that influence the use of e-Government monitoring systems in Brazil.

Method: A structured questionnaire was applied to 377 Brazilian accountants using the Public Digital Bookkeeping System (SPED). The model by Chen, Chen, Huang and Ching (2006) was used for support, which appoints factors that influence the use of e-Government in the United States and China.

Results: The results confirm that, as verified in those countries, in Brazil, the use of SPED is subject to aspects that directly interfere in the users' level of difficulty, namely infrastructure factors (access to network and network economy), cultural (national culture) and social factors (availability of information).

Contributions: With the myriad changes in the universe of e-Government technologies, understanding the behavior of its users provides support to companies, professionals, and governments to decide on investments in tools and improvements necessary in those systems.

Keywords: e-Government; SPED; monitoring; information technology.

1. Introduction

The emergence of innovations is directly related to the search for knowledge, permitting the exploration of new tools and their applicability (Flayar, Lee, Lutch & Kettinger, 2012). This has resulted in telephone, radio, TV (Bhimani & Bromwich, 2009) and, more recently, information and communication technologies (ICT). Consequently, the governments of diverse nations, especially in the last decades, have endeavored to improve their structure and efficiency, increasing openness and transparency in their actions.

In this sense, the ICT, especially the internet, are strategic tools that are part of the so-called e-Government, defined as the use of ICT systems to democratize and improve access to public information and optimize the quality of services provided in all spheres of government (Chen et al., 2006). This helps to overcome communication obstacles, strengthen governments' relations with businesses and citizens, and increase the transparency and accountability of businesses and governments (Governo Digital, 2017b).

Companies, in turn, due to the constant changes generated by the acceleration of businesses, processes, evaluation and decision need to deploy technology and improve their databases, under threat of failing to meet the requirements of e-Government systems (Trigo, Belfo & Estébanez, 2014).

The implementation of e-Government systems usually includes three phases, with several categories to be put into operation. Many developing countries have still not been able to overcome challenges in this process, especially because their conditions are quite different from developed countries. According to Chen et al. (2006), these distinctions are related to political, technical, and organizational aspects, which exert influence from the conception to the assessment of how those systems function (Belanger, Hiller & Smith, 2002).

The differences are also reflected in e-Government processes between countries and, for this reason, it is not recommended to simply transpose e-Government processes from developed to developing countries (Chen et al., 2006), as happened in Brazil. In a comparative study between USA and China, for example, Chen et al. (2006) concluded that social, cultural and infrastructure-related factors interfere in the use of e-Government systems.

Brazil, inspired by experiences from countries like Spain, Chile, and Mexico (Sebold, Mello, Schappo & Mello, 2012) has been developing the system - Public Digital Bookkeeping System (Sped), which is now part of Brazilian e-Government and is intended to unify information in real time, in a correct and effective manner (Sistema Público de Escrituração Digital, 2017; Governo Digital, 2017c). The process of the various modalities of Sped in Brazil has occurred very quickly and, in most cases, the beginning of its validity had to be extended, as the companies have not been able to advance at the same speed required by the responsible governmental organs. These delays and difficulties in implementing systems may be affected by infrastructural, social and cultural factors suggested in the conceptual model by Chen et al. (2006) in the implementation of e-Government.

In that sense, this study tested the conceptual model by Chen et al. (2006) to understand the factors that have influenced the use of e-Government monitoring systems in Brazil, aiming to analyze the Public Digital Bookkeeping System. The hypothesis is that this interference exists. Therefore, an exploratory-descriptive study with a cross-sectional and quantitative approach was carried out, using primary data. A structured questionnaire was applied to 377 Brazilian accountants using the Public Digital Bookkeeping System (Sped). The results appointed to aspects related to infrastructural, cultural and social factors that interfere directly with the users' level of difficulty.

The results can provide clues for governments to deploy e-Government projects more effectively, revolutionizing ways and standards through which government agencies can work functionally, offering higher quality, more accessible and refined services (Huang, D'ambra & Bhalla, 2002).

Besides this introduction, this article is further subdivided into four sections. The second section contains the literature review with the discussion of e-Government and SPED related research. The third is the method used in the research; fourthly, the presentation and analysis of the data; and finally, in the fifth section, the conclusions are presented.

2. Literature Review

E-Government, also known by the equivalent terms e-Gov or electronic government (Governo Digital, 2017b, Brasil, 2007), is the use of information and communication technology systems that facilitate and democratize the access to public information at low cost. It maintains the permanent commitment to improve the relationship between the public and private sectors with efficiency, efficacy, transparency and accountability for the information (Carter & Belanger, 2005; Chen et al., 2006; Alawadhi & Morris, 2009; Governo Digital, 2017b).

Around the globe, several countries already apply ICTs in the development of e-Government systems, promoting transparency and greater quality in services and communication focusing on companies, citizens and public organizations themselves.

The first country with specialized software in e-Government technologies and services in the world, however, was Australia, which revolutionized the application of these tools in government agencies. In view of the success achieved, the country assisted several others whose public organizations experienced difficulties and results below expectations in the use of those systems. Its main clients were the USA, UK, Singapore and Canada, which later became leaders in the early march towards the development of e-Government (Huang, D'ambra & Bhalla, 2002).

In Brazil, investments in e-Government began in the 1990s with the implementation of its system the following year. In 2007, however the Public Digital Bookkeeping System (Governo Digital, 2017b) was implemented, which was already used in Spain, Chile and Mexico (Sebold et al., 2012). In South America, the country ranks first in investments and development of e-Government technologies. Globally, it ranks 17th, according to the ranking developed by the Open Data Barometer in 2015 (Governo Digital, 2017a).

In accordance with Decrees 6.022/2007 and 7.979/2013, the Sped allows you to receive and unify digital files and then validate, store and authenticate books and documents that are part of the companies' accounting and fiscal documents, including those covered by immunity and exemption rules (Brasil, 2007; Geron, Finatelli, Faria & Romeiro, 2011).

Bélangier, Hiller and Smith (2002) proposed the classification of e-Government systems into six categories, based on the target of the service. Thus, they allow the government to provide services to: a) citizens as part of the political process; b) market sectors; c) civil servants; d) individual citizens; e) companies and f) other spheres of government.

Even developed countries do not always implement all of the above categories. In Brazil, only the last three are in operation. Thus, for companies and the market, services are provided related to taxes, social security, notarial services, acquisitions of goods and services and electronic trading sessions. Citizens, in turn, can access services and information regarding social benefit payments, scheduling of appointments, distance learning courses, delivery of tax returns and tax payment. Among the governmental spheres, e-Government is used in the dissemination of calendars of public hearings, regulations and interdepartmental communication (Governo Digital, 2017a).

Specifically with regard to companies, in the Sped, they generate tax and accounting information and tax laws in a standardized manner, forwarding them to the government database. For each type of information, a version, subproject or SPED modality has been created, called the *Validation and Signature Program*. The subprojects the companies use most are *Digital Accounting Bookkeeping* (ECD), *Tax Accounting Bookkeeping* (ECF), *Digital Fiscal Bookkeeping* (EFD-ICMS/IPI) and *EFD-Contributions* (Sistema Público de Escrituração Digital, 2017).

Usually, the implementation of e-Government systems covers the phases of initiation, infusion and personalization (Chen et al., 2006; United Nations, 2016), which many developing countries still have not been able to overcome, especially because their conditions are quite different from developed countries.

For example, in terms of history and culture, Chen et al. (2006) point out that developing societies are marked by greater instability in governments, being relatively recent democracies and, hence, with less transparent government policies and rules. In addition, their governments do not have staff with high technical potential, like in developed countries.

Additionally, the technological infrastructure and Internet access for citizens are poor. Relatively less experience with democratic regimes makes citizens reluctant to rely on online services, and their participation in public policy-making is also lower than in developed countries, where social control is usually high (Chen et al., 2006).

In countries with e-Government, infrastructure factors (network access, network learning, network economy and network policy) should inspire confidence, providing quality service to users (Lu & Ramamurthy, 2011; Chen et al., 2006). Studies suggest that the managers of companies using such systems, in turn, need to pay attention to the development of their information technology framework, deploying and reconfiguring resources to support and enhance business strategies and work processes (Alawadhi & Morris, 2008).

Social factors, in turn, include the historical course of a given society, citizens, governance, organizational structure and information availability, which interfere in the use of e-Government systems, for example, allowing the users to mobilize knowledge, including with their network of relationships (Chen et al., 2006; Brewer & Venaik, 2014; Wang & Rafiq, 2014).

Lastly, cultural factors involve social norms and organizational and national cultures. Thus, one needs to look at how the employees in a company behave, for example, in the development of their interpersonal relationships and in the use of the power obtained as a result of their performance. Furthermore, it is fundamental to analyze individual skills in stressful situations, such as when upgrading versions of e-Government systems, which requires adaptability to meet determinations (Treadway, Breland, Williams, Cho, Yang & Ferris, 2013).

Therefore, according to Chen et al. (2006), the effective deployment of an e-Government program should be understood as a multi-step process, which incorporates political, technical and organizational aspects. These factors act from the conception to the functional assessment of those programs (Belanger & Hiller, 2002), as shown in Picture 1.

Factors	Description	Source
Network access	Measured by the technology, access and quality, through the following elements: development and infrastructure; IT resources and support and internet use.	Chen <i>et al.</i> (2006)
Network learning	An educational system that needs to integrate the network and offer training to the community.	Chen <i>et al.</i> (2006)
Network economy	A system that allows the users to access their information rapidly, obtain it in print or complete on-line forms/fields.	Chen <i>et al.</i> (2006)
Network policy	A system the government needs to maintain to guarantee transparent legislation, strategies and problem solving.	Chen <i>et al.</i> (2006)
Brazilian culture	The adoption of IT is affected by the culture (values of daily social life, religious and political influences etc.) in all societies.	Baligh (1994), Hofstede (1994) and Smith and Shilbury (2004)
Organizational culture	The members of an organization interrelate through factors that directly influence the leadership styles.	Baligh (1994), Hofstede (1994) and Smith and Shilbury (2004)
Social standards (resistance to change)	The function of the standards is to guide the daily behavior of the stakeholders, including in the usage process of e-Government, and guide their actions to achieve the organizational objectives; behaviors of resistance impede the implementation of the e-Government process.	Rezende, Freitas and Oliveira (2011)
Society as history	Throughout history, educational processes influence behaviors, contributing to enable people to use the technology effectively or not.	Baligh (1994), Hofstede (1994), Smith and Shilbury (2004)
Citizen	E-Government informs the citizens on how to execute on-line transactions for example, which can improve their efficiency.	Chen <i>et al.</i> (2006)
Governance	Web-based strategies to improve the access to high-quality information and inter-country services.	Chen <i>et al.</i> (2006)
Organizational structure	Represents company hierarchy, the respective rules and efforts to execute what was planned.	Smith and Shilbury (2004)
Information availability	Related to information availability, as well as to perceived safety in the use of the systems where the information is stored.	Belfo and Trigo (2013)

Picture 1. Description of the factors serving as research variables

Throughout the development of the e-Government process, governments and businesses persist for managers to feed systems with reliable and quality information (Chen *et al.*, 2006; Brewer & Venaik, 2014), also because, as evidenced by Chan, Thon, Venkatesh, Bown, Hu and Tam (2010), the performance expectations, effort, social influence and ease of conditions of electronic systems affect citizen satisfaction. Therefore, the greater the search for technological strategies, the more tools will be adopted, so that the usage process can be unified.

Although the success of the e-Government system depends on the willingness of citizens to use its services, Carter and Bélanger (2005) report that a survey of top administrative officials from government agencies around the world revealed that 74.2% of them have websites, but that 90.5% do not conduct surveys with citizens and businesses to know their needs when using e-Government tools.

As the factors mentioned take different shapes in each nation, Chen *et al.* (2006) argue that experiences in developed countries cannot be directly applied in developing countries. This recommendation goes against the decision taken by the Brazilian government (Brasil, 2014), as the e-Government categories implemented thus far in the country were already operating in the United States and Spain (Governo Digital, 2017b).

One cannot ignore that the sharing of experiences between governments is one of the determinants for establishing a development process through ICT (United Nations, 2016). It is also important to consider the differences highlighted by Chen et al. (2006) and Chan et al. (2010) though. Therefore, the study reported here tested the model by Chen et al. (2006), aiming to understand if the factors they identify as causes of interference in the use of e-Government monitoring systems also influence the use of the Public Digital Bookkeeping System used in Brazil.

3. Method

To understand the factors that have influenced the use of e-Government monitoring systems in Brazil, an exploratory and descriptive study with a cross-sectional design and a quantitative approach was performed, based on primary data.

The study population consisted of Brazilian accountants who used the Sped users. These professionals need to act and be registered in the Regional Accounting Council (CRC), as their digital signature, as well as that of the business owner, are required when sending information using the modalities of the e-Government system (Receita Federal, 2017).

Initially, 544 professionals from a wide range of states were contacted, being only 377 accountants, who were included in the non-probabilistic sample and fully answered the questionnaire. The participation of the other professionals was discarded.

The respondents are distributed across all Federation Units (FU). The states of SC, MT, RS, SP, RJ, ES, TO and PR account for almost 80 of the sample. Table 1 shows the distribution of respondents across the FU's.

Table 1

Distribution of sample of respondents per Federation Unit

Federation Unit (FU)	Number of Respondents per FU	Percentage of Respondents per FU	Federation Unit (FU)	Number of Respondents per FU	Percentage of Respondents per FU
SC	98	26.0%	MS	4	1.1%
MT	98	26.0%	AP	4	1.1%
RS	23	6.1%	SE	4	1.1%
SP	19	5.0%	PB	4	1.1%
RJ	19	5.0%	RO	3	0.8%
ES	16	4.2%	AM	3	0.8%
TO	14	3.7%	RN	3	0.8%
PR	13	3.4%	RR	3	0.8%
MG	9	2.4%	AC	2	0.5%
BA	8	2.1%	PE	3	0.8%
PA	7	1.9%	DF	3	0.8%
GO	5	1.3%	CE	2	0.5%
AL	4	1.1%	PI	2	0.5%
MA	4	1.1%	Total	377	100%

To collect the data, a seven-item questionnaire was used to characterize the respondents (gender, age, state of residence, length of experience with Sped, educational background, activity as accountant, professional CRC register and state where the register was obtained) and 29 other statements, five of which were related to the dependent variable (difficulty in using Sped) and 24 to the independent variables (social, cultural and infrastructural factors), according to the conceptual model by Chen et al. (2006). A five-level Likert scale was used (1 = strongly disagree and 5 = strongly agree). The conceptual model of Chen et al. (2006) takes into account differences between developed and developing countries. Hence, the variables indicated in the conceptual model were used, especially those aligned with developing countries, adapting to the Brazilian e-Government and using Sped as a proxy.

The questionnaire was prepared on the Google Forms platform and pre-tested with 130 accountants. After adjustments, the definitive version was applied between September 2017 and February 2018. The link was forwarded via the CRC's, accounting firms and other digital media (email, WhatsApp, Facebook, Sped Brasil (blog), Fórum de Contadores (website)). The same questionnaire was distributed in print at two events that join accountants who have been working with Sped.

The internal consistency of the Likert items varied, with acceptable Cronbach's alpha coefficients for the items related to infrastructure factors (0.8241) and questionable coefficients for the items related to social (0.7916) and cultural (0.6344) factors.

The data were analyzed using descriptive statistics, test of difference of means, correlation, regression and factor analyses. Specifically regarding the use of the latter, the Kaiser-Meyer-Olkin (KMO) test result (0.8299) confirmed the indication of this tool, as well as Bartlett's sphericity test (Hair Junior, Black, Anderson & Tatham, 2009; Devellis, 1991; Wooldrige, 2001).

4. Data Presentation and Analysis

The sample characteristics ($n = 377$) indicate that 84.6% are accountants and that 81.2% are active, evidencing that Brazilian companies act in accordance with the decrees 6.022/2007 and 7.979/2013, which require the forwarding of information via Sped with digital signatures of the accounting professional and the business owner (digital certificate). The most frequent users of Sped have more than six years of experience (36.9%). As for the age, 16.7% are between 26 and 30 years old, with only 5.3% of users over 61 years of age. In Table 2, the behavior of the independent variables is presented, that is, which are supposed to influence the difficulty to use Sped.

Table 2

Descriptive Statistics - Difficulties to use the Sped

(n = 377; min. = 1; max. = 5)					
Variables	Mean	SD	0.250	Mdn	0.750
Sped 1	3.040	1.160	2.000	3.000	4.000
Sped 2	2.530	1.210	2.000	2.000	3.000
Sped 3	2.780	1.140	2.000	3.000	4.000
Sped 4	3.230	1.060	2.000	3.000	4.000
Sped 5	3.320	1.090	3.000	3.000	4.000

There is slightly moderate difficulty in using system functions (*Sped 1*), with an average coefficient close to 3. In addition, the distribution for *Sped 4* shows that 160 respondents agree partially or fully that they know accountants who have difficulty using Sped. The difficulty of accountants to understand the notifications of the tax authorities (*Sped 5*) was appointed by 167 users, although 120 neither agreed nor disagreed that this difficulty exists.

The standard deviation (SD) (1.21) in *Sped 2* shows a relatively high level of dispersion, indicating that a significant portion (198) experiences no difficulty in accessing the system modalities. On average, there is also little difficulty to use the modalities (*Sped 3*).

Thus, the results are consistent with Chen et al. (2006), which point out the insufficient of information about technology in developing countries as potential difficulties in using e-Government systems. In Brazil, they may also be related to the complexity of the legislation regulating the deployment, operation and use of Sped.

The descriptive statistics for infrastructure, cultural and social factors are found in Table 3.

Table 3
Descriptive Statistics – Factors that Influence the use of Sped

(min. = 1; max. = 5)						
	Variable	Mean	SD	0.250	Mdn	0.750
Infrastructural F.	Network access 1	3.340	1.480	2	4	5
	Network access 2	4.110	1.140	4	4	5
	Network learning 1	3.710	1.220	3	4	5
	Network learning 2	3.940	1.070	3	4	5
	Network economy 1	4.110	0.990	4	4	5
	Network economy 2	3.840	1.090	3	4	5
	Network policy 1	3.360	1.120	3	3	4
	Network policy 2	3.060	1.240	2	3	4
Cultural F.	Brazilian culture 1	3.080	1.320	2	3	4
	Brazilian culture 2	2.700	1.170	2	3	3
	Org. culture 1	3.790	1.110	3	4	5
	Org. culture 2	3.750	1.140	3	4	5
	Social standards 1	3.740	1.040	3	4	5
	Social standards 2	3.620	1.130	3	4	4
Social F.	Society as history 1	3.130	1.100	2	3	4
	Society as history 2	2.970	1.140	2	3	4
	Citizen 1	3.850	1.050	3	4	5
	Citizen 2	3.770	1.140	3	4	5
	Governance 1	3.900	1.050	3	4	5
	Governance 2	4.240	0.900	4	4	5
	Org. structure 1	3.350	1.390	2	4	4
	Org. structure 2	3.400	1.280	3	4	4
	Inf. availability 1	3.440	1.070	3	4	4
	Inf. availability 2	3.330	1.130	3	3	4

The average for *Network Access 1* (3.34), with normal distribution, indicates that the responses were concentrated in the neither agree nor disagree option, approaching agreement with the items. In the variables *Network access 2* and *Network economy 1*, the answers were more concentrated in the disagree and strongly disagree options.

In the analysis of the cultural factors that according to Chen et al. (2006) cause difficulties in using e-Government systems, 152 users strongly agree or agree that innovation and technological change cause stress (*National Culture 1* - average 3.08 and SD 1.32). Besides, most responded that their lives are unstructured and experience few cultural changes (*National Culture 2* - average 2.70 and SD 1.17).

As for the cultural factors, in total, 254 users stated that their organizations value people with experience (*Organizational Culture 1* - average 3.79 and SD 1.11) and 246 agreed that they encourage employees to seek solutions (*Organizational Culture 2* - average 3.75 and SD 1.14).

Regarding the social standards, the respondents are connected to other professionals (*Social Standards 1* - average 3.74 and median 4.00) and partially agree that, through the Internet, they maintain contact with those who help them to use Sped (*Social Standards 2* - average 3.62 and SD 1.13).

Finally, about the social factors that influence the difficulty of using Sped, the variable *Society as history* identified the citizen's perception of the instructions and rules that the society in which he is inserted needs to know. The average coefficient of both statements regarding this variable was 3.05, with answers to the items being concentrated in the option neither agree nor disagree.

The analysis of the *Citizen* variable shows partial agreement (*Citizen 1* - average 3.85 and SD 1.05; *Citizen 2* - average 3.77 and SD 1.14). Most respondents consider that it is easy to use the digital certificate, allowing them to access the information through e-Government at any time.

In the *Governance* variable, the average item coefficient was 4, showing that the users tended to agree that Sped is an effective tool for curbing fraud and evasion (*Governance 1* - average 3.90 and SD 1.05) and improving monitoring (*Governance 2* - average 4.24 and median 4.00), as stated by the Brazilian tax authorities (Sistema Público de Escrituração Digital, 2017).

The companies where the users under study operate offer courses and training to solve difficulties in the use of Sped (*Organizational Structure 1* - average 3.35). Among the respondents, 207 stated that they always participate in those activities. Another 203 revealed that companies invest in rules and management (*Organizational Structure 2* - average 3.40 and SD 1.28).

Among the users, 204 confirmed that they have access to the information provided by Sped (*Information availability 1* - average 3.44 and SD 1.079) and 187 felt secure in doing so (*Information availability 2* - average 3.33 and SD 1.13).

The test of difference of means was also performed, grouping users by time of experience (in years), with the following comparison: Alpha (<1) x Beta (> 6) (Table 4). The group with less experience experiences more difficulty in using the system (Sped = 0.797). Network learning also showed statistical significance in the comparison (Dif. of means = -0.866). On average, the Beta group tries out more new versions of Sped and stays more up to date on system changes.

The differences of means between the groups for *Organizational Culture* and *Social Standards* were, respectively, -0.865523 and -0.823464. This means that, among the users of the Beta group, on average, even partially, there was greater agreement that cultural factors are important in the e-Government structure.

Table 4

Test of Difference of Means (Alpha x Beta groups)

Variables	Alpha Group		Beta Group		Dif.Means	P-value
	Mean	SD	Mean	SD		
Sped	3.723077	0.7726079	2.92518	0.0833125	0.797897	0.0032*
Infrastructural F.						
Network access	3.461538	1.050031	3.809353	1.015096	-0.347814	0.2710
Network learn.	3.230769	1.251922	4.097122	0.902648	-0.866353	0.0297**
Network econ.	3.653846	1.068188	4.169065	0.8837379	-0.515218	0.1146
Network policy	3.307692	1.031553	3.244604	1.175485	0.063088	0.8378
Cultural F.						
Braz. culture	3.269231	1.012739	2.874101	1.009185	0.39513	0.1993
Org. culture	3.076923	1.077152	3.942446	1.044446	-0.865523	0.0147**
Social standards	3.115385	1.227359	3.938849	0.8937392	-0.823464	0.0342**
Social F.						
Society	3.076923	1.037749	3.129496	1.03444	-0.052573	0.8637
Citizen	3.846154	0.7183492	3.874101	1.071863	-0.027946	0.8999
Governance	4.115385	0.8454251	4.179856	0.8512718	-0.064471	0.7964
Organ. struct.	3.230769	1.284773	3.679856	1.168746	-0.449086	0.2449
Inform. avail.	3.230769	1.235168	3.482014	1.104028	-0.251245	0.4910

Obs. 1: * $p < 0.01$, ** $p < 0.05$, *** $p < 0.1$. Obs. 2: diff = mean (Alpha) – mean (Beta).

In the correlation analysis, it was observed that when the *Experience using Sped* (-0.1551) increases, the difficulty in using Sped drops. Regarding the factors that influence the use of e-Government systems according to Chen et al. (2006), there was an association between difficulty in using Sped and variables related to infrastructure factors, specifically *Network Policy* (-0.1469), *Network Learning* (-0.1396) and *Network Economics* (-0.2337). When, for example, the *network policy* expands, with better strategies, technologies and legislation, the difficulty level drops, encouraging users to look for solutions.

As for the cultural factors, there was a negative correlation between *Organizational Culture* and *Social Standards* on the one hand and the difficulty in using Sped on the other. That is, when professional relationship networks, user training and less resistance to technology exist, the difficulty to use the system decreases.

For social factors, in turn, the correlation between difficulty in using Sped and the variables *Citizen* (-0.1741) and *Information availability* (-0.2998) was evidenced, which move in the opposite sense. Thus, the more the users connect with people who can help them, also via networking, and the greater their your search for information on the government website, the lesser their difficulty in using the system.

Therefore, in accordance with Chen et al. (2006), these results show that e-Government needs to be structured, so that developing countries can achieve rates as satisfactory as those achieved in developed countries.

Based on the Kaiser criterion, in which factors with eigenvalues ≥ 1 are neglected, the correlation analysis (Table 5) shows that 85.59% of the accumulated variance is mainly explained by four factors: infrastructure factors (49.94%), cultural factors (14.60%), social factors (11.49%) and controls (9.56%).

Table 5

Correlation Analysis of the Factors

Factor	Eigenvalues	Difference	Not rotated		Rotated	
			Proportion (% of variance)	Accumulated (% of variance)	Proportion (% of variance)	Accumulated (% of variance)
Factor 1	6.49015	4.59250	0.4994	0.4994	0.1985	0.1985
Factor 2	1.89766	0.40413	0.1460	0.6454	0.1954	0.3939
Factor 3	1.49353	0.25179	0.1149	0.7604	0.1384	0.5323
Factor 4	1.24174	0.33747	0.0956	0.8559	0.1051	0.6374
Factor 5	0.90426	0.13996	0.0696	0.9255	0.1040	0.7414
Factor 6	0.76430	0.16102	0.0588	0.9843	0.1028	0.8442
Factor 7	0.60328	0.14108	0.0464	1.0307	0.073	0.9172
Factor 8	0.46219	0.07633	0.0356	1.0663	0.0631	0.9803
Factor 9	0.38586	0.09545	0.0297	1.0960	0.0558	1.0361
Factor 10	0.29041	0.05696	0.0223	1.1183	0.0429	1.0790
...
Factor 30	-0.29454	.	-0.0227	1.0000	.	.
Observations (n)	377					
Retained Factor	16					
Number of parameters	360					
LR test: independent vs. saturated	0.0000***					

Obs.: * p<0.1, ** p<0.05, *** p<0.01.

To explain the relationship between the difficulty to use the Sped – e-Gov (*Sped*) variable – and infrastructural, cultural and social factors, expressed in 24 assertions, regression analysis (Table 7) was applied without and with controls (*SPED 1* and *SPED2*, respectively).

The econometric model is described in Equation 1 and was tested for the absence of heteroskedasticity (White's general test statistic, Breusch-Pagan/Cook-Weisberg test for heteroskedasticity and Shapiro-Wilk W), showing the validity of the regression estimators. In addition, it was verified that the sample comes from a normal population (*Shapiro-Wilk W*).

$$e-Gov (SPED) = \beta_0 + \sum_{i=1}^{12} \beta_i X_i + \sum_{k=13}^{19} \beta_k X_k + \varepsilon \quad (1)$$

Where: β_0 is the intercept and ε is an error term. The variables are described in Table 6.

Table 6

Dependent and Independent Variables

Variable	Description	Variable	Description
e-Gov (Sped)	Usage difficulty	x_{10}	Governance
x_1	Network access	x_{11}	Organizational structure
x_2	Network learning	x_{12}	Information availability
x_3	Network economy	x_{13}	Gender
x_4	Network policy	x_{14}	Age (in years)
x_5	Brazilian culture	x_{15}	State of residence
x_6	Organizational culture	x_{16}	Length of experience with SPED
x_7	Social standards (resistance to change)	x_{17}	School education
x_8	Society as history	x_{18}	Active accountant
x_9	Citizen	x_{19}	Professional CRC register

Table 7

Regression Results

Variables	Sped 1	Sped 2	Hypothesis ^a
Network access	0.146*** (0.0492)	0.148*** (0.0497)	H ₁
Network learning	-0.0373 (0.0553)	-0.0233 (0.0559)	
Network economy	-0.193*** (0.0660)	-0.185*** (0.0655)	H ₁
Network policy	-0.0349 (0.0531)	-0.0479 (0.0531)	
Brazilian culture	0.203*** (0.0476)	0.198*** (0.0473)	H ₂
Organizational culture	-0.0448 (0.0547)	-0.0522 (0.0544)	
Social standards	0.0472 (0.0634)	0.0719 (0.0641)	
Society	0.0177 (0.0525)	0.00296 (0.0529)	
Citizen	-0.0399 (0.0547)	-0.0462 (0.0543)	
Governance	0.0875 (0.0600)	0.0899 (0.0598)	
Organizational structure	-0.00501 (0.0411)	-0.00265 (0.0417)	
Information availability	-0.209*** (0.0532)	-0.195*** (0.0532)	H ₃
Controls	No	Yes	
Constant	3.335*** (0.303)	3.451*** (0.364)	
Observations (n)	377	377	
White's general test statistic	5.31***	7.10**	
Breusch-Pagan/Cook-Weisberg Test for heteroskedasticity	2.37	3.32***	
Shapiro-Wilk W test		0.99782b	
R-squared	0.179	0.209	

Obs. 1: confidence level - * 99%, ** 95%, *** 90%. Obs. 2: ^bthe hypothesis is formulated as H₀; the sample comes from a normal population; H₁: the sample does not come from a normal population. H₀ is rejected at significance level α if $W_{\text{calculated}} < W_{\alpha}$.

The results in Table 7 show that there are positive effects between the variables *Network access*, *Network economy*, *National culture* and *Information availability* and the difficulty in using Sped. Other relevant features that reduce this difficulty are the experience of using Sped and acting as an accountant.

Thus, the results for the *Network Access* variable, for example, indicate that the more Internet access, the less difficulty with Sped when updates occur. Regarding the *Network Economy*, the regression reveals that, the more experience accessing Sped resources, the greater the perceived agility and knowledge of the tools of this system.

Regarding the *national culture*, the users' difficulty was observed, both without and with the controls (0.203 and 0.198, respectively). Hence, the greater the resistance to change, the greater the stress and perceived difficulty in using Sped. Consequently, they end up experiencing agitation and demonstrate cultural difficulty to adapt to the demands imposed by the tax authorities.

Information availability is another relevant variable (-0.209 and -0.195, respectively, without and with the control variables) because, the greater the availability, the lesser the difficulty in using the system. This means that, for each point of increase in this variable, the difficulty in using the Sped drops. Besides, the users consider the system as safe, as recommended by Belfo and Trigo (2013).

As the presence of multicollinearity between the variables influences the standard errors of the coefficients, making estimation difficult in the equation process and leading to a doubtful regression of results. The variance inflation factor (VIF) was measured (Table 8). The constant variable presents zero beta of the regression, that is, corresponding to the average answer about Sped without considering the factors.

Table 8
Variance Inflation Factor

Variable	VIF	1/VIF
Social factors	14.25	0.070177
Active CRC	4.86	0.205920
Active accountant	2.95	0.338741
School education	2.58	0.387694
Experience	1.63	0.611720
Age	1.43	0.700101
Cultural factors	1.18	0.844041
Gender	1.08	0.929294
Infrastructural factors	1.01	0.992851

Thus, the absence of multicollinearity was found for infrastructure and cultural factors, with VIF <10. Hence, there was no high degree of correlation between the factors.

In view of the above, one can affirm with some degree of security that at least one variable of each of the factors studied decreases the difficulty in using Sped. In infrastructural factors, the variables *Network access* and *Network economy* exert influence; in cultural factors, the national culture variable stands out. Finally, in social factors, *Information availability* exerts influence.

In other words, the results obtained based on the statistical tools confirm all three hypotheses tested in this research. Thus, in accordance with what Chen et al. (2006) stated for developing countries, in Brazil, It can be inferred that infrastructural, cultural and social factors influence the use of the e-Government system, which require attention for the sake of the maximum efficiency of the monitoring mechanisms.

5. Conclusions

In the literature analysis, for developing countries, transposition of e-Government systems deployed in developed countries is dissuaded. This is the case because, according to Chen et al. (2006), each nation possesses specific nuances in aspects that influence the use of these systems, which rank under infrastructure, cultural and social factors. In order to test the conceptual model by Chen et al (2006), this study aimed to understand which factors have influenced the use of e-Government monitoring systems in Brazil, focusing the analysis on the Sped.

The application of a questionnaire to 377 Brazilian accountants demonstrated that, in the country, those factors do influence the use of Sped. Among the structural factors, the variables *Network access* and *Network economy* were highlighted; among the cultural factors, the national culture was relevant; finally, *Information availability* is important among the social factors. Thus, the three hypotheses tested in the research were confirmed.

The study revealed that, when there are difficulties in using the Sped, the professionals seek to meet their needs through online contacts, training, recycling their knowledge and investing in innovations. In this situation, some professionals resist change, as seen in the analysis of cultural factors. These findings confirm the results of other studies, such as Chen et al. (2006) and Carter and Bélanger (2005), on the use of e-Government technology. Furthermore, the results are in line with Geron et al. (2011) and Sebold et al. (2012), who studied the Sped information technology system.

Given the findings, the deployment of e-Government monitoring systems such as Sped requires care in relation to technological resources, so that the users can access the system by Internet at any time; in relation to the difficulty the stress of technological innovations and their influence on individuals' daily lives generates; and, finally, the availability of information about the system and security for users to access the information.

Although accountancy does not experience profound changes in the principles on which it is based, the area does experience transformations, mainly deriving from technologies that have strongly evolved, promoting transparency for companies, citizens and governments. This implies changes in the modus operandi, particularly of Tax Accounting.

In this sense, the results presented here provide important information and insights into the social, cultural and technological behavior of the Sped users in Brazil, helping companies, professionals and governments to act more assertively, promoting the more efficient use of this system.

The use of technological resources in accounting is an exciting aspect, mainly due to the constant updates they go through. Future researchers could continue the investigation of the aspects involved, mainly at such moments, even including other countries that already use Sped, such as Spain, Chile, Mexico, India and Portugal. Research in other nations and, therefore, other cultures, other social standards and different infrastructure factors, broadens the understanding of the aspects that influence the implementation and use of such systems.

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