The role of Trust in e-Government Effectiveness, Operational Effectiveness and User Satisfaction: The case of Colombia

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Degree work to opt for the master's degree in administrative sciences

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Cali, December 2019

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Abstract

E-government systems are becoming an essential strategy for socio-economic development as countries' governments begin to integrate their operations with local organizations or Government to Business (G2B). The purpose of this research is to investigate whether trust plays a relevant role in the alignment of system effectiveness—represented by the quality of the e-government systems, quality of the information and quality of the service—and the effectiveness of the operations—quality, cost, and flexibility—and user satisfaction of the organizations using these technological innovations, as these views have not been investigated before in South America, and particularly in Colombia.

The preliminary findings resulting from the application of Structural Equation Modeling (SEM) to the hypothesized theoretical model, suggest that there is a predictive relationship of trust with quality of the system, quality of information, and quality of the service, and of quality of the information with quality, cost, and flexibility. Therefore, trust is built through the effectiveness of the operations that e-government systems bring to organizations, and trust also has a relevant role in the effectiveness of the e-government systems. Additionally, quality of the system and quality of the service have no impact on operational effectiveness. However, quality of information scored the highest and showed the most significant impact on operational effectiveness. In order to build up effective operations of the users of e-government applications, the government needs to improve the quality of the systems and quality of the service.

Another important finding of this research is that neither trust, e-government effectiveness, or operational effectiveness has an impact on user satisfaction. To improve the perception of benefit, or user satisfaction, the government should enhance the quality of the service and the quality of the system in order to build up the perceived impact on quality, cost, flexibility, and finally, user satisfaction.

Keywords: Trust, e-Government Effectiveness, User Satisfaction, Operational Effectiveness.

Palabras claves: Confianza, Efectividad del gobierno electrónico, satisfacción del usuario, efectividad operacional

1. Introduction

The Internet has brought dramatic changes to the processes and procedures used by organizations and government entities to fulfill the requirements established by the market and social environment (M. Shareef, Kumar, & Kumar, 2008). Governments have set their priorities on interaction with firms and citizens and facilitating access to information, as it is considered indispensable for the social and economic development of countries (Qureshi, 2015). Leading countries in e-government implementation are developed countries such as Australia, the Republic of Korea, the United Kingdom and Singapore (UN, 2016). The search for more efficient and better ways to communicate with the community is one of the main priorities of modern organizations (Park, 2007) and IT development makes it possible for developing countries to enhance IT infrastructure and acquire state-of-the-art IT resources. Changes in infrastructure require improvements in processes and procedures; however, effective implementation seems not to meet the expectations of the organizations making the investment (Bakunzibake, Grönlund, & Klein, 2016; Banerjee & Chau, 2004; Meijer, 2010). The momentum of e-government implementation unleashed academic interest in the new ways of interaction between government, organizations, and citizens (Yildiz, 2007). Development and implementation of e-government systems are generating issues that need to be explored to enhance the success rates and acceptance by users (Hsieh, Huang, & Yen, 2013; M. A. Shareef, Archer, Kumar, & Kumar, 2010). One of the main issues in the measurement of efficiency and effectiveness of e-government services is the lack of reliable and generally accepted metrics which still have to be developed (Hsieh et al., 2013; Petricek, Escher, Cox, & Margetts, 2006; Rana, Dwivedi, & Williams, 2015; Rodríguez Bolívar, Alcaid Muñoz, & López Hernández, 2014).

Although Colombia has made progress in implementing e-government services, it is slow compared to developed countries. Existing literature is based on process changes (Valencia-Tello, Karam de Chueiri, & Lopes Pereira, 2014), and focuses on the perception of corruption and on the different factors that influence the use of e-government services (Gómez Villegas & Montesinos Julve, 2014; Velasquez 2014), but there is no literature that connects e-government service and usage with operational effectiveness. Nevertheless, both government and organizations spent significant resources in implementing e-government services and expected a positive impact on organizational outcomes, but how far that impact improve operational effectiveness still needs to be explored (Armbruster, Bikfalvi, Kinkel, & Gunter, 2008). One of the consequences may be that the outcome does not meet users' expectations, with negative implications on trust in the e-government system and consequent implications on organizational effectiveness (Olson, Slater, & Hult, 2005).

The effectiveness of e-government can be considered as how the IT infrastructure and services offered by the government meet organizational requirements and needs under specific conditions (R. Santa, Hyland, & Ferrer, 2013). On the other hand, operational effectiveness considers the ability of organizations to define processes, based on their core capabilities, with the ultimate goal to exceed customers' expectations (Stalk, Evans, & Shulman, 1992).

Considering all the above, we believe that it is important to explore the factors and expectations that influence trust in e-government systems and, therefore, how the implementation of an e-government system within an organization affects the operational effectiveness outcome. Based on the review of the literature, the specific research question being addressed in this study is "Is the degree of the users' trust a predictor of

attitudes toward system quality, service quality, information quality, operational effectiveness, and user satisfaction?" To answer the question, this research uses quantitative data collected from organizations using e-government applications in Colombia.

2. Background

2.1. E-Government

There are many definitions of e-government according to the preferences of the authors or the primary focus of groups of interest involved. Yildiz (2007) defines e-government as every system or process that handles information exchange between government and organizations and/or citizens through the use of the internet and the World Wide Web (Yildiz, 2007).

In Colombia, the governmental entity responsible for technological development and implementation, and therefore for e-government is the Ministry of Information Technology (MinTIC). The starting point for e-government services in Colombia was the initiative called "Gobierno en línea" (government online) in 2008, and between 2013 and 2014 only, MinTIC spent more than 35 million USD to promote e-government development, initiatives, strategies and consultancy. In 2016, more than 25 million USD were spent on infrastructure, hardware, software and IT services. According to *Corporación Colombia Digital (2017),* which uses the e-government definition given by the United Nations (e-government is the use of information technology to provide information and public services to the community), the results of such a huge investment are not encouraging. Only 55% of public entities are in line with the government strategy for providing online services to citizens. The focus of budget spending is on acquiring

hardware and software in the first place, and training, diffusion, and promotion take second place. Only 73% of the entities have a Strategic Information Technology Plan (PETI) that guides their decisions in technology. Although 92% of public entities publish data, only 40% share data with other entities through the use of information standards (Corporación_Colombia_digital, 2017). Surveys published by the United Nations, showed the same depressing results. Colombia is falling behind other countries, from place 43 in 2012, to 50 in 2014 and 57 in 2016, and with almost the same index number of 0,6237 (from 0,0 to 1,0), proving the poor performance of e-government implementation in the country (UN, 2014, 2016)

E-government should help organizations and citizens in their decision-making process, and therefore improve efficiency and productivity. It is vital in the socio-economic development of society (Qureshi, 2015) and considering the investment made by the Colombian government and organizations they should explore the needs of organizations and the impact on operational effectiveness and user satisfaction. Trust is considered vital to users' acceptance of e-government systems, and trust define how citizens and organizations perceive the effectiveness of government systems and operations (Bélanger & Carter, 2008; Carter & Bélanger, 2005; Welch, Hinnant, & Moon, 2005).

2.2. Trust

Trust is one of the most commonly investigated concepts in behavioral sciences. Marketing literature cites trust as an important element of relationship and one of the key concepts in B2B and B2C service connections (Rauyruen & Miller, 2007; Samiee & Walters, 2003). In this environment, trust is based on personality traits, the users or

consumers culture and previous experiences and influences the intention to repeat such experiences (M. K. O. Lee & Turban, 2001).

Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA) is the basis for the handling of trust concerns, and was recently validated by Yzer (2017). The theory states that a person´s intention to perform an action or behavior is the trigger for the planned move. It also states that the customer acts rationally according to his beliefs. The key reason for the adoption of new technologies is end-users' beliefs and perceptions (Bermudez-Edo, Hurtado-Torres, & Aragon-Correa, 2010).

According to the TRA model, behavioral intentions can be predicted by analyzing the customers' subjective norms and attitudes. Behavioral intentions are the basis for actual behavior and attitudes (Fishbein & Ajzen, 1975). Thus, it should be possible to predict actual behavior based on customers' norms and attitudes. There are several studies that relate the TRA model with information technology (Ajzen, 1991; Mishra, Akman, & Mishra, 2014; Moore & Benbasat, 1996). Therefore, the attitudes and perception of customers toward information technology such as e-government, predicts the use of technological applications. Trust can be considered as equal to or even more important than perceived usefulness and perceived ease of use in online business (Gefen, Karahanna, & Straub, 2003) and is a key factor in new technologies' acceptance and implementation (Ettlie, Tucci, & Gianiodis, 2017; Mousavi, Pimenidis, & Jahankhani, 2008). Moreover, Benamati et al. (2010) discovered that trust has been a far more important variable than technology acceptance and has a positive impact on the usage of B2C websites. Other authors argued that trust has a positive impact on B2C websites, on C2C business (Lu, Wang, & Hayes, 2012), and on internet banking activities (Suh & Han, 2003).

But the adoption and implementation of new technologies not only depends on the availability of technological solutions, but that such solutions satisfy the need or the particular services required by the end user (Srivastava & Teo, 2005). Trust is a key factor in user satisfaction and user acceptance of technologies, such as the internet or, specifically, e-government applications (Rao, Perry, & Frazer, 2003; Srivastava & Teo, 2005; Tegethoff, Santa, Morante, & Valencia, 2019; Warkentin, Gefen, Pavlou, & Rose, 2002). In contrast to much of the existing literature that models trust as an outcome of user satisfaction, operational efficiency, and system quality (Fang, 2011; Schillewaert, Ahearne, Frambach, & Moenaert, 2005), this research sees attitudes or concerns about trust as predictors of attitudes towards system quality, quality of the service, quality of the information, operational effectiveness, and user satisfaction.

Therefore we state following propositions regarding the influence of trust: Subjects with greater perceptions of Trust with respect to e-government services will report higher evaluations for Quality of the Information (P1). On the same, subjects with greater perceptions of Trust with respect to e-government services will report higher evaluations for Quality of the System (P2) and subjects with greater perceptions of Trust with respect to e-government services will report higher evaluations for Quality of the Service (P3).

Trust is also a key dimension in enhancing user satisfaction and operational effectiveness (Chung & Kalnins, 2001; Costa, 2003; Fang, 2011; Kassim, Jailani, Hairuddin, & Zamzuri, 2012; R. Santa, López, Villa, & Rios Patiño, 2014). Consequently, our next propositions consider that subjects with greater perceptions of Trust will report higher evaluations for operational effectiveness (P4) and subjects with greater perceptions of Trust will report higher evaluations for User Satisfaction (P5).

2.3. E-Government Effectiveness

Investment in technological innovation and advanced technology is one of the strategies to maintain or improve performance within an organization and can be considered one of the key goals of any (Ferrer, Santa, & Almadani, 2013). It is expected that e-government will grant benefits to public entities, organizations, and citizens by reducing information cost, enhancing communication speed, and reducing the distance between all involved parties (Jaeger & Thompson, 2003). Therefore, e-government qualifies perfectly as such a technological improvement allowing the effective management of information between all involved parties, improving efficiency and performance (R. Santa, Morante, & Tegethoff, 2019; Shan, Wang, Wang, Hao, & Hua, 2011).

The first e-government initiative appeared in the 2000s and had a difficult start, facing many problems. The most benevolent reports described the experiences as ´chaotic´, ´unmanageable´ or even just ´impossible´ (Layne & Lee, 2001). One of the main reasons was probably that there were no previous experiences and no previous theoretical knowledge or practical experiences from previous implementations (Jaeger & Thompson, 2003). And the implementation of e-government initiatives is still struggling and far from reaching its potential, even with the existing knowledge of successful e-government services introductions (Bahrke, Kempermann, & Schmitt, 2016; Stier, 2017; Sá, Rocha, & Pérez Cota, 2016). The main difficulty is still the measure of improvement produced by the introduction of e-government services, both for the government and for the organizations or citizens. Even within the academic community there is disagreement on what the best construct is for measuring IS success. On what the academic community does agree is that the effectiveness of IS, such as e-government systems, depends on how

they contribute to the achievement of the organization's goals, benefits, and performance (Wang & Liao, 2008).

Six variables are considered in the DeLone & McLean model to measure the success of an IS implementation process: service quality, system quality, information quality, user satisfaction, user use, organizational impact and individual impact (DeLone & McLean, 1992; DeLone & McLean, 2003). Wang & Liao (2008) presented an enhanced model based on the original DeLone & McLean model. The enhanced model also includes six dimensions, but it replaces the variable organizational impact with perceived net benefit (a variable that is a summary of impact measures). The authors conclude that the initial dimensions are valid measures of e-government, but the perceived net benefit is a closer measure of success than the other variables.

Perceived net benefit can be defined as the sum of adequate management of system use, perceived system quality, and user satisfaction. Such dimensions are based more on psychological and behavioral processes, and management actions can change such perceptions, in both positive and negative ways (Wang & Liao, 2008). It is obvious that to increase the perceived net benefit, owners of e-government systems must take actions to enhance information quality, system quality, and service quality. Having good systems in place, will influence user satisfaction and system acceptance and, finally, the perceived net benefit for users and organizations (Wang & Liao, 2008). It is important to separate real operational benefits from the achievement of technological systems outcomes, and the effectiveness of e-government systems should be measured according to the real operational benefits. Thus, the e-government effectiveness dimensions should be linked to operational performance and viewed in alignment with system and environmental characteristics (Olson et al., 2005).

The first dimension, service quality, reflects the service level given to the user of the system application. Such service considers both service in hardware and software implementation and user tutorials for the use of the application by the organization. Perceived service quality is a key component of user satisfaction (DeLone & McLean, 2003; Pitt, Watson, & Kavan, 1995). To what extent the organization provides installation assistance, product knowledge, training, and online or personal help defines the relationship between user and organization and is a key element in acceptance of the application (Moad, 1989; Pitt et al., 1995). The relationship between the end user and the IT/IS department clearly has an impact on the effectiveness of the application, and thus on the operational effectiveness of the organization. Accordingly, our proposition 6 and 7 states that subjects with greater perceptions of Quality of the Service will report higher evaluations on Operational effectiveness (P6) and subjects with greater perceptions of Quality of the Service will report higher evaluations on User Satisfaction (P7).

System quality measures the technical efficacy of the system. It compares the design of what the application should do according to the specifications and what the system really does. The main basis for evaluating system quality is the performance and productivity of the system. Additionally, the existence of ´bugs´, quality of the documentation, interface consistency, support and maintenance of the source code, and user-friendliness are all considered part of system quality (DeLone & McLean, 2003; Seddon, 1997; Von Hellens & Nielsen, 2004).

Therefore, our propositions 8 and 9 declares that Quality of the system will report higher evaluations on Operational effectiveness (P8) and subjects with greater perceptions of Quality of the System will report higher evaluations on User Satisfaction (P9).

The initial definition of information quality refers to how accurate and timely the information given back by the system is and if such information satisfies users' requirements (DeLone & McLean, 2003; Von Hellens & Nielsen, 2004). Other authors (Y. Lee, Strong, Kahn, & Wang, 2002) provide an enhanced definition, classifying information quality into four categories: contextual, intrinsic, representational, and accessibility. Contextual quality refers to information given back that adds value when it is timely, appropriate, and complete. Intrinsic quality refers to the quality characteristics of the information. Representational quality and accessibility quality consider the importance of the information and the means of getting back the stored information, ensuring that the information is interpretable, understandable, manipulable, but still secure. Subsequently, proposition 10 and 11 states that subjects with greater perceptions of Quality of the Information will report higher evaluations on Operational effectiveness (P10) and greater perceptions of Quality of the Information will report higher evaluations on User satisfaction (P11).

2.4. Operational Effectiveness

Actual environmental changes and increased competition makes it more difficult for organizations to survive in the market and be successful, generating benefit for different groups of interest. The answer of the firms to such challenges has been to improve production and services processes, making them more flexible. Such changes comprise cost reduction and being more efficient (Grundy, 2006; Teece, Pisano, & Shuen, 1997). Literature defines two different generic strategies as drivers for competitive advantage: Differentiation and Cost leadership (Dess & Davis, 1984; Porter, 2004). According to the definition, operational effectiveness clearly classifies as a part of cost leadership strategy, and therefore, is a primary driver of the firm's performance. Performance undoubtedly

contributes to competitiveness and therefore the organization needs to focus on quality, cost, reliability, flexibility, and how fast operations and processes are carried out (Ben-Rajeb, Morel-Guimaraes, Boly, & Assielou, 2008). According to Porter (1996, 2013), operational effectiveness includes efficiency, but it is not limited to it, as it encompasses performing similar activities better and in a different way than competitors and any practice that allows the organization to process inputs in a better way can be considered as improving operational effectiveness.

Strategy and operational effectiveness are not the same, but successful organizations require both to improve performance to maintain a difference between their competitors and themselves (Tuturea & Rotaru, 2012). Therefore, the key to organizational success should include operational effectiveness, which allows the firm to act faster and better than the competition (Namnai, Ussahawanitchakit, & Janjarasjit, 2015). The definition of operational effectiveness is based on the core capability of the organization to define processes and methods that allow the firm to offer value-adding products or services of a superior quality at a fairer price than the competition and exceed the customers' expectations (Porter, 1996).

Operational effectiveness implies the measurement, control, and improvement of processes and procedures. Reducing costs, eliminating waste, and use of the appropriate technology within core processes results in better use of resources (Porter, 1996). But measurement requires valid metrics and standards, and difficulties arise when trying to measure performance. Such complications are more frequently in service environment than in manufacturing industries (Gomes, Yasin, & Lisboa, 2007; Gomes, Yasin, & Lisboa, 2008) and the situation becomes even more complicated when trying to measure

not only quantitative benefits, but also qualitative ones (Brigham & Ehrhardt, 2017; Ehrhardt & Brigham, 2015).

The first step to solve the problem is to define the primary and supporting activities of the organization, both for internal and external clients. The result of such an analysis is that the firm can define how to add value at every point of the process according to their need and operational performance objective (Rosenbusch, Brinckmann, & Bausch, 2011). According to Hill (Hill, 2005), five performance dimensions have an impact on operational effectiveness. Those are cost, speed, reliability, quality, and flexibility.

Cost performance comprises reducing inefficiencies within all organizational processes, i.e. production, design, and procurement (Russell & Taylor, 2008). Bisbe & Otley (2004) narrow the definition to the relationship between cost and meeting goals at the lowest price.

Speed is considered the time required to answer any environmental change and market requirements. It includes, but is not limited to, how fast the organization can deliver new products or services into the market. Due to constant market changes, speed is considered one of the core capabilities that any organization requires to survive (Tidd & Bessant, 2009). If speed is used as a core competitive advantage, fast moves, fast adaption, and tight linkages within the firm are essential (Russell & Taylor, 2008)

Reliability means that any product or service offered by the organization performs as expected, is delivered on time, and does not fail (Corbett, 1992; Porter, 1996). Between reliability and customer satisfaction there exists a tight connection and it is essential for operational effectiveness. It is defined as the likelihood that the system will work as designed and not fail before the planned and projected lifetime under certain environmental conditions (Kuo & Zuo, 2003)

Giving the customer products and services they need is only one part of quality. This dimension also encompasses producing with no defects (Russell & Taylor, 2008). Producing without defect also has an impact on cost performance. Even with different operational processes, all kinds of firms have common service quality characteristics, such as service methods, response time, post-sale service, delay time, guarantee time, delivery time, service consistency, repair quality, responsible attitude, and service facilities and locations, etc. (Yang, 2011)

The last of the five dimensions, flexibility, is considered vital for any kind of organization, whether manufacturing or service focused, public or private, profit or non-profit orientated, and is highly relevant in the present environment of ferociously competitive and constantly changing markets (Slack, Stuart, Johnston, & Betts, 2006). Thus, operational flexibility is considered to be a core capability of any organization as it allows the management to provide a quick answer to any environmental changes through the set-up of different processes or routines that fit into market conditions (Verdu-Jover, Llorens-Montes, & Garcia-Morales, 2004; Zajac, Kraatz, & Bresser, 2000). Flexibility includes also the ability to respond to any seasonal demand, meet shorter lead times, and cope with customer specification changes (Hill, 2005). The present technological advancement and the speed of technological evolution transform flexibility into one of the most important core capabilities any organization can have, and should be one of the most competitive priorities.

Operational effectiveness has also an impact on the user´ satisfaction. A job well done or systems working well and efficiently enhances the user´s liking and approval. Therefor our last proposition declares that subjects with a higher perception of Operational effectiveness will report higher appraisals of User satisfaction (P12).

Figure 1 presents the hypothesized model for this study.

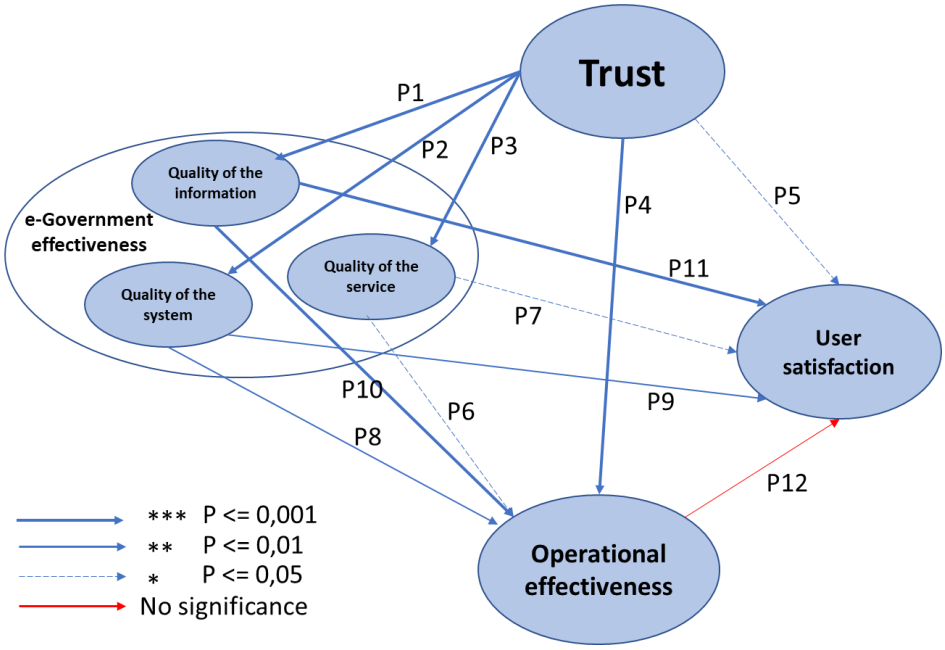

Figure 1 – Research Model with Hypotheses

3. Research method

The purpose of this research is confirmatory – correlational. Although, there is no evidence of research on the role of Trust in the alignment between e-government effectiveness and operational effectiveness in Colombia, similar studies already exist in other countries (Bélanger & Carter, 2008; Carter & Bélanger, 2005; Warkentin et al., 2002). Confirmatory research is undertaken to explain and quantify relationships between variables and determine the causes of different phenomena (Kaplan & Sage Publications, 2004; Yin, 2013).

To test the hypotheses, the survey instrument, measurement constructs, and best fit model were developed according to guidelines established by Hair et al (2010). A self-

administered questionnaire was designed to collect responses from users of e-government applications in local businesses and government organizations in Colombia. The survey format consisted of a demographic section (industrial sector, size of the company, e-government area and work area) followed by a conceptualized set of variables to build a model that was tested using both descriptive and inferential statistical analysis once the data was collected. A five-point Likert-type scale (Strongly Agree - Strongly Disagree) was used to rate statements related to the operationalization of the model's variables. Considering the advantages of online surveys (Evans, 2005) an electronic survey was developed and a link to the survey´s website was shared with the potential respondents through emails. 487 questionnaires were collected through the electronic survey instrument. Each questionnaire was reviewed for completeness and 47 were considered unusable owing to inconsistencies and significant missing data, therefore, only 440 valid surveys were usable. The average mean values of the statements' ratings were used to build the variables that made up the structural equation model.

The following Figure 2 shows the sample demographics for this study by respondent sector, and company size. For this research, the sample is important, as 40% of the respondents were government organizations, particularly linked to the ministry of national defense, where the study was developed in partnership with a local university. Organizations linked to the aerospace industry represent 34.5% of the responses, and the rest of the responses were collected from organizations linked to the government such as providers of services to the military industry. Another important factor about the sample is that 81% were large organizations, which according to Adeshara et al (2004) are more prompt to use innovative technologies such e-government services and rate them as efficient and essential, than small to medium enterprises (SME).

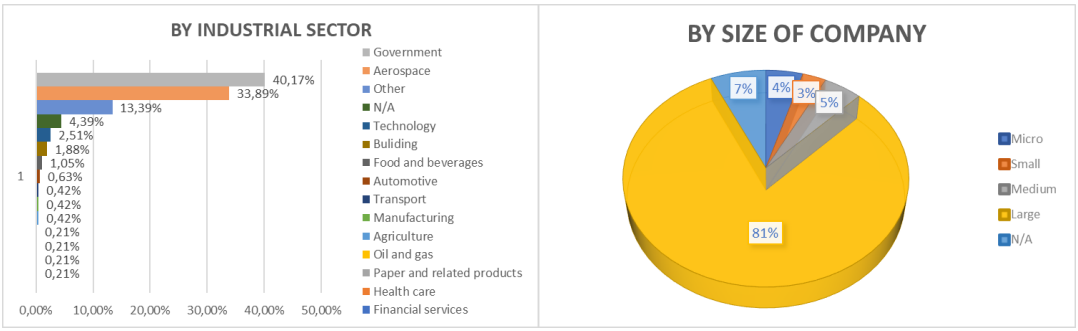

Figure 2 – Sample Demographics

Both SPSS V21 (SSPS Inc and IBM Company, Chicago, Ill, USA) and Analysis of Moment Structures (AMOS version 21.0.0, AMOS Development Corporation, Spring House, Penn., USA) were used to undertake multivariate analysis research on the gathered data. Software applications were used to confirm the conceptualized model shown in Figure 1, by estimating the model variables' predictive relationship and model fit indices, and to determine the confidence level. Confirmatory factor analysis (CFA) was used to study the relationships between observed and continuous latent variables, and to determine the measurement model's overall fit (Cooksey, 2007; Hair et al., 2010). Factor loadings were estimated, items loaded on only one construct (i.e., no cross loading) and latent constructs were correlated (equivalent to oblique rotation in exploratory factor analysis). Internal consistency was assessed using Cronbach's alpha coefficient and the items-to-total correlation. Table I summarizes the constructs' coefficient values. All constructs have values greater than 0.7 of the cut-off level set for basic research (Nunally and Bernstein, 1978). Additionally, confirmatory factor analysis (CFA) was conducted to test construct validity.

Variable	**Number of Items**	**Alpha (α)**
Trust (T)	5	0.959
User Satisfaction (US)	9	0.961
Quality of the system **(**QSys**)**	6	0.914
Quality of the service (QSer)	7	0.808
Quality of the information (QInf)	9	0.949
Operational effectiveness **(**OE**)**	11	0.963

Table 1- Cronbach's alpha

To support the model goodness-of-fit indices (GFI) were utilized: the model shows 595 distinct sample moments, with 97 distinct parameters to be estimated. The Chi-square equals 2204,860 with 508 degrees of freedom, with a CMIN/DF of 4,34 and a 0.000 probability level. Note that Wheaton et al. (1977) suggested a ratio of approximately five or less as a reasonable criterion, Marsh and Hocevar (1985) recommended using ratios as low as two or as high as five, and Carmines and McIver (1981) suggested ratios in the range of 2:1 or 3:1 as indicatives of an acceptable fit between the hypothetical model and the sample data. The CFI value above 0.9 supports the model, with a result of 0.900 (Bentler, 1990). In addition, the reliability of each of the constructs in the model was evaluated using several fit statistics, the root mean square error of approximation (RMSEA) was acceptable as the model had a value of 0.08 and the maximum is considered to be 0.08 (Bentler, 1990; Jöreskog and Sörbom, 1982).

The baseline comparisons fit indices suggest that the hypothesized model fits the observed variance-covariance matrix well relative to the null or independence model (see Table 2).

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	,875	,862	,901	,890	,900
Saturated model	1,000		1,000		1,000
Independence model	,000	,000	,000	,000	,000

Table 2- Baseline comparison

4. Results

The findings from SEM (Table 3 and Figure 3) suggest that there is a strong and positive impact of Trust on Quality of the Information, Quality of the System and Quality of the Service (b=0.81, p<0.001; b=0.71, p<0.001, b=0.60, p<0.001, respectively). Therefore, P1, P2 and P3 were not rejected. There also exists a moderate relationship between Trust and Operational effectiveness (b=0.46, p<0.001), not rejecting P4. Additionally, there is a strong relationship between Quality if the Information and User Satisfaction (b=0.70, p<0.001) and a moderate relationship between Quality of the Information and Operational Effectiveness, (b=0.33, p<0.001). Accordingly, P10 and P11 cannot be rejected. These findings show that the quality of the data or quality of information given back by the system when presented in the right format, at the right time, and with easy access within their contextual and intrinsic context will satisfy the user requirements and enhance performance (DeLone & McLean, 2003; Y. Lee et al., 2002; Von Hellens & Nielsen, 2004). These hypotheses also endorse the importance of Trust as a key element in the effectiveness of e-government systems and also show that it is one of the key concepts in electronic commerce services connections as pointed out by Rauyruen & Miller (2007) and Samiee & Walters (2003).

			Estimate	S.E.	C.R.	P
QInf	<---	Trust	,810	,038	21,487	***
QSys	<---	Trust	,711	,041	17,128	***
QSer	<---	Trust	,601	,047	12,722	***
OE	<---	Trust	,459	,096	4,798	***
US	<---	Trust	,152	,077	1,982	,048
OE	<---	QSer	-,216	,100	-2,173	,030
US	<---	QSer	,178	,078	2,293	,022
OE	<---	QSys	,121	,044	2,737	,006
US	<---	QSys	,093	,034	2,718	,007
OE	<---	QInf	,333	,064	5,191	***
US	<---	QInf	,697	,056	12,450	***
US	<---	OE	,057	,043	1,329	,184

Table 3 - Regression Weights: (Group number 1 - Default model)

The results of this study show that the relationship between Quality of the System and Operational effectiveness ($b=0.12$, $p<0.01$), and Quality of the service and Operational Effectiveness ($b=-0.216$, $p<0.05$) are not significant, therefore, there is no support for hypotheses P6 and P8. This finding is important, as quality of the system and quality of information are two substantial factors in achieving system effectiveness according to the DeLone & McLean (2003) model. This demonstrates that there is a lack in the quality of the system and the quality of the services of e-government in the country, and indicates that the Colombian government needs to take measures to improve the service. Additionally, the study shows no predictive relationship between Trust and User Satisfaction ($b=0.15$, $p<0.05$), or between Quality of the Service and User Satisfaction ($b=0.18$, $p<0.05$), rejecting P5 and P7. Likewise, there is no predictive relationship

between Quality of System and User Satisfaction (b=0.09, p<0.05) and therefore P9 is rejected. Similarly, no relationship was found between Operational Effectiveness and User Satisfaction (b=0.06, p< n.s.) rejecting in this manner P12.

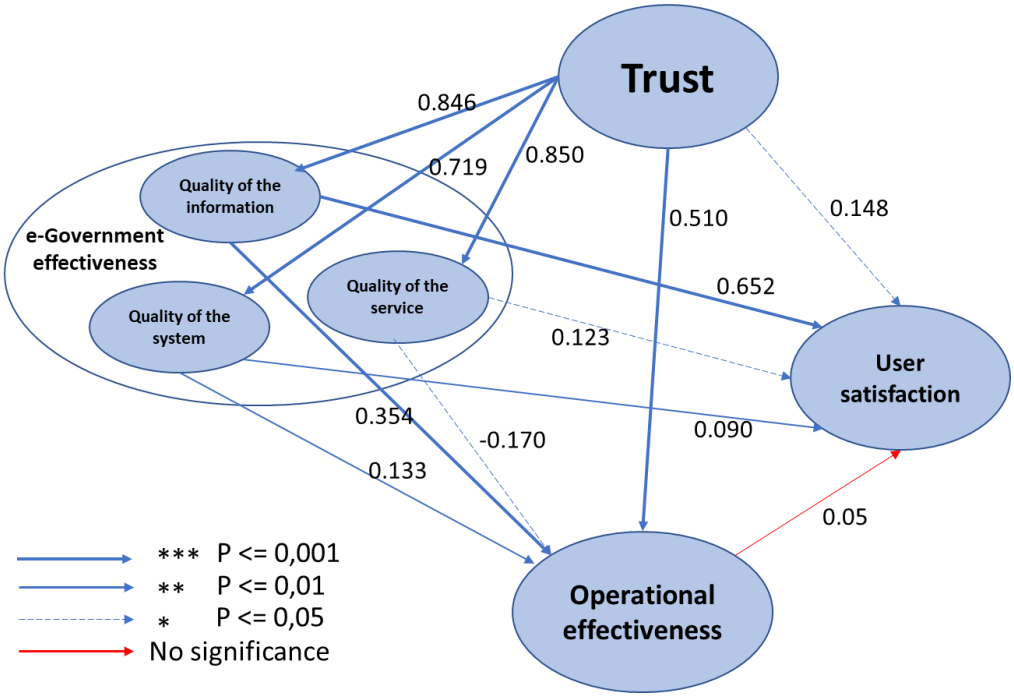

Figure 3 - Structural model results

5. Conclusion

The research question "Is the degree of the users' trust a predictor of attitudes toward system quality, service quality, information quality, operational effectiveness and user satisfaction?" has been answered by this study. The proposed model provides a picture of the dynamics surrounding quality measures of e-government systems, when tested simultaneously with perceptions of trust, user satisfaction, and the dimensions of operational effectiveness. This research found that trust has a very strong, positive, and

significant relationship on quality of the system, quality of the information, and quality of the service. To a lesser degree, but still with a significant and positive impact, quality of the information has an impact on operational effectiveness and user satisfaction (operational effectiveness). This demonstrates the high importance of trust and the quality of information when implementing technological innovation such as e-government systems.

This study supports Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA) which is the basis for the handling of trust concerns. The fact that trust was an indicator of operational effectiveness and systems effectiveness (quality of the system, the information, and the service), shows that users of e-government systems in Colombia act rationally according to their beliefs, which is also a key reason for the adoption of new technologies (Bermudez-Edo et al., 2010). Additionally, trust has a positive impact on the implementation and usage of e-government applications, a fact that supports the views of Benamati et al. (2010); Lu, Wang, & Hayes (2012); Gefen et al. (2003) and Ettlie et al. (2017).

This research also found that two of three dimensions stemming from e-government effectiveness (quality of the system and quality of the service), have no impact on operational effectiveness. The first indicates that the performance and productivity of the systems are not perceived by the users of these technologies as appropriate or adequate, as required by DeLone & McLean (2003) and Von Hellens & Nielsen (2004) for a system to be effective. Therefore, the specialists in the Colombian government need to focus more on the quality of the e-government system, in particular on the correction of problems or 'bugs' in the system, quality of documentation, user-friendliness, user interface consistency, and support and maintainability of the source code as a factor of

system quality according to the view of Seddon (1997). The second factor with no impact on operational effectiveness is service quality which is perceived as inadequate by the e-government system users. Service quality comprises not only the service level received by the users, but also the system support by the IT/IS department and has an impact on user satisfaction (DeLone & McLean, 2003; Pitt et al., 1995). The ability of the IT/IS department to solve user problems, to provide assistance, training, and product knowledge will enhance the relationship with users and enhance the success probabilities of the e-government application (Moad, 1989; Pitt et al., 1995). Clearly the relationship between the IT/IS department and the end users has an impact on the effectiveness of the system. Consequently, the investment focus of the government should not only be on the quality of the system (hardware) but also on the IT specialists attending the end-user and on training capacities and facilities.

The third variable stemming from e-government effectiveness—quality of the information—is key in achieving operational effectiveness. The results of this study show that government authorities are paying attention to promoting the quality of the information of e-government systems and are seeking ways to guarantee operational effectiveness through the achievement of better operational cost, quality, reliability, flexibility, and speed, which are part of the overall e-government implementation strategy. Furthermore, information quality can also be defined as the quality of the data and refers to the information given back by the e-government applications. Users consider the content, accuracy, format, and time when information is given by e-government systems and whether the data satisfies user requirements (DeLone & McLean, 2003; Von Hellens & Nielsen, 2004). Therefore Colombian specialists should focus on factors such as whether the data is available and of easy access when required, if it is correct and

representational, and finally, that it adds value to the operations and processes of the user (Y. Lee et al., 2002).

Neither trust, operational effectiveness dimensions, Quality of the Servie nor Quality of the System variables have a positive impact on user satisfaction. Moreover, the findings suggest that there exists a general dissatisfaction with e-government systems.

The results of this research show in strong direct impact of Trust on Operatinal effectiveness and, additionally, there is no direct impact of Operational Effectiveness on User Satisfaction in colombian environment, contrasting in such way other (Ricardo Santa, MacDonald, & Ferrer, 2019) . The research also confirms the hypothesis that the most important factor affecting User Satisfaction is the Quality of the Information, the dimension that also impacts Operational Effectiveness(Ricardo Santa et al., 2019).

The difference may be based on the dimension of Power Distance (Hofstede, 2011), but still requieres further research, as this findings may have important consequences for practice and theory

Based on the findings, and in our opinion, in Colombia, managers need to be aware that the five performance objectives included in operational effectiveness—cost, quality, reliability, flexibility, and speed—are necessary in the quest for e-government systems to be successful and effective and to improve user satisfaction. In the quest for operational effectiveness and user satisfaction through the implementation of e-government systems, it is essential that government organizations encourage the delivery of value-adding flexible and reliable services of exceptional quality, on time, and at reasonable cost, to guarantee successful implementation of e-government systems. Additionally, government officials and managers should pay more attention to other dimensions such as the quality of the service offered by the information systems department, which also

affects the quality of the e-government systems and the perception of the system users. The main reason for this claim is that between quality of the service, quality of information, and quality of the system, quality of the service has the most predictive impact on trust according to the DeLone and McLean (2003) model.

6. Further research.

It is very interesting to realize that the quality of the system and quality of the service are perceived to be inadequate in Colombia. The literature states that both variables, together with quality of the information, are key factors for the successful implementation of e-government systems (DeLone & McLean, 2003 and Von Hellens & Nielsen, 2004). Further research should focus on why the quality of the service and quality of the system are perceived as insufficient in the e-government environment in Colombia. Similarly, it seems that operational effectiveness has no impact on user satisfaction. Following studies should focus on the dimensions of operational effectiveness and which are the variables affecting user satisfaction.

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