TECNOLOGÍA

Literature review on the application of the Unified Theory of Acceptance and Use of Technologies in e-Government

Marcelo Machado de Freitas, Fabricia Silva da Rosa
Universidade Federal de Santa Catarina (UFSC), Brasil

Governments are spending a considerable amount of resources to digitalize their many services. The purpose of this research was to conduct a systematic review of e-Government acceptance papers that used the Unified Theory of Acceptance and Use of Technologies (UTAUT) as the theoretical background. From the 1529 articles using UTAUT (from 2003 to 2019), we selected the 41 most cited papers that were related to e-Government acceptance. All 41 articles were fully read to understand research gaps. We found that only a few studies have been faithful to the original UTAUT model. Although improving the theory with new variables is important, the validation of the original model also is. Constructs such as trust, quality of information, quality of service, and quality of the system, despite not being original from UTAUT seminal paper, were often integrated into the model to predict individuals' behavioral acceptance. Our findings are important to understand that as different technologies have different users and different purposes, different constructs might help to explain the individual behavior about using or not those technologies. By highlighting the research gaps, our paper guides future work on the use of UTAUT as a theoretical lens for the acceptance of e-Government.

Keywords: UTAUT, electronic governments (e-Government), technology acceptance, social control

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Revisión de literatura sobre la aplicación de la Teoría Unificada de Aceptación y Uso de Tecnologías en gobiernos electrónicos

Los gobiernos están gastando una cantidad considerable de recursos para digitalizar sus numerosos servicios. El propósito de esta investigación fue realizar una revisión sistemática de los artículos de aceptación del gobierno electrónico que utilizaron la Teoría Unificada de Aceptación y Uso de Tecnologías (UTAUT) como base teórica. De los 1529 artículos que utilizaron UTAUT, se seleccionaron los 41 artículos más citados relacionados con la aceptación del gobierno electrónico. Los 41 artículos fueron leídos en su totalidad para comprender las lagunas de la investigación. Se descubrió que solo unos pocos estudios han sido fieles al modelo UTAUT original. Aunque mejorar la teoría con nuevas variables es importante, la validación del modelo original también lo es. Construcciones como la confianza, la calidad de la información, la calidad del servicio y la calidad del sistema, a pesar de no ser originales del artículo seminal de UTAUT, a menudo se integraron en el modelo para predecir la aceptación del comportamiento de los individuos. Los hallazgos de esta investigación son importantes para comprender que, dado que las diferentes tecnologías tienen diferentes usuarios y propósitos, diferentes construcciones pueden ayudar a explicar el comportamiento individual sobre el uso o no de dichas tecnologías. Al resaltar las lagunas en la investigación, este atriculo orienta el trabajo futuro sobre el uso de UTAUT como lente teórico para la aceptación del gobierno electrónico.

Palabras clave: UTAUT, gobiernos electrónicos, aceptación de tecnología, control público

Revisão de literatura sobre a aplicação da Teoria Unificada de Aceitação e Uso de Tecnologias em governos eletrônicos

Os governos estão gastando uma quantidade considerável de recursos para digitalizar seus muitos serviços. O objetivo desta pesquisa foi realizar uma revisão sistemática de artigos de aceitação do governo eletrônico que usaram a Teoria Unificada de Aceitação e Uso de Tecnologias (UTAUT) como base teórica. Dos 1529 artigos que utilizaram o UTAUT, selecionamos os 41 artigos mais citados que estavam relacionados à aceitação do governo eletrônico. Todos os 41 artigos foram lidos na íntegra para compreender as lacunas da pesquisa. Descobrimos que apenas alguns estudos foram fiéis ao modelo UTAUT original. Embora melhorar a teoria com novas variáveis seja importante, a validação do modelo original também é. Construtos como confiança, qualidade da informação, qualidade do serviço e qualidade do sistema, apesar de não serem originais do artigo seminal da UTAUT, foram frequentemente integrados ao modelo para prever a aceitação comportamental dos indivíduos. Nossas descobertas são importantes para entender que, como diferentes tecnologias têm diferentes usuários e diferentes propósitos, diferentes construtos podem ajudar a explicar o comportamento individual sobre o uso ou não dessas tecnologias. Ao destacar as lacunas da pesquisa, nosso artigo orienta trabalhos futuros sobre o uso de UTAUT como uma lente teórica para a aceitação do governo eletrônico.

Palavras-chave: UTAUT, governos eletrônicos, aceitação de tecnologias, controle público

1. Introduction

New Information and Communication Technologies (ICT) change the way information is generated, used, and accessed. Examples such as Artificial Intelligence (Casares, 2018), the Internet of Things (Lu et al., 2018), XBRL (Chen, 2012), or Blockachain (Dai & Vasarhelyi, 2017) can directly impact the way organizational information is used both in the private and in the governmental sector (Kozlowski et al., 2018). In the last few decades, ICTs have also affected government management worldwide (Dečman, 2015), and the use and implementation of these technologies by the government have been called e-Government (Gupta et al., 2016; Turnip et al., 2018; Witarsyah et al., 2017). These innovations allowed citizens to get closer to the government which was now able to offer their various services via the Internet, such as tax collection (Andriani et al., 2017; Chaouali et al., 2016; Fakhoury & Aubert, 2015), provision of transit services (Weerakkody et al., 2013), interactive availability of financial and accounting information (Zuiderwijk et al., 2015), popular participation services in the budget process (Naranjo-Zolotov et al., 2018), among others. Not only have ICTs made government processes more transparent, efficient and effective (Saxena & Janssen, 2017), but they have also served as a strategic, political and organizational element (Dečman, 2015).

Some of these technologies are new to the general public and because of that the acceptance of these tools are not completely understood. An important theoretical model about the subject is the Unified Theory of Acceptance and Use of Technology (UTAUT), proposed by Venkatesh et al. (2003). This theory unified several models that proposed, directly or indirectly, to understand human behavior in the face of the acceptance of technologies. UTAUT is the newest and most widespread theory in the IT literature to access technology acceptance (Dwivedi et al., 2017) and has been widely used in the public area, mainly in research that addresses issues related to the acceptance of e-Government (Williams et al., 2015). Understand how society reacts to these new ICTs it`s very important because they can change the process of how we perceive and use available data (Arnold, 2018). As e-Government services usage expands in modern society and governments are heavily investing in these new technologies (Kachwamba & Makombe, 2011), it is important to understand the current state of the art about the acceptance of e-Government studies.

Although there are other studies that reviewed UTAUT (Williams et al., 2015) or the acceptance of specific technologies, such as cloud services (Amron et al., 2017), online learning (Panigrahi et al., 2018), mobile banking (Hanafizadeh & Keating, 2014), none of them was concerned exclusively with reviewing how UTAUT has been applied to explain the acceptance of e-Government. The closest studies found in this regard are those

by Gupta et al. (2016), who carried out a systematic review of different models that were used to study the adoption of e-Government by citizens, the work of Arduini and Zanfei (2014), who performed a meta-analysis of the literature on Electronic Public Services and the work of Turnip et al. (2018), who conducted a review of the use of ICT in bureaucratic governments. However, none of the three articles deeply reviewed how UTAUT has been used to explain the adoption of e-Government services. The present research proposes to fill this gap, carrying out a systematic review on the acceptance of e-Government under the lens of UTAUT.

The study becomes particularly important in a scenario where the next wave of automated technologies tends to have an even greater impact on auditors, information users, managers, management accountants and the entire flow of organizational information (Arnold, 2018). In addition, studies that align technologies and the public area are scarce (Issa, 2018). The first step in enhancing this research field is to understand the state of the art of studies that analyzed the behavior acceptance of technologies related to e-Government under the lens of an important theory of acceptance, which is UTAUT.

2. Literature review

2.1. The Unified Theory of Acceptance and Use of Technology (UTAUT)

Several predictors have been studied to understand the behavior of individuals. A theory used to understand this phenomenon is the Theory of Planned Behavior (TPB), presented by Ajzen (1991), whose purpose is to identify the antecedents of an individual's intention for certain behavior, such as the intention to use the internet (Dijk et al., 2008). However, Davis was one of the first authors to research specifically the intention of using and accepting technologies (Davis, 1989). The Technology Acceptance Model (TAM) became the focus of several studies in the area of Information Technologies (Venkatesh et al., 2003). More than a decade later, UTAUT was presented by Venkatesh et al. (2003) as an advance in studies in the area, as it unified a series of competing models and theories that dealt with related themes. Over time, UTAUT has gained popularity and is being currently widely used in many different fields (Turnip et al., 2018).

The original theoretical model of UTAUT presented three predictors of the behavioral intention (expectation of performance, expectation of effort and social influences) and two antecedents of the behavior, which are the behavioral intention and the facilitating conditions. The model also theorized the moderation of relationships by different personal characteristics. According to Venkatesh et al. (2003), performance expectancy is the degree to which an individual believes that using the system will

help him to obtain gains in job performance. Effort expectancy is the degree of ease associated with using the system. Social influence is the degree to which an individual realizes that important peers believe that they should use the new system. Facilitating conditions refer to the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system. Behavioral intention is the willingness of individuals to use the system and [usually] is measured by means of a 3-item scale adapted from the Davis (1989) TAM model. Finally, as suggested by Davis (1989), the construct of use behavior is often operationalized by a self-report by the participants about their current level of use of the system.

As explained by Dwivedi et. al (2017), although the original UTAUT model had a considerable explained power for the behavioral intention and the use behavior, the model theorized some relationships that may not apply to all contexts, omitted some relationships that can be potentially important and excluded some constructs that may be crucial to explain IS / IT acceptance and use. Dwivedi et. al (2017) argued that the moderators specified in the original model of UTAUT may not be applicable in all contexts, the path of conditions that facilitate behavioral intent absent in the original model should be included and individual characteristics such as attitude, not theorized in the original model of UTAUT, should be introduced.

Another important issue highlighted by Venkatesh et al. (2003) is that different technologies might have different acceptance predictors. As e-Government services consist of using available technologies to enhance governmental services, understanding the acceptance predictors of these systems should be a major concern for governmental agencies.

2.2. E-Government

E-government can be defined as the use of ICTs to improve the efficiency, effectiveness, transparency and accountability (Bannister & Connolly, 2015) of informational and transactional exchanges between governments, citizens, companies and agencies at the federal, state and municipal levels, and empower citizens through access and use of information (AlAwadhi & Morris (2009). One of the main objectives of any e-Government initiative is the potential to reduce corruption (Fakhoury & Aubert, 2015).

According to a United Nations survey, even though most countries have government websites, a portion of them still do not provide transactional services, such as online forms submission (Taheri & Mirghiasi, 2016; United Nations, 2010). In addition, it is common that e-Government implementation projects are unsuccessful and fail at some point during their execution (Taheri & Mirghiasi, 2016).

A literature review by Alryalat et al. (2012) revealed that the Technology Acceptance Model (TAM), the Theory of the Diffusion of Innovation (DOI), the Theory of Planned Behavior (TPB) and UTAUT were some most used models to analyze the acceptance of e-Government. Their results help to understand the importance of analyzing specifically how UTAUT has been used in this scenario.

ICTs can be used to facilitate communication in several directions: a) Government for Citizens (G2C), b) Citizens for Government (C2G), c) Government for Business (G2B), d) Business to Government (B2G), e) Government to Government (G2G), f) Government to Non-Profit Organizations (G2N), g) Non-Profit Organizations to Government (N2G), h) Government to Employee (G2E) (see Amagoh, 2016; Fang, 2002; and Witarsyah et al., 2017). An important question to be asked is how the literature has explored the acceptance of e-Government in the different existing relationships.

Although some American Latin countries are well placed in the Electronic Government Development Index (EDGI), which considers three dimensions (online service index, infrastructure index and human capital index), the acceptance of services offered by these technologies need to be better exploited. Uruguay is in the 34th, Chile is in the 42th, Argentina is in the 43th, and Brazil is in the 44th, which places these countries within the group with high development in this area (United Nations, 2018). Research opportunities emerge in the area since most of these innovations and government resolutions about the subject are recent and still lacking research that seeks to understand the acceptance of these technologies.

3. Research design

A systemic review was carried out to see how UTAUT has been applied to understand the acceptance of e-Government. The bibliographic survey was carried out in the Web of Science, Scopus, Science Direct and Emerald databases. No filter was used for the time-lapse or the different fields. Only “UTAUT” or “Unified Theory of Acceptance and use of Technology” were used as keywords, which should be included in the title, abstract or keywords of the articles. In addition, only academic articles and articles in press were selected.

Articles information was then exported in Bibtex files and later imported into the Mendeley software, where the repeated articles were excluded. In total, 2104 articles were found. 1529 articles remained after excluding duplicates articles. All titles were manually read to find articles using UTAUT that were related to e-Government technologies. When any doubt emerged, the abstract was read. In the first round, 402 studies remained. In the second round, which included fully reading the abstracts of these

papers, the number of 94 surveys was reached. After that, the 70 most cited studies were analyzed through a dynamic reading. The final Bibliographic Portfolio (BP), which includes only papers that used UTAUT (or minimal adaptations from UTAUT) and were available for reading, was composed of 41 articles. All these 41 articles were included in the literature review analysis. Table 1 presents information about the databases, metrics, and the number of articles.

Table 1. Articles in databases

Database	Articles	Notes
Scopus	We found 678 articles (article and article in press, reviews, notes)	No subject area limitation, only in title, abstract and keywords
Web of Science	We found 467 articles (article, review, editorial material)	Search made in Topic (Title, summary, keywords and key words plus)
Science Direct	We found 840 articles (Review articles, research articles, data articles, discussion, editorials)	Title, abstract, keywords
Emerald	We found 95 articles (Research paper)	Title, abstract, keywords

Some descriptive characteristics of our bibliometric portfolio are presented (year of publication, citation count, journals and methodological approach). Research methodologies were categorized according to the classification by Birnberg et al. (1990), which divides them into analytical, archive/documentary, field, study case, experimental, framework, survey and literature review.

Finally, articles were fully read to highlight useful information for the systematic review, such as, the main variables and relationships analyzed by the literature. The data were tabulated in Microsoft Office Excel spreadsheets. Based on the methodological design, the bibliometric (general characteristics) and systemic (analysis of the variables and relationships used in the literature, based on the original UTAUT model, by Venkatesh et al., (2003)) are presented next.

4. Results and discussion

4.1. Characteristics of the Bibliographic Portfolio (BP)

Publications on e-Government using UTAUT have increased since 2013. The largest number of articles on the subject was published in the years 2015 to 2017, with 9 publications in the year 2016. These results point to a greater awareness of the importance of the theme in recent years. However, the original UTAUT paper was only published in 2003, which may explain the low number of publications on the subject in the past decade.

Considering that the number of citations reflects the scientific relevance of an article, the Google Scholar tool was used to collect the number of citations. Google Scholar was used as a reference because it is the only one that allows the comparison of the different articles of the Bibliographic Portfolio (BP), since they are indexed in different databases. It is important to note that the Google Scholar citation counting methodology includes documents published on the internet from different sources. The papers with more than 100 citations from the BP can be seen in table 2.

Table 2. The seven papers with over 100 citations

Citations	Journal	Title	Authors	Year
503	Journal of Strategic Information Systems	Adoption of ICT in a government organization in a developing country: An empirical study	Gupta et al.	2008
350	Information Systems Journal	Extending the two-stage information systems continuance model: incorporating UTAUT predictors and the role of context	Venkatesh et al.	2011
255	Journal of the Association for Information Systems	Modeling Citizen Satisfaction with Mandatory Adoption of an E-Government Technology	Chan et al.	2010
232	Government Information Quarterly	Explaining the acceptance and use of government Internet services: A multivariate analysis of 2006 survey data in the Netherlands	Dijk et al.	2008
193	Journal of Software	Factors influencing the adoption of e-Government services	AlAwadhi & Morris	2009
125	International Journal of Information Management	Examining the influence of intermediaries in facilitating e-Government adoption: An empirical investigation	Weerakkody et al.	2013
100	Government Information Quarterly	Acceptance and use predictors of open data technologies: Drawing upon the unified theory of acceptance and use of technology	Zuiderwijk et al.	2015

This Gupta et al. (2008)'s study was conducted in India and was one of the pioneers in seeking to understand the acceptance of technologies (internet) related to e-Government. Comes to our attention that the questionnaires were applied to public employees, and not to citizens, which makes this article one of the few exceptions since most studies analyzed the subject from the point of view of the citizen. Another

important contribution of this paper is that they used the original UTAUT model, something equally rare in the papers analyzed in our literature review.

The second and third most cited papers are authored by Venkatesh, one of the authors of the seminal UTAUT paper (Venkatesh et al., 2003). Despite the work of Venkatesh et al. (2011) having used UTAUT as a lens to understand the citizen's acceptance of Electronic Government technologies, the theory was incorporated into the Two-stage Information Systems Continuance Model to understand the intention of citizens to continue using a particular technology. Among the innumerable novelties that the research brings, the use of the trust construct stands out as an important predictor of human behavior.

The *Government Information Quarterly* Journal stands out with five articles published on the subject. This journal is highly regarded in the government area and usually publishes papers of great impact in the academic community. It is worth mentioning that of the seven most cited papers, two were published in this journal. Following, the journals *International Journal of Electronic Governance*, *International Journal of Information Management* and *Journal of Theoretical and Applied Information Technology* had published three papers each. Publications that used UTAUT as a lens to understand the acceptance of e-Government are spread in many different journals (29). 23 of these journals had only one publication about the acceptance of e-Government using UTAUT.

The questionary survey is the predominant methodological approach used by papers. This can be explained because UTAUT, according to the seminal work of Venkatesh et al. (2003) has a positivist characteristic and uses questionnaires to achieve it. However, it is interesting to note that few studies had a qualitative approach, although qualitative research is important to understand (why) the reasons for some relationships found in the literature. The exceptions are the works of AlAwadhi and Morris (2009), Mosweu et al. (2016), Olasina (2014), Olasina and Mutula (2015), and Sharma and Mishra (2017). The first study used several focus groups to qualitatively explore the factors for adopting e-Government services in Kuwait. The second and third focused on understanding the adoption of e-Parliament in Nigeria (technologies that allow popular participation in parliament / congress). The fourth study used five interviews to complement the results of the applied questionnaires. The technology analyzed in this latest study was a Document Flow Management System. This study also fits within the few studies that analyzed the topic from the point of view of public servants. The last paper was an exploratory study with interviews to identify possible factors for the adoption of technologies. In a second step, this study applied questionaries based on the previous knowledge acquired in the exploratory study.

28 papers analyzed the acceptance of e-Government services from the citizen's point of view, that is, the intention of a citizen to use or not a certain service related to e-Government. Only 9 studies (Dečman, 2015; Gupta et al., 2008; Hu et al., 2011; Ibrahim & Zakaria, 2016; Mardiana et al., 2015; Mosweu et al., 2016; Olatubosun & Rao, 2012; Olasina, 2014; Olasina & Mutula, 2015) analyzed from the point of view of the civil servant - or of the congressmen, as in the case of the studies by Olasina (2014), and Olasina and Mutula (2015). The remaining papers didn't use any population, as they were purely theoretical articles.

Ibrahim and Zakaria (2016) argue that the perception of employees in relation to a new technology in the organization differs from that of citizens or entrepreneurs. Employees need to receive special attention in the form of training and support programs from the IT staff. Workers also must understand the benefits of the new service or technology. In view of the lack of these studies, as demonstrated by our systematic review, future research should pay more attention to the acceptance of these technologies in the view of public servants.

It's also noticed that the literature on the subject has developed predominantly in developing countries: Saudi Arabia (Alghamdi & Beloff, 2016; Almarashdeh & Alsmadi, 2017; Botswana, Mosweu et al., 2016; Weerakkody et al., 2013); United Arab Emirates (AL Athmay et al., 2016; Mansoori et al., 2018; Rodrigues et al., 2016); Esolvenia (Dečman, 2015); USA (Hu et al., 2011; Lee & Rao 2009); Greece (Voutinioti, 2013); Netherlands (Dijk et al., 2008; Hoefnagel et al., 2012); Hong Kong (Chan et al., 2010; Venkatesh et al., 2011); India (Chatterjee et al., 2018; Dwivedi et al., 2017; Gupta et al., 2008; Rana et al., 2016; Saxena & Janssen, 2017; Sharma & Mishra, 2017); Indonesia (Andriani et al., 2017; Mardiana et al., 2015; Susanto & Aljoza, 2015; Witarsyah et al., 2017); Iraq (Faaeq et al., 2015; Ibrahim & Zakaria, 2016); Jordan (Alryalat et al., 2012, 2013); Kuwait (AlAwadhi & Morris, 2009); Lebanon (Fakhoury & Aubert, 2015); Nigeria (Amagoh, 2016; Olasina, 2014; Olasina & Mutula, 2015; Olatubosun & Rao, 2012); Pakistan (Ahmad et al., 2013); Portugal (Naranjo-Zolotov et al., 2018); Tunisia (Chaouali et al., 2016).

If, on the one hand, this guarantees a good comparison of the results and opens possibilities for studies to be carried out in American Latin countries, on the other hand, it inhibits the understanding of how these researches are being organized in developed countries. A justification for this may be because developed countries face only limited issues in the adoption of e-Government services while developing countries face more implementation issues (Ibrahim & Zakaria, 2016).

Another point that deserves attention and serves of interest to the academic community is the availability or not of questionnaires in scientific articles. In this

sense, the articles that adequately presented the items of the applied questionnaire are presented below in decreasing order of citations: Venkatesh et al. (2011), Chan et al. (2010), Weerakkody et al. (2013), Zuiderwijk et al. (2015), Dwivedi et al. (2017), Rana et al. (2016), Lee & Rao (2009), Hu et al. (2011), Fakhoury & Aubert (2015), Saxena & Janssen (2017), Mosweu et al. (2016), Almarashdeh & Alsmadi (2017), Alryalat et al. (2013), Chaouali et al. (2016), Chatterjee et al. (2018), Sharma & Mishra (2017), Hoefnagel et al. (2012), Mansoori et al. (2018), and Naranjo-Zolotov et al. (2018). It is noteworthy, however, that not all studies used the original UTAUT model and therefore different variables can be viewed in these questionnaires. We believe that presenting all the studies that had published the complete questionary might be very useful for future researchers that want to explore UTAUT for understanding the e-Government acceptance.

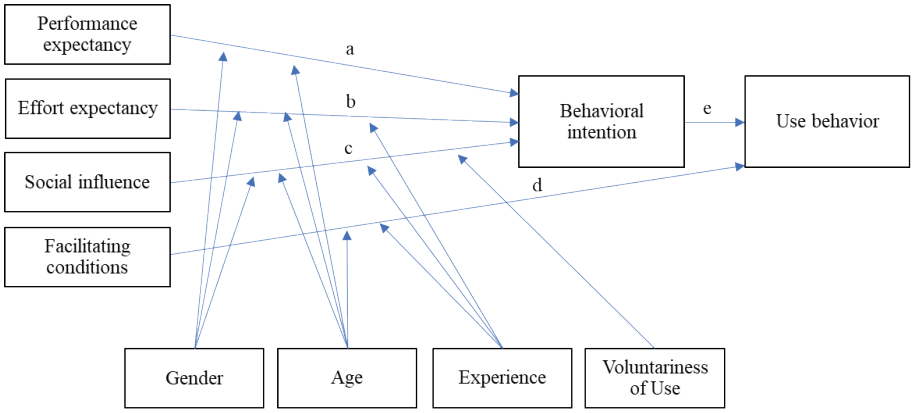
Regarding the elaboration and application of these questionnaires, some studies were concerned with carrying out some previous procedures before applying the research instrument. Dwivedi et al. (2017), for example, introduced the technology (Online Permanent Account Number Card registration system) for some respondents who were entering the labor market and who had not yet had contact with it, letting them interact with the technology for a few days before applying the questionnaire. One reason for using this procedure it's because UTAUT's main purpose is to know the intention to use a certain technology and, therefore, the respondent must have some knowledge about such technology. In another research, Naranjo-Zolotov et al. (2018) were explicit about the need to present some context before applying the questionnaire. In their research participants received an explanatory introduction to the research objective at the beginning of the questionnaire, including the presentation of the Participatory Electronic Budget as an example of an Electronic Participation tool (e-Participation). Another procedure that was seen in some research was the translation of the questionnaire into the local language, and then the translation back into English to validate linguistic consistency, as in the example of Voutinioti (2013). All the previously mentions procedures should be considered in future researches. Applying a questionary to understand the acceptance of an e-Government service, without first presenting the technology might create skewed results.

4.2. Variables and relationships used by the literature

4.2.1. Analysis of variations and relationships from the original model by Venkatesh et al. (2003)

The original model by Venkatesh et al. (2003) has three antecedents of behavioral intention and two antecedents of the use behavior. We can see in figure 1 studies that used any of the original relationships of the UTAUT.

Figure 1. Original UTAUT Model



[a] Ahmad et al. (2013), Alghamdi & Beloff (2016), Almarashdeh & Alsmadi (2017), Alryalat et al. (2012), Amagoh (2016), Andriani et al. (2017), Chaouali et al. (2016), Dečman (2015), Dijk et al. (2008), Gupta et al. (2008), Hoefnagel et al. (2012), Ibrahim & Zakaria (2016), Mansoori et al. (2018), Mardiana et al. (2015), Mosweu et al. (2016), Naranjo-Zolotov et al. (2018), Olasina & Mutula (2015), Saxena & Janssen (2017), Sultana et al. (2016), Susanto & Aljoza (2015), Voutinioti (2013), Weerakkody et al. (2013), and Witarsyah et al. (2017).

[b] Ahmad et al. (2013), Alghamdi & Beloff (2016), Almarashdeh & Alsmadi (2017), Alryalat et al. (2012), Amagoh (2016), Andriani et al. (2017), Chaouali et al. (2016), Dečman (2015), Dijk et al. (2008), Gupta et al. (2008), Hoefnagel et al. (2012), Hu et al. (2011), Ibrahim & Zakaria (2016), Mansoori et al. (2018), Mosweu et al. (2016), Naranjo-Zolotov et al. (2018), Saxena & Janssen (2017), Sultana et al. (2016), Susanto & Aljoza (2015), Voutinioti (2013), Weerakkody et al. (2013), and Witarsyah et al. (2017).

[c] Ahmad et al. (2013), Almarashdeh & Alsmadi (2017), Alryalat et al. (2012, 2013), Amagoh (2016), Chaouali et al. (2016), Dečman (2015), Dijk et al. (2008), Gupta et al. (2008), Hoefnagel et al. (2012), Hu et al. (2011), Ibrahim & Zakaria (2016), Mansoori et al. (2018), Mosweu et al. (2016), Naranjo-Zolotov et al. (2018), Saxena & Janssen (2017), Sultana et al. (2016), Susanto & Aljoza (2015), Voutinioti (2013), Weerakkody et al. (2013), and Witarsyah et al. (2017).

[d] Ahmad et al. (2013), Alryalat et al. (2012), Chaouali et al. (2016), Gupta et al. (2008), Mansoori et al. (2018), Voutinioti (2013), Weerakkody et al. (2013), and Witarsyah et al. (2017).

[e] Ahmad et al. (2013), Alghamdi & Beloff (2016), Almarashdeh & Alsmadi (2017), Alryalat et al. (2012), Andriani et al. (2017), Chaouali et al. (2016), Chatterjee et al. (2018), Dijk et al. (2008), Gupta et al. (2008), Hu et al. (2011), Ibrahim & Zakaria (2016), Mansoori et al. (2018), Olasina & Mutula (2015), Susanto & Aljoza (2015), Voutinioti (2013), Weerakkody et al. (2013), and Witarsyah et al. (2017).

At least one moderator: Alryalat et al. (2012), Dečman (2015), Mansoori et al. (2018), Mosweu et al. (2016), Naranjo-Zolotov et al. (2018), and Voutinioti (2013).

Note. Adapted from "User acceptance of information technology: Toward a unified view" from V. Venkatesh, M. G. Morris, G. B. Davis, & F. D. Davis, 2003, *MIS Quarterly*, *27*(3), pp. 425-478 (https://doi.org/10.2307/30036540).

As expected, the original relationships proposed by UTAUT were the most analyzed in the literature. However, even though the studies presented in figure 1 have used at least part of the relationships proposed by the original model, it should be noted that not all have used all the relationships in the same study. For instance, only a few studies have used at least one moderator proposed by Venkatesh et al. (2003).

Performance Expectancy and Effort Expectancy of Effort were treated in some studies as Perceived Utility and Perceived Ease of Use, respectively (see for example Susanto & Aljoza, 2015) which were the terms used by Davis (1989), in TAM. The work of Susanto & Aljoza (2015) considered the set of information completeness, cost reduction, energy savings, time savings and useful information as Perceived Utility. Perceived Ease of Use was identified as easy navigation, quick response, good interface, accessible from anywhere, accessible at any time. Due to their similar theoretical constructions, we decided to treat these expressions as synonymous in this research. In table 3 we highlight those studies that used some dependent variables that belong to the original model, but that modified or presented new relationships between these variables.

Table 3. Studies using dependent variables from Venkatesh et al. (2003) but testing different relationships

Relationships between variables			Authors
Performance Expectancy	→	Use Behavior	Faaeq et al. (2015).
Effort Expectancy	→	Use Behavior	Faaeq et al. (2015).
Social Influence	→	Use Behavior	Almarashdeh & Alsmadi (2017), Faaeq et al. (2015).
Trust	→	Use Behavior	Alryalat et al. (2012).
Effort Expectancy	→	Performance Expectancy	Hu et al. (2011), Rana et al. (2016); Susanto & Aljoza (2015).
Information Quality	→	Performance Expectancy	Witarsyah et al. (2017).
System Quality	→	Performance Expectancy	Witarsyah et al. (2017).
Culture	→	Performance Expectancy	Olasina & Mutula (2015).
Social Influence	→	Performance Expectancy	Hu et al. (2011).
Facilitating Conditions	→	Effort Expectancy	Dwivedi et al. (2017), Rana et al. (2016).

Although presented as a direct antecedent of use behavior in some studies, performance expectancy, effort expectancy and social influence, are direct antecedents of behavioral intention in the original UTAUT model.

In the set of relationships presented in table 3, it can be seen that an important variable for areas that are concern with information (as information systems, accounting, business, among others) emerges as a predecessor of performance expectation, which is the quality of information. Although the work of Witarsyah et al. (2017) is a theoretical framework that has not been tested or validated, it was considered important to present it together with the other works. In table 4 we present studies with variables and relationships very different from the original UTAUT model.

Table 4. Studies using different variables and different relationships of Venkatesh et al. (2003) original model

Relationships between variables			Authors
Attitude; Facilitating Conditions; Confidenciality; Performance Expectancy; Effort Expectancy	→	User Satisfaction	Rodrigues et al. (2016).
Perceived Effectiveness and Influence	→		AL Athmay et al. (2016).
System Quality and Information Quality	→		AL Athmay et al. (2016), Andriani et al. (2017), Chatterjee et al. (2018).
Service Quality	→		Andriani et al. (2017), Chatterjee et al. (2018).
Anxiety	→	Attitude	Rana et al. (2016).
Performance Expectancy; Effort Expectancy; Social Influence; Perceived Risk	→		Dwivedi et al. (2017), Rana et al. (2016).
User Satisfaction; Internet Usage; Personal characteristics such as educational level, nationality and gender	→	Adoption	Rodrigues et al. (2016).
Intentaion and Empowerment	→	Intent to Recommend	Naranjo-Zolotov et al. (2018).
Effort Expectancy and Trust	→	E-Government Readiness	Alghamdi & Beloff (2016).
User Satisfaction	→	Net Benefits	Chatterjee et al. (2018).
Perceived Security and Perceived Privacy	→	Trust	Alryalat et al. (2012, 2013).

As an important dependent variable, user/use satisfaction is used by different works and its main predecessors are system quality, information quality, and service

quality. These relationships were systematically theorized and presented by the Information Systems Success Model, by DeLone & McLean (1992, 2003). Integration between models seems very common, including the integration between DeLone & McLean (1992) model and UTAUT. In addition to these relationships, it should be noted that several authors sought to understand the variables that relate to the behavior intention, as can be seen in table 5.

Table 5. Studies exploring the relationship between different variables and intention behavior

Variables → Behavioral Intention	Authors
Self-Efficiency in Technologies	Ibrahim & Zakaria (2016).
Attitude	Dijk et al. (2008), Dwivedi et al. (2017), Rana et al. (2016).
Anxiety	Hoefnagel et al. (2012).
Perceived Benefits	Chatterjee et al. (2018), Mardiana et al. (2015).
IT Workforce Capability	Ibrahim & Zakaria (2016).
Personal and / or sociocultural and / or demographic characteristics	Alghamdi & Beloff (2016), Dijk et al. (2008), Hoefnagel et al. (2012), Saxena & Janssen (2017).
Active Citizenship	Fakhoury & Aubert (2015).
Facilitating Conditions	Alryalat et al. (2012, 2013), Amagoh (2016), Andriani et al. (2017), Dwivedi et al. (2017), Hoefnagel et al. (2012), Hu et al. (2011), Ibrahim & Zakaria (2016), Mansoori et al. (2018), Mosweu et al. (2016), Naranjo-Zolotov et al. (2018), Rana et al. (2016), Saxena & Janssen (2017), Sultana et al. (2016), Susanto & Aljoza (2015).
Trust	Alryalat et al. (2012, 2013), Almarashdeh & Alsmadi (2017), Amagoh (2016), Chaouali et al. (2016), Fakhoury & Aubert (2015), Mansoori et al. (2018), Sultana et al. (2016), Voutinioti (2013), Weerakkody et al. (2013), Witarsyah et al. (2017).
Consciousness	Alghamdi & Beloff (2016), Ibrahim & Zakaria (2016).
Culture	Sultana et al. (2016).
Cost of service	Almarashdeh & Alsmadi (2017).
Empowerment	Naranjo-Zolotov et al. (2018).
Digital Media Experience	Dijk et al. (2008).
Digital Gap	Amagoh (2016).

E-Government Readiness	Alghamdi & Beloff (2016).
Perceived Public Value	Sultana et al. (2016).
Government Quality	Sultana et al. (2016).
Information Quality	Andriani et al. (2017), Chatterjee et al. (2018), Mardiana et al. (2015).
System Quality	Andriani et al. (2017), Chatterjee et al. (2018), Mardiana et al. (2015).
Service Quality	Alghamdi & Beloff (2016), Andriani et al. (2017), Chatterjee et al. (2018)
Website Quality	Ibrahim & Zakaria (2016).
Perceived Risk	Alryalat et al. (2012)
User/Use Satisfaction	AL Athmay et al. (2016), Andriani et al. (2017), Chatterjee et al. (2018), Mardiana et al. (2015).
Perceived Security	Alryalat et al. (2013).
Training	Ibrahim & Zakaria (2016).
Voluntary Use	Saxena & Janssen (2017).

Understanding the intention to use a certain technology is the main goal of UTAUT and it has been so in studies on e-Government. However, as shown in the literature, studies that came after Venkatesh et al. (2003) proposed changes to the original UTAUT model, including modifications in the paths of some existing relationships. As highlighted by Dwivedi et al. (2017), in his critical review of UTAUT, the path between facilitating conditions and the intention to use, for example, needs to be explored by the literature, both for its theoretical support and for its empirical evidence. Several studies in our literature review have explored this relationship when analyzing technologies related to e-Government.

In addition, numerous variables have been studied by the literature, exploring different relationships. Nevertheless, all studies in our literature review used UTAUT as their theoretical background model, sometimes integrated with other models. The most common and relevant dependent variables were the behavioral intention, use behavior, and use/user satisfaction. The latter, closely related to the DeLone & McLean model (1992).

Venkatesh et al. (2011) paper was intentionally left out of tables 3, 4 and 5, as its representation could be confusing. However, Venkatesh et al. (2011) goals were to understand which variables affect the continued use of a certain technology, which differs somewhat from the initial proposal of UTAUT. Venkatesh et al. (2011) divided

the constructs into three phases: pre-use stage, use stage, and post-use stage. Within these stages, the authors analyzed the influence of performance expectations, effort expectations, social influences and confidence on attitude, satisfaction and the eventual intention of continuing to use a certain technology.

The construct of the original UTAUT model (or with small variations, such as, for example, the direct relationship between Facilitating Conditions and Intention to Use) was basically the most used by the studies. However, as listed by the authors themselves, the moderating variables were disregarded in the vast majority of research on the topic (Venkatesh et al., 2012) and as noted, this also occurred in studies on the acceptance of e-Government. In addition, Venkatesh et al. (2003) comment that different technologies can trigger different antecedents of acceptance and different relationships must be tested. Perhaps for this reason, other variables that go beyond this model stood out, such as the constructs of trust, quality of the system, quality of information, quality of service and use satisfaction. For their relevance, they will be briefly explained below.

4.2.2. Trust

In most developing countries, citizens do not trust the government, especially when in the presence of a past of dictatorship, political instability, and corruption. Thus, the trust factor has gained enormous attention among many surveys, especially in the field of e-Government (Sultana et al., 2016). According to Almarashdeh and Alsmadi (2017), perceived trust plays a vital role in reducing perceived risks from the use of new technologies, especially for transactions involving uncertainty. As the adoption of these technologies is still in the initial stage in some countries, users are not clear about the technical capacity of their service provider and about the security and reliability of the services provided, which helps to justify the use of this variable in different studies.

Broadly speaking, the literature shows that trust is classified into two parts: (1) Trust in the body (entity) that provides services (government agencies), and (2) Trust in the tools that will be used to deliver services to users (Weerakkody et al. 2013). However, some studies have gone beyond these classifications.

The most common cases found were about trust in the government (Amagoh, 2016; Sultana et al., 2016) and trust in technology (Amagoh, 2016; Chaouali et al., 2016; Sultana et al., 2016; Weerakkody et al., 2013). However, some studies also researched the trust in the electronic government intermediary (Weerakkody et al., 2013). Weerakkody et al. (2013) purpose was to identify the role of intermediaries in facilitating the adoption and diffusion of e-Government services in Saudi Arabia. Amagoh (2016), on the other

hand, sought to understand the confidence in the supply of electricity and its impact on behavioral intention. The justification for using this variable was that Nigeria, the population under analysis, has many distribution problems and the constant lack of energy is common in some regions.

Although it seems to be an important variable, trust is not an original construct of the work of Venkatesh et al. (2003) nor from its update, UTAUT 2, by Venkatesh et al. (2012). Therefore, it is suggested that future research carefully analyze which technologies would probably need to be trusted, and if so, this variable should be used as a predictor of the intention/use behavior. The aspect that most justifies the use of this variable in our literature review seems to be more related to technologies that have transactional aspects, i.e., when they refer to technologies where the citizen does some transaction with the government (pays his taxes or provides some information staff, for example).

4.2.3. Information, system and service quality

Some variables that also stood out were the information quality, system quality and service quality and their impact on the intention to use and on the use satisfaction. It is noteworthy that these constructs, although not original to UTAUT, are central pillars in DeLone & McLean's (1992) model.

According to Veeramootoo et al. (2018), information quality refers to a user's assessment of the performance of an IS in providing information based on their experience of using the system. This assessment is based on the content of an IS structure that is necessary to be personalized, complete, relevant, easy to use, and to provide security aspects to encourage transactions (DeLone & McLean, 2003). The quality of the information, therefore, incorporates the objective and subjective perspective of the information consumed. Low-quality information distracts users and leads to higher information processing costs (Zheng et al., 2013).

A simpler and more objective definition can be taken from the work of AL Athmay et al. (2016), who comments that the quality of information is the ability of the e-Government system to provide citizens with information that is new, accurate, clear, and easy to understand. According to Chatterjee et al. (2018), Information Quality includes precision (Bailey & Pearson, 1983; Mahmood, 1987), the extension of completeness (Miller & Doyle, 1987), and the extension of relevance (King & Epstein, 1983). It has an impact on the users' intention, as well as on the users' satisfaction because if the quality of the information is transparent, accurate, comprehensive, and explicit, it would motivate the users' intention and also the level of satisfaction with its use (Mohammadi & Hossein, 2015).

As it is an important construct, we chose to present the questionnaire items that could be used in future research, according to the work of Chatterjee et al. (2018). The perception of quality was measured by the authors by three statements: a) Data generated by the Internet of Things will be accurate, b) The information processes through the system will be protected and c) Information available through the system will be relevant to me. Internet of Things was the technology under analysis in Chatterjee et al. (2018) research, but future research could replicate these questions with other technologies.

Chatterjee et al. (2018) also comment that researches on Service Quality and System Quality are common. AL Athmay et al. (2016) define System Quality as the ability of an electronic government system to provide its citizens with accurate, reliable, relevant and easy to understand information (AL Athmay et al., 2016). These three constructs (information quality, system quality and service quality), simultaneously impact the use and satisfaction of users (Chatterjee et al., 2018).

4.2.4. Use satisfaction or user satisfaction

AL Athmay et al. (2016) adopt the following definition for user satisfaction: the levels of experience and achievement that citizens gain from the use of e-Government services in terms of content, speed, quality and safety. As previously mentioned, this construct is part of the DeLone & McLean (2003) model.

4.2.5. Other variables

Naranjo-Zolotov et al. (2018) were interested in understanding the intention of a citizen to recommend e-Government services, and therefore, intention to recommend was one of their dependent variables. Olatubosun and Rao (2012) was another study that used variables quite different from the original model of UTAUT. In addition, the authors did not seek to find cause and effects, but rather, existing relationships between different constructs, such as between age / gender and effort expectancy, the performance expectancy and social influence, etc. Hoefnagel et al. (2012) found that affectivity predictors, such as anxiety and some social influences, are more important than cognitive predictors in predicting the intention to use virtual technologies. Another variable distinct from the original models can be seen in Venkatesh et al. (2011), in which they sought to understand the intention of individuals to continue using a certain technology. This is particularly interesting in cases where the technology is already implemented, and researchers want to understand the intentions of those involved in continuing to use that technology.

4.2.6. Moderators variables

As for the moderating variables, as has already been shown in other UTAUT reviews (Venkatesh et al., 2012), they have been practically ignored by the literature (see some exceptions in Gupta et al. (2008) and Dečman (2015)). At first, this could distort the original UTAUT model and make it difficult to compare results accurately, however, as the theory's authors themselves comment, UTAUT model is still under development and new perspectives are encouraged (Venkatesh et al., 2003). Another distinct feature in some studies is the use of some moderating variables as control variables, such as Hoefnagel et al. (2012) (gender, age, having previously used the technology), and Naranjo-Zolotov et al. (2018) (age, gender and education).

4.3. Research gaps

One of the most important gaps for potential researchers interested in the topic is about the fact that accounting and financial literature has practically not explored UTAUT within governments, even though accounting and finance fields are responsible for controlling different types of information that are now electronically available, such as contracts, bids, agreements, and other information. The electronic availability of financial and accounting information is a technology, and as such, it can be studied by UTAUT. The closest researches about the subject tried to understand the intention of citizens to use electronic tax filing technologies, (Andriani et al., 2017; Dijk et al., 2008). In addition, the work of Naranjo-Zolotov et al. (2018) analyzed the intention of citizens to use a tool (e-Participation) related to a participatory budget.

The subject is little explored both from the point of view of the citizen and from the point of view of public/civil servants. The acceptance of technologies by employees (G2G or G2E) under the lens of UTAUT is generally little explored, regardless of the technology analyzed. It is to be expected that some specific characteristics that affect public/civil servants' e-Government acceptance might differ from other kinds of organizations.

Dečman's research (2015) is one of the few exceptions that analyzes the intention to use ISs from the employee's point of view. Although studies such as Rana et al. (2013b), claim that the adoption of e-Government by citizens is crucial since citizens are the most benefited by these technologies, employees and organizations are equally important (Dečman, 2015), and consequently, studies need to better explore this subject using UTAUT.

Several articles used frameworks that differ from the original UTAUT model. Although this is interesting from a theoretical point of view, the potential for further validation of this theory, which is still recent and under construction, is lost. Thus, it

is suggested that the original model of UTAUT or even the updated model (UTAUT 2) be maintained in future research so that the comparability of results is not impaired.

Another aspect that is evident in the literature is the low frequency of qualitative studies that used UTAUT to understand the acceptance of e-Government. This can be justified by the positivist theorization presented by the seminal work of Venkatesh et al. (2003). However, reviewing the theory from a qualitative perspective would help to improve the understanding of some empirical relations that the literature has found. In our systematic review, we also evidence the lack of studies in English that explored the acceptance of e-Government services under the lens of UTAUT in American Latin countries.

Finally, different questions arise from this context that can be answered in future research. Which constructs of UTAUT interfere in the intention of using technologies in the accounting/financial area within governmental organizations? Which UTAUT constructs predict the use of technologies that allow greater social control by the citizen? Although there are examples in the literature, such as the work of Naranjo-Zolotov et al. (2018), such studies are rare and need to be better explored by future research.

5. Final remarks

In conducting this systematic literature review, we show that the original model of UTAUT, proposed in 2003 by Venkatesh et al. (2003), was the lens for several studies in the governmental area, especially regarding e-Government acceptance. However, as noted, few studies have been entirely faithful to that original model. Other variables such as trust, quality of information, quality of the system, satisfaction of use/user were explored as possible antecedents of the behavioral intention of individuals to use technologies related to e-Government.

Although exploring the theory about new perspectives has benefits, such as the possible theoretical increase, it also has risks, such as the possible loss of validation and comparability of results. For this reason, it is important that researchers carefully evaluate the need to include or not include any variable other than the original UTAUT construct. This assessment must take into account the technology analyzed, the population studied, among other specific features.

The study reveals that the use of ICTs from the point of view of employees needs to be further investigated, as few studies have been carried out with the lens of UTAUT. In addition, there was a lack of studies on the use of technologies in the governmental sector to help improve accounting or financial information. Still, some technologies are already used in the governmental sector, such as Business Intelligence or XBRL and that can be explored under the lens of UTAUT.

In addition to the gaps found that can assist researchers in the most diverse areas, it is hoped that this research will encourage researchers in the accounting and the financial area to use UTAUT as a theoretical lens to understand the acceptance of the technologies used within the governmental sector. By demonstrating the various variables explored in the literature, this work can serve as a starting point for future empirical research.

The study was limited to analyzing articles in English. For this reason, articles in Portuguese or Spanish may have already analyzed the intention to use e-Governments services through the lens of UTAUT, but because of this limitation, they were not considered in the present research. In addition, the study was limited to analyzing the research that had UTAUT as a theoretical basis, leaving out important models of acceptance of technologies such as TAM.

It is suggested that a next bibliographic survey be carried out without the limitation of UTAUT, since models close to it, such as TAM, are commonly used in the acceptance of e-Government. Thus, some of the papers that we cross throughout the research, were discharged, as they did not explicitly use UTAUT, although they used similar constructs. Another suggestion for future research is to better explore how academia is mixing different models of technology adoption, as, throughout our systematic review, several studies sought to integrate one or more of these models.

Contribución de autores

Machado, M.: Conceptualización, Metodología, Validación, Análisis formal, Investigación, Curación de datos, Redacción borrador original, Validación, Administración del proyecto. **Silva, F.:** Conceptualización, Validación, Análisis formal, Investigación, Escritura borrador original, Escritura revisión y edición, Supervisión, Administración del proyecto.

Marcelo Machado de Freitas – Machado, M.

Fabricia Silva da Rosa – Silva, F.

Declaración de conflicto de intereses

El (los) autor(es) declara(n) que, durante el proceso de investigación, no ha existido ningún tipo de interés personal, profesional o económico que haya podido influenciar el juicio y/o accionar de los investigadores al momento de elaborar y publicar el presente artículo.

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Contacto: mmf.marcelofreitas@gmail.com