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Evaluation of the main performance criteria of IT outsourcing for contract management in public companies: a bibliometric review

Avaliação dos principais critérios de desempenho de terceirização de TI para a gestão contratual em empresas públicas: uma revisão bibliométrica

Evaluación de los principales criterios de desempeño de la subcontratación informática para la gestión de contratos en empresas públicas: revisión bibliométrica

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Abstract

Although Information Technology Outsourcing (ITO) is common in private companies, it is less common in public organizations. In addition, extant literature focuses mainly on private companies and researchers from public organizations use and replicate these results often without adequate validation for the public context. This points to a scenario in which ITO studies may have worse results due to the lack of an appropriate theoretical framework. To analyze this disparity, the existing literature on IT, public organizations and outsourcing is reviewed. A systematic review of the literature allows to extract the content organized by groups. Thus, a framework is proposed to understand the main dimensions of monitoring IT outsourcing for public organizations. The results point to four main criteria (monitoring, relationship, performance and uncertainty) divided into 16 sub-criteria. This study contributes

to the literature by refining the IT outsourcing theories for the public sector and providing a platform for advances in future studies.

Keywords: IT Outsourcing; Management; Inspection; Public sector; Criteria.

Resumo

Embora a terceirização de tecnologia da informação (TI) seja comum em empresas privadas, é menos comum em organizações públicas. Além disto, a literatura atual concentra-se principalmente em empresas privadas e pesquisadores de organizações públicas usam e replicam esses resultados muitas vezes sem a validação adequada para o contexto público. Isto aponta para um cenário em que os estudos de TI para organizações públicas podem ter resultados piores devido à falta de uma estrutura teórica apropriada. Para analisar essa disparidade, a literatura existente sobre TI, organizações públicas e terceirização é revista. O uso de uma revisão sistemática da literatura permite extrair o conteúdo organizado por grupos. Assim, propõe-se um *framework* para compreender as principais dimensões do monitoramento da terceirização de TI para organizações públicas. Os resultados apontam para quatro critérios principais (monitoramento, relacionamento, desempenho e incerteza) subdivididos em 16 subcritérios. Este estudo contribui para a literatura ao refinar as teorias de terceirização de TI para o setor público e fornecer uma plataforma para avanços em estudos futuros.

Palavras-chave: Terceirização de TI; Gestão; Fiscalização; Setor público; Critério.

Resumen

Aunque la subcontratación de tecnologías de la información (TI) es común en las empresas privadas, es menos común en las organizaciones públicas. Además, la literatura actual se centra principalmente en empresas privadas e investigadores de organizaciones públicas que utilizan y replican estos resultados a menudo sin una validación adecuada para el contexto público. Esto apunta a un escenario en el que los estudios de TI para organizaciones públicas pueden tener peores resultados debido a la falta de un marco teórico adecuado. Para analizar esta disparidad, se revisa la literatura existente sobre TI, organizaciones públicas y outsourcing. El uso de una revisión sistemática de la literatura permite extraer el contenido organizado por grupos. Por lo tanto, se propone un marco para comprender las principales dimensiones del monitoreo de la subcontratación de TI para las organizaciones públicas. Los resultados apuntan a cuatro criterios principales (seguimiento, relación, desempeño e incertidumbre) subdivididos en 16 subcriterios. Este estudio contribuye a la literatura al

perfeccionar las teorías de subcontratación de TI para el sector público y proporciona una plataforma para avances en estudios futuros.

Palabras clave: Subcontratación de TI; Gestión; Inspección; Sector público; Criterio.

1. Introduction

Outsourcing occurs with increasing intensity, generally aiming at cost reduction and greater efficiency in the allocation of resources (Langer & Mani, 2018), and commonly in activities outside the central scope of companies (Lacity *et al.*, 2017). In the 1990s, due to the increasing dissatisfaction of the results pointed out by public companies for executed outsourcing processes, a trend of public-private partnerships emerged (Bovaird, 2016; Koh *et al.*, 2004), incorporated in the 2000s outsourcing contracts.

In order to provide services not linked to essential areas, many public companies have chosen outsourcing as a solution (Lee, 2017; Widermann *et al.*, 2015). Therefore, to determine Information Technology Outsourcing (ITO - *Information Technology Outsourcing*) as a viable candidate for outsourcing, public company executives may use their own local, legal standards, differently from what established studies suggest. This happens due to the government management models adopted, whose objectives are to verify the good functioning of the public machinery, inspired by the results in private contexts, yet keeping their own public-related intricacies (Guarda, 2011; Prager, 1994). IT outsourcing therefore follows a logic of institutional isomorphism - especially in the mimetic and normative aspects (DiMaggio & Powell, 1983), but also translating into an imitation trend (Common, 2004), adapted from market leaders.

Despite having a different nature from private companies, public companies also seek procedures that are similar to private companies, striving to increase productivity efficiently (dos Santos, 2013). However, for institutional and legal issues, in addition to mandatory requirements related to local legislation, public companies face other challenges (Blaskovich & Mintchik, 2011), being more limited in their ability to outsource.

It must be taken into consideration the fact that public companies do not have the same nature as private companies - that is, while the former aim to provide services to the population, the latter aim to reach the market to obtain profits. Public companies differ from private ones both ideologically and operationally (Khalfan, 2004). In fact, IT outsourcing in public companies (ITO - *Information Technology Outsourcing*) has not yet been deeply analyzed by academic literature, which, of course, is more focused on the private sector

(Marco-Simó & Pastor-Collado, 2020). Some authors introduce conceptual aspects that lead to IT outsourcing (Langer & Mani, 2018; Lacity *et al.*, 2017; Susarla, 2012; Alaghehband *et al.*, 2011; Blaskovich & Mintchik, 2011; Poppo & Zenger, 2002), interpreted using technical criteria.

There are three main factors in deciding to outsource the provision of a public service: budget, transaction costs and political agendas (Benito *et al.*, 2015). Companies are charged with deciding whether to generate goods and services by executing the entire process, or deciding to outsource some or all of the steps involved (make or buy strategies), and for that they must consider the total costs associated with this path (the costs of transaction) mainly when they aim to reduce their costs (Coase, 1995, Williamson, 1988). This view can also be considered in the public context, the public sector has changed from an absolutely formalized practice, based on contracts (Neves, 2018; Lee & Cavusgil, 2006; Koh *et al.*, 2004), to a balanced practice between aspects contracts subject to public legislation and new elements of relational management.

Companies participating in public auctions, as well as companies already outsourced with many contractual renewals or very long contracts, may be opportunistic and act in bad faith or in a predatory manner (Schermann *et al.*, 2016; Valéro, 2015; Williamson, 2007). The IT outsourcing process, combined with the low traditional flexibility of public companies, becomes a complex process, requiring deep knowledge of the public business, for the decision and success of outsourcing (Skipworth *et al.*, 2020). The relationship and knowledge transfer in IT outsourcing can become a very important factor in changing paradigms and cultural change for the public contracting company.

Today, companies continue to seek and add more value through IT outsourcing, but while initial contracts focused on cost reduction, many organizations, in the second or third generation of IT outsourcing, sought significant business advantage (Lacity & Willcocks, 2001). Many governments provide a rhetoric that IT is strategic, but treat it as just another administrative tool - that is, a guideline used blindly without reevaluation and adaptation to new situations (Cordella & Willcocks, 2012, p. 305).

The private sector is not always better managed than the public sector, and outsourcing is not always the most appropriate way, when there is no prior study, especially when political management does not consider the particularities of IT, which has a different nature, where characteristics that are often strategic to the business are involved (Burnes & Anastasiadis, 2003). This is due to the need to maintain control over all operational aspects of the service in terms of quality and quantity, which can be dispensed with in many cases in private

outsourcing (Arlbjørn & Freytag, 2012). The problem arises when public activity is criticized for efficiency issues. However, this can only be confirmed through empirical studies that support or reject the widely accepted hypothesis that the cost of public production is greater than that of outsourcing (Benito *et al.*, 2015), hence the question about the success of IT outsourcing in public companies.

The motivations for IT outsourcing processes in companies are the most varied, and the lack of this understanding is one of the biggest causes of failure in many outsourcing (Prado & Takaoka, 2006). This issue of IT outsourcing in public companies still needs further studies, not only in terms of outsourcing motivations, but also in managing the management of public IT outsourcing contracts already established.

ITO in public companies is linked to aspects such as the decision to outsource, or the outsourcing strategy - which must consider the product or service to be outsourced, which must not belong to the core of the company's business, and this must maintain control over outsourced processes. During contractual management, aspects such as non-compliance with the SLA (*Service Level Agreement*), the risk of, and non-compliance with inadequate training or training (Karimi-Alaghehband & Rivad, 2020) can bring risks in the delivery of the service or product. For example, non-compliance with the SLA can cause problems, especially when the degree of criticality in the service is not clear, which can generate poor quality services, such as interrupting an infrastructure service in public service (Fehrenbacher & Wiener, 2019).

Thus, re-outsourcing is the transfer or assignment of a contractual job outsourcing to another provider of outsourced services, not included directly in the contract. This practice occurs for the same reasons as outsourcing: reducing costs, and dedicating oneself to the main activity of the business, and encourages an increase in this practice, but this attribution requires trust between the parties (Chang *et al.*, 2017), and can generate opportunistic behavior for ITO service providers.

Another risk occurs when the outsourced company delegates to the other (outsourcing) the execution of the IT services or products established in the contract, with a loss of quality in the services provided. Re-outsourcing companies seek to quickly meet their demands, because they bill through the number of services provided. However, this rapidity of the quartered companies, is often reflected in the low quality of these services. On the other hand, outsourcing can also generate contractual distortions, when the outsourced company delegates services agreed in the contract, due to the cost reduction by the outsourced company.

Many of these contractual risks are considered in current legislation, which provides for various degrees of penalty to the outsourced company, and in this context, the importance of records in monitoring the execution of the IT contract is emphasized, where the managers and responsible inspectors must measure these risks in the continuity solution and in the quality of delivery of the contracted IT product or service.

On the other hand, on some occasions, public activity is criticized on issues of efficiency, highlighting this problem. However, this can only be confirmed through empirical studies of the literature, which support or reject public ITO (Benito *et al.*, 2015). On the other hand, the literature shows a focus more on private companies, and few studies on public companies, without presenting a consensus regarding the intersection between ITO in the public and private sectors. Although IT outsourcing in the public sector is increasing worldwide, when looking at this sector there are several problems related to IT outsourcing, such as poorly dimensioned resources, lack of strategic planning, efficiency or lack of qualified people with a profile in the IT area and little concern with information security (Guarda, 2011).

The public sector seeks to be increasingly efficient in order to provide better products and services to the population, and in this context, there is a shortage in the scientific literature. The references in this area are found in countries with greater maturity in this sector, such as Australia, Canada, the United States and England (Cordella & Willcocks, 2010), yet comprehensive reviews could not be found. An example of the maturing of the capacity of public companies to fulfill their cost-benefit to public resources in the provision of services, occurred during the 2008 recession, leveraging the capacity of BPO (*Business Process Outsourcing*) in contracting business activities and functions (Lacity *et al.*, 2009) that are not part of the company's main focus.

A search on the number of ITO publications shows a greater number of publications in the private sector (Gantman, 2011) in relation to the public sector (Lacity *et al.*, 2017; Langer & Mani, 2018; Neves, 2018), and one fewer empirical ITO surveys in public services. The Brazilian public ITO is reflected in the digital services offered to the population, with increasing agility, as in the digital service centers, in the public services applications for smartphones, and in the infrastructure of the data clouds in public Data Centers that support them.

However, in order to provide these products and services, Brazilian public companies are subject to several regulatory laws, such as Law 13.303/2016 or the law of state-owned companies, which requires compliance by top management; decree 9.507/2018, which

regulates what can be outsourced, depending on the strategic scope of outsourcing; and the law on bids and contracts - 8,666/1993 that regulates purchases, including IT products and services such as electronic auctions, bids, and requires the creation of an internal technical body of managers and inspectors for inspection and management contractual.

Resolution 182/2013 of the CNJ (National Council of Justice) of Brazil establishes the technical body for the management of IT contracts, composed of a contracting inspector responsible for the functional aspects of the required IT solution, a contract inspector responsible for technical aspects of the solution, and an administrative contract supervisor, responsible for the administrative aspects of the contract. Each person in charge of this technical body has specific duties and competences, and is subject to periodic audits (da Costa, 2013), in accordance with the law on public tenders and contracts (law 8,666 / 1993). In establishing the acquisition of the public ITO, there are risks involved in direct purchases or in bids, but after the contract is established, contractual management and management are mandatory.

Another regulation focused on IT service management in Brazil is the ABNT NBR ISO / IEC 20000-1 (Brazilian Technical Standards Association - ABNT, 2011) standard, which specifies, among other requirements, the implementation, operation and monitoring, based on best practices. This service management system standard establishes the conditions necessary for IT service providers in accordance with good market practices such as ITIL, and for incident and change management.

Thus, management and contractual inspection of public ITO are linked to the current legislation in order to guarantee the transparency of public resources, avoid legal problems such as impersonality, morality and advertising, evaluate the activity of the contracted company, evaluate the quality of the product or services provided. The inspection of resources initially guarantees that what has been contracted is being delivered, because the public agency must issue the "acceptance term" for the purchase of the good or service. This technical part of the inspection must be accompanied by someone with technical knowledge of the subject in question, so that you know what to expect from deliveries of the outsourced IT product or service.

The current legislation in Brazil for public ITO is contemplated by laws, decrees and normative instructions, which establish the legal regulation. Law 8666/1993, or the law on bids and contracts, establishes impersonality, morality and publicity, among others, as legal principles between the parties. It is concerned with the contractual risks of outsourcing, such as opportunism or bad faith that may exist in the bidding or during the exercise of

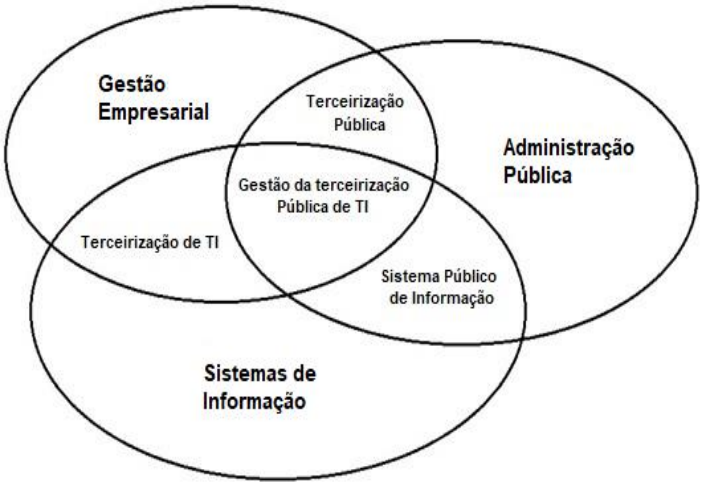
outsourcing, as well as the vulnerability of the data. This law also establishes the obligation of public agents (da Costa, 2013) for ITO contractual inspection. Although the inspector is the public representative in the contractual management, this law does not mention the mandatory profile for the inspection of the contract, however it is recommended that the public manager behave unblemished, and have knowledge of the object to be inspected.

Law 13.303 / 2016, or the law of state-owned companies, is concerned with establishing, through the senior management of public companies (dos Santos, 2013), administrative compliance with good market practices, such as financial transparency. Decree 9.507/2018 or ITO public and autarchies law, establishes what can be outsourced (Parreira, 2018), considering that the product or service to be outsourced is not strategic or is linked to the main business of the public company or autarchy. Normative Instruction 01 (IN04) of April 4, 2019 (Brazil, 2019) deals with cloud computing, a software factory and digital authentication, linked to public IT.

2. Theoretical framework

Applications of this study also deal with the Brazilian scenario (Prado & Takaoka, 2006; Poleto, 2012) and can be considered as antecedents of this proposal. The management of IT outsourcing in public companies, is an intersection between three major fields: public administration, business management of public companies and information systems (Gantman, 2011).

Figure 1 - Venn diagram and public ITO management.



Source: Adapted from Gantman, (2011).

On the one hand, the intersection between public administration and business management is public outsourcing, as well as the intersection between public administration and information systems is the public information system. Likewise, the intersection between business management and information systems is located in IT outsourcing.

It can be seen from the Venn diagram (Figure 1) that public IT outsourcing management is a unique intersection in this universe, which is why one cannot consider the traditional models of public outsourcing, IT outsourcing or public information systems. found in the literature as completely valid for the study of public ITO, requiring adaptations.

In Brazil, IT outsourcing in public services has its specific and regulatory legislation, requiring compliance and contractual management. Routinely, public activity receives criticism on issues of efficiency in IT outsourcing, with a search for business process innovation, and better prepared suppliers. This innovation can be achieved through outsourcing (Lacity & Willcocks, 2014), where public companies can encourage outsourced companies to periodically deliver better quality services, however this outsourcing must be disciplined and supervised (Cordella & Willcocks, 2010) so that public companies have control over their processes.

ITO in public companies is a great tool for reducing costs and improving performance and the search for innovation, however in the context of Brazil, public companies are subject to current legislation. Process control and contract management and inspection are required. On the other hand, the literature shows a focus more on private companies, and few studies on public companies, without presenting a consensus regarding the intersection between ITO in the two sectors (Langer & Mani, 2018; Lacity *et al.*, 2017). Many studies in Brazil deal with the motivation for IT outsourcing in public companies, but few are focused on ITO contractual management and inspection in these same companies, and so this research is inserted and justified when evaluating the main criteria and dimensions for the contractual management, meeting this gap facing the Brazilian reality.

The literature review addresses topics such as outsourcing itself, IT outsourcing, and IT outsourcing in public companies. In addition, it is also about the dimensions and performance criteria found in the literature used in contractual management, and about IT outsourcing processes that are potentially compatible with research applied in public companies.

A company has a cost for the production of goods or services, and when there is a decision to outsource there are other costs to be considered, the transaction costs, which are the costs involved in all negotiations, drafting of contracts and their fulfillment. For

outsourcing or the acquisition of goods and services in the public sector, there is legislation in force that establishes the acquisition of goods and services, which is the law 8666/93 of bids and contracts. Depending on the value of the IT solution that the public company is looking for, there is public competition for higher values, pricing and invitation for lower values.

Bidding is the administrative instrument that seeks among the interested companies to lend IT services, the most economically interesting contract, and that must follow the principles of equality or equality of rights of the participants, the legality to the current laws, impersonality, morality and ethics, the publicity of information in the bidding process, the same rules and criteria to all participants, and the objective and public judgment. The public company establishes a contract with the winning company, and defines those responsible for the management and supervision of this contract during its execution.

1989 marked the beginning of outsourcing, when Eastman Kodak Co. outsourced it on a large scale, initiating a major market trend. In the early 1990s, the first studies were established, attracting researchers from various disciplines, especially in the IT area (Gantman, 2011). The evolutionary research of information technology and its outsourcing were followed for the public sector, through several articles and suggested models (Dibbern *et al.*, 2004), where several American companies following their example, have outsourced their IT infrastructure (Foogooa, 2008).

Considering an internal area or sector of an organization, outsourcing or outsourcing is the substitution by third parties, acquiring goods or services (Lacity & Willcocks, 2012). By delegating processes or services to third parties, there can be risk mitigation, adding values and transferring knowledge to an organization, but this practice requires a transformation in public organizations, which seek to concentrate their energies on their main activity, favoring efficiency and optimization management (Guarda, 2011), however, there are other risks of outsourcing, such as loss of control over outsourced activity, leakage of information, and additional expenses such as transaction costs due to poor management of outsourcing (Yang *et al.*, 2016).

After the period when outsourcing started, economics studies considered firms and their markets, showing concepts of influence such as transaction costs or the relationship between transaction costs, and contractual relationships (Williamson, 1979) that contributed to IT outsourcing studies. Activity or monitoring controls require frequent customer feedback on the outsourced IT task, promoting the supplier's knowledge of customer expectations, and improving the quality of service level and satisfaction (Langer & Mani, 2018). All significant positive and negative results found beneficial results from detailed contracts (Lacity *et al.*,

2017). The company's strategic alignment is very important for the outsourcing of IT services due to the strategic relevance that this area has (Cohen & Young, 2006; Henderson & Venkatraman, 1992; Willcocks & Lacity, 2001).

The literature also points out the criticality of IT management, the assessment of risks and costs, and the maintenance of internal technical knowledge for the success of an outsourcing venture (Gantman, 2011), as well as to avoid the opportunism of suppliers and the loss of control over the project and performance monitoring and evaluation processes.

The initial generations of IT outsourcing aimed to reduce costs, seeking business advantages, but when it comes to public companies, you cannot simply lease, or hand over the management of a good or service to private administration, as if you were releasing the responsibility for this task, defending the lack of costs or the lack of technical improvement, moreover, several governments show IT as strategic, but really treat it as just another administrative tool (Cordella & Willcocks, 2012). On the other hand, IT outsourcing is strategic, as it allows the outsourcing company to focus on its core competencies, while the outsourced partner offers services that it has no technical or organizational domain (Karimi-Alaghehband & Rivard, 2019).

The growth of information technology outsourcing (ITO - *Information Technology Outsourcing*) in many market companies, and particularly in public companies, has become a worldwide trend, offering better public services and reducing costs to the population (Langer & Mani, 2018). Public companies are political and bureaucratic by their very nature, and unlike private companies that are concerned with the efficiency and quality of products and processes aiming at adapting to market competition and profits, public companies focus on providing services public, regardless of profits, as they are subsidized by the state.

In this context, the bureaucracy and lack of innovation, the conservatism of inefficient processes and the pressing need for the use of information technologies - already well established among the population, through smartphones, (IOT) internet of things, (AI) Intelligence Artificial, Big Data used in various sectors, and other technologies already established among society - can lead this state that tries to keep bureaucracy and inefficient services, to suffer the adoption of specific policies in the acceptance trend that in following the majority or accepting the influence of those who are similar, with bankruptcy or the provision of low quality public services, in disagreement with the increasingly demanding society. This is a current paradox of public services worldwide, which must consider insufficiently studied criteria, such as culture and citizenship. It is not enough to decide to outsource or not to outsource, IT outsourcing is not a cure-all, but it simply shows a different

way of managing depending on the learning and daily work between customers and suppliers (Lacity & Willcocks, 2012).

Outsourcing of public services has become common, but despite its prevalence, there is still no consensus in the academic literature on the expected cost savings for the government (Jensen & Stonecash, 2005), as well as IT outsourcing. Public sector outsourcing is now an established mechanism for government service delivery, but despite the vast practical experience of governments, in many countries there is still relatively little agreement on whether outsourcing is uniformly beneficial or how big the cost reductions are. governments (Pollitt & Bouckaert, 2003). Unlike other types of outsourcing, IT outsourcing has specific characteristics that differentiate it from other areas of outsourcing, and companies make a mistake in treating IT outsourcing as a simple decision between making or buying (Willcocks & Lacity, 2001).

On the other hand, the public ITO is often concerned with problems such as poorly designed bids, poor quality outsourced services, or inadequate monitoring of IT contracts (Skipworth *et al.*, 2020). IT outsourcing in the public sector is considered highly complex compared to the private sector due to the legal requirements of government organizational processes and due to the fact that IT outsourcing in the public sector is often a political process, with many stakeholders arguing differently conflict perspectives (Currie & Guah, 2007; Lin *et al.*2007).

From another point of view, public information is strategic, and requires a high degree of data security. There is a greater possibility of successful outsourcing in public companies, when there is a strong and committed IT area, with experience in outsourcing and aligned with strategic objectives. Thus, the CIO must be someone with knowledge of the role of IT within the strategic framework of operations, but unfortunately, few public companies understand the position of the CIO (Moon *et al.*, 2016).

The differentiation between the two types of companies is based on the fact that the private sector aims at financial results, while the public sector focuses on legal compliance (Rodrigues, 2010). However, there are examples of large private companies in strategic sectors with clearly formal and bureaucratic processes in a complex context, and examples of public companies as autonomous bodies or autarchies (Marco-Simó & Pastor-Collado, 2020), with process flexibility, similar to private companies.

In Brazil, IT outsourcing in public companies is regulated by the law of bids and contracts (Law 8666/1993), the law of state-owned companies (Law 13.303 / 2016), Decree

9.507 / 2018 of outsourcing in general and Normative Instruction 01 (IN04) of April 4, 2019 (Brazil, 2019) on cloud computing, software factory and digital authentication.

The public IT contracting company, as well as the outsourced company, must obey legal principles such as equality of bidders, impersonality or equal treatment, and morality, where the parties must be ethical and honest. After contracting IT outsourcing, the public contracting company must elect contract managers and inspectors to monitor the terms and technical requirements established in the terms of reference - which is the technical part of IT contracts - such as SLA compliance (*service level agreement*), or service level agreement, established according to the degree of criticality of the asset, and other contractual criteria. These public agents thus established by law and legal guardians, must follow performance criteria during contractual execution, in addition to being able to establish eventual changes in the agreed conditions, or in the establishment of penalties.

If, on the one hand, there is a worldwide tendency for public ITO to reduce costs, streamline services and acquire more technological knowledge, there is also a discussion about the increasing contractual management and outsourcing control by public companies (Cordella & Willcocks, 2010). The contractual management of the public ITO in Brazil, is done by the managers and inspectors of contracts established in Brazilian law 8.666 / 1992 of bids and contracts, responsible not only for the contractual inspection, but also for any modifications or changes that may be made during the term of the contract.

During management and inspection, the public agent must ensure legal compliance, such as transparency, impersonality and morality, as well as be technically trained in the knowledge of the object of inspection, so that he can establish parameters such as criticality, time of outsourced service, and the quality of services provided. The quality of the services provided by the public ITO is explicit in the contracts, but one must monitor and inspect with the registration of contractual evidence, because quality measures are often intangible (Högberg, 2010).

The risk of delivery of low-quality or second-line IT infrastructure products is also common in Brazil. The terms of reference - the technical part of public ITO contracts - often establish the delivery of new products, as for the IT infrastructure (Silva *et al.*, 2020), but the risk increases when these products IT are focused on the infrastructure of Data Centers, such as servers, storage, telecommunication elements, *nobreaks* or generator sets - where they encompass the so-called corporate clouds - and which depend on the 24/7 operation to meet the demand for public services, present, for example, in smartphone applications (Langer & Mani, 2018).

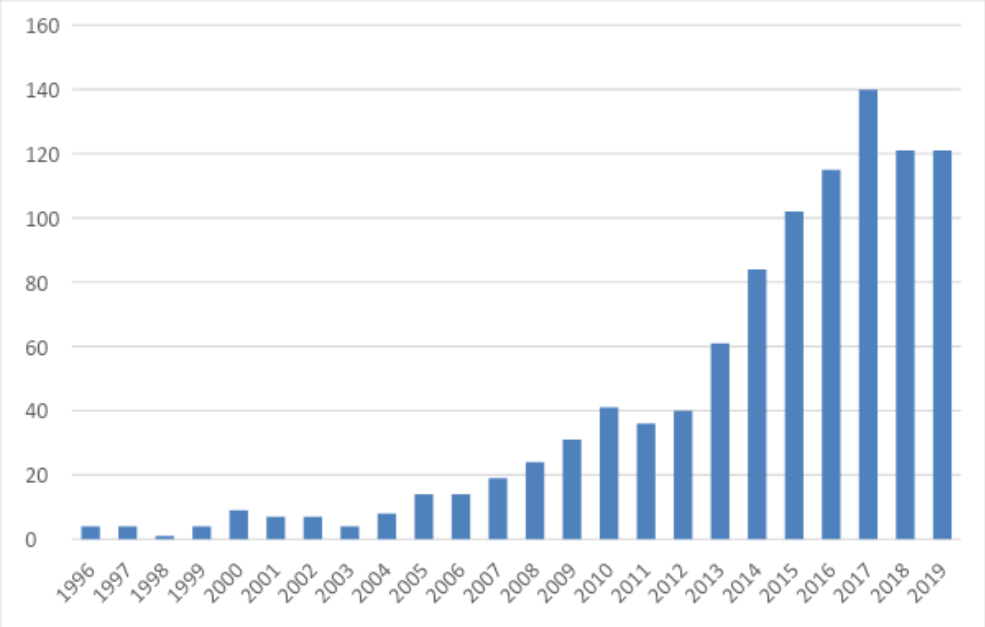
3. Materials and Methods

In order to analyze a scope of certain academic theme, a few methods may be used, yet a Systematic Literature Review (SLR) has gained a lot of attention in the last decades. In this paper, we follow the procedures found in Kitchenham et.al. (2007), since this is the most cited SLR author in IT and computer science. Kitchenham et.al. (2007) establish three main phases: a) review plan (identifying needs, specifying goals, develop a search protocol); b) review processes (research identification, primary results analysis, quality insurance procedures, extraction and synthetizing), and c) reporting (dissemination and formatting).

Consequently, an SLR is a qualitative method, whose goal is descriptive rather than prescriptive. As such, we follow a post-positivist ontology and frame the paper from a objective epistemology (Pereira *et al*., 2018).

In the initial search on the ITO (*Information Technology Outsourcing*), its relevance and evolution in the literature, we sought to observe the number of annual publications. It is observed that since 1996 - beginning of publications for the ITO theme - there has been an increase in the publication of journals, as shown by the WoS (Web of Science) base.

Figure 2. Annual ITO publications by the WoS database.



Source: Web of Science.

A literature review was carried out between the Web of Science, JSTOR, Science Direct, IEE Xplore and Scopus databases, initially choosing 500 articles on outsourcing in general, selecting 200 articles on IT outsourcing. between public and private companies, and in a last step, a choice of the 50 most relevant articles, paying attention to the articles of literature reviews and articles with theoretical models of ITO.

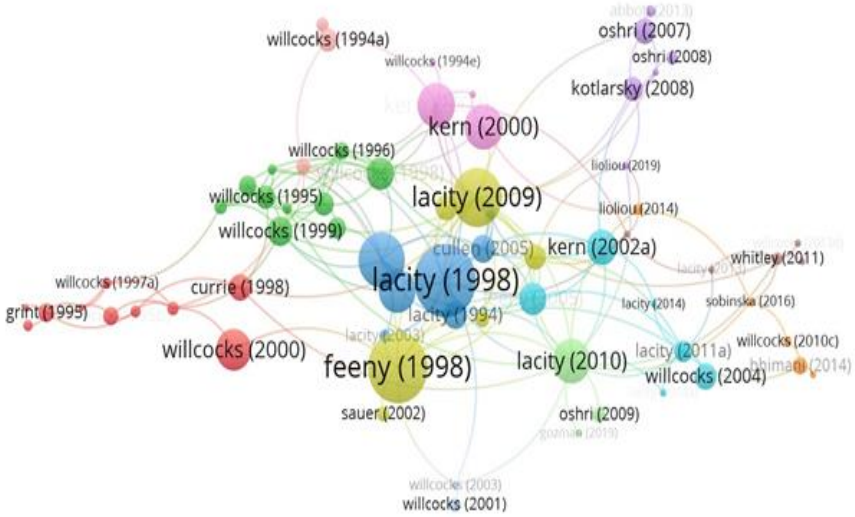
The 50 most relevant ITO articles were selected, which include articles from literature reviews, articles with theoretical models focused on ITO, and seminal or "state of the art" articles from the last five years, both for public companies and companies private.

4. Results and Discussion

An association was found between several criteria selected by keywords, and the four main ones for public ITO were monitoring, performance, relationship and uncertainty, called by the seminal authors of dimensions, because several other criteria are associated with them. Through the theoretical models, it is observed that each related criterion, or promoting criterion, positively favors or promotes the related dimension.

Seeking a relationship between publications and authors, a network of co-citations was generated, using the WoS Web of Science database (Figure 2).

Figure 2. Network of co-citations of ITO authors.



Source: Authors (VOSViewer tool).

The network of co-citations above demonstrates the relationship between authors, many of them seminal for outsourcing information technology. An association was found between several criteria selected by keywords, and the four main ones for public ITO were monitoring, performance, relationship and uncertainty, called by the seminal authors of dimensions, because several other criteria are associated with them.

Through the theoretical models, it is observed that each related criterion, or promoting criterion, positively favors or promotes the related dimension.

Following up, a selection of the main themes or dimensions of ITO was made in the selected theoretical models. Through these models, it is observed that each associated criterion, positively favors or promotes the related dimension. The crossing of data between the criteria and the dimensions found and their respective authors, generated the theoretical table of dimensions and ITO performance criteria.

Table 1. Theoretical table of dimensions and ITO criteria by authors.

Dimensions	**Performance**				**Uncertainty**				**Monitoring**				**Report.**			
Authors / Criteria	5	6	7	8	13	14	15	16	1	2	3	4	9	10	11	12
Alaghehband, Rivard, Wu, & Goyette, 2011		X			X				X		X			X		
Aubert, Houde, Patry, & Rivard, 2003		X	X		X	X				X		X	X	X	X	
Blaskovich & Mintchik, 2011		X		X	X	X	X		X	X	X		X	X	X	X
Brown & Potoski, 2003	X				X				X			X	X	X		
Burn & Szeto, 2000	X													X	X	
Coase, 1995	X								X			X			X	
Currie & Guah, 2007	X	X											X	X		
Domberger, Fernandez, & Fiebig, 2000	X		X			X				X	X	X	X		X	
dos Santos, 2013		X			X	X			X		X		X	X	X	
Fairchild, 2004	X	X		X	X				X	X					X	
Fitoussi & Gurbaxani, 2012	X														X	
Geyskens, Steenkamp, & Kumar, 2006		X			X	X			X	X	X		X		X	
Goo & Nam, 2007	X				X					X	X	X	X	X	X	X
Guard, 2011			X										X			
Lin & Hekkala, 2016		X							X	X	X			X		X
Johansson, 2015			X		X					X	X		X			
Joshi, Bollen, Hassink, De Haes, & Van Grembergen, 2018	X	X									X		X	X		

Kale, Singh, & Perlmutter, 2000	X	X	X			X			X		X	X	X	X		
Kern, Willcocks, & Van Heck, 2002	X	X											X	X	X	
Koh, Ang, & Straub, 2004	X	X	X			X			X	X			X		X	
Lacity, Khan, & Yan, 2017	X	X	X		X					X			X	X	X	
Langer & Mani, 2018	X	X	X	X	X		X	X	X		X	X	X	X	X	
Lee & Cavusgil, 2006	X					X			X	X	X		X	X	X	
Liang, Wang, Xue, & Cui, 2016	X								X			X	X	X	X	
Alaghehband, Rivard, Wu, & Goyette , 2011		X			X				X		X			X		
Aubert, Houde, Patry, & Rivard, 2003		X	X		X	X				X		X	X	X	X	
Blaskovich & Mintchik, 2011		X		X	X	X	X		X	X	X		X	X	X	X
Brown & Potoski, 2003	X				X				X			X	X	X		
Burn & Szeto, 2000	X													X	X	
Coase, 1995	X								X			X			X	
Currie & Guah, 2007	X	X											X	X		
Domberger, Fernandez, & Fiebig, 2000	X		X			X				X	X	X	X		X	
dos Santos, 2013		X			X	X			X		X		X	X	X	
Fairchild, 2004	X	X		X	X				X	X					X	
Fitoussi & Gurbaxani, 2012	X														X	
Geyskens, Steenkamp, & Kumar, 2006		X			X	X			X	X	X		X		X	
Goo & Nam, 2007	X				X					X	X	X	X	X	X	X
Guard, 2011			X										X			
Lin & Hekkala, 2016		X							X	X	X			X		X
Johansson, 2015			X		X					X	X		X			
Joshi, Bollen, Hassink, De Haes, & Van Grembergen, 2018	X	X									X		X	X		
Kale, Singh, & Perlmutter, 2000	X	X	X			X			X		X	X	X	X		
Kern, Willcocks, & Van Heck, 2002	X	X											X	X	X	
Koh, Ang, & Straub, 2004	X	X	X			X			X	X			X		X	
Lacity, Khan, & Yan, 2017	X	X	X		X					X			X	X	X	
Langer & Mani, 2018	X	X	X	X	X		X	X	X		X	X	X	X	X	
Lee & Cavusgil, 2006	X					X			X	X	X		X	X	X	
Liang, Wang, Xue, & Cui, 2016	X								X			X	X	X	X	

Source: Authors.

Table 2 identifies the 16 criteria associated with the 4 associated dimensions, whose names could not be placed. The Performance dimension is associated with the criteria Competitiveness, Technical improvement, Cost reduction and Focus on business, the dimension Uncertainty is associated with the criteria Asset specificity, Contract duration, Business risk and Service criticality. For the Monitoring dimension, the Service Level Agreement, Empirical Evidence, Knowledge Transfer and Service Inspection criteria are associated. And for the Relationship dimension, the criteria Quality, Communication, Opportunism and Stakeholders (*stakeholders' engagement)* or simply (*stakeholders)* are associated.

Table 2. Criteria in Table 1.

Criteria	
1- Service level agreement	9- Quality
2- Empirical evidence	10- Communication
3- Transf. of knowledge	11- Opportunism
4- Service inspection	12- Stakeholders
5- Competitiveness	13- Asset specificity
6- Technical improvement	14- Contract duration
7- Cost reduction	15- Business riskBusiness
8-focus	16- Service criticality

Source: Authors.

The following definitions refer to the context of IT outsourcing in public services and their relationship between the main dimensions and the associated criteria, raised in the literature.

The performance dimension occurs when the public company improves its activity in terms of IT, in providing public services, improving training, reducing costs and improving its focus on its mission (Langer & Mani, 2018; Lacity, Khan, & Yan, 2017; Poppo & Zenger, 2002), the Uncertainty dimension can be linked to the outsourcing decision, but in this study it is linked to the criteria for compliance with contractual management and possible risks to the opportunism of the outsourced company (Langer & Mani, 2018 ; Lacity, Khan, & Yan, 2017; Poppo & Zenger, 2002), the monitoring dimension is the inspection or monitoring of the IT outsourced company's services by the public contracting company (Wacker *et al.*,

2016; Soliño & Gago De Santos, 2016; Goo & Nam, 2007) and the relationship dimension refers to the relationship between the public client company and the outsourced company, where there is exchange of knowledge between the employees of both companies (Langer & Mani , 2018; Park *et al.*, 2017; Miranda & Kim, 2006).

The following definitions refer to the context of IT outsourcing in public services and their relationship between the main dimensions and the associated performance criteria, raised in the literature.

The *service level agreement (SLA)* is the criterion related to the commitment that the outsourced IT company assumes to serve the public contracting company according to the criticality level of the problem that it will meet. The SLA helps inspect third-party IT services, as it is a contractual clause and subject to performance measurement. The activities encouraged by companies to be competitive can be controlled by effort when they are subject to good measures (Susarla *et al.*, 2016). The effects of the SLA service level agreement on the relational management of IT outsourcing contracts are significant. The SLA can stimulate a relationship of trust for the success of IT outsourcing, which is well designed (Goo & Nam, 2007).

Competitiveness is the criterion to meet the needs and expectations of the public company linked to IT outsourcing as service improvement, and quality service to the public (Lacity, Khan & Yan,2017; Soliño & Gago De Santos, 2016; Goo & Nam, 2007).

The criterion *communication* is present in the exchange of information or in the dialogue between two or more entities, physical or legal. Communication creates a relationship between the company or the employees who outsource, and the outsourced company, facilitating the exchange of experiences in IT outsourcing of public companies (Lacity *et al.*, 2017; Moon *et al.*, 2016; Liang *et al.*, 2016).

The *criticality of the service* is the criteria establishing a risk of arrest or discontinuation of activity of a public company. Thus, it is considered how much a service may be at risk, establishing a degree of importance, or degree of criticality, defining its importance. Generally, the outsourced service is linked to non-critical or routine activities, and is not linked to the core activity of the public company that outsources (Lacity *et al.*, 2017; Lacity *et al.*, 2011; Poppo & Zenger, 2002).

The *duration of the contract* is related criteria to the contract time that a public company does IT outsourcing, which is always fixed or determined, to avoid uncertainty or risk to the bidding opportunism, preventing the perpetuation of a single supplier (Lu *et al.*,

2018; Martins *et al.* 2017; Blaskovich & Mintchik, 2011, Williamson, 2008, Aubert *et al.*, 2003)

The Criterion *asset specificity* relates to a greater or lesser degree of criticality of an IT outsourcing contract asset, and the influence with which this asset influences transaction costs for a public company that outsources (Lioliou & Zimmermann, 2015; Alaghehband *et al.*, 2011; Lacity *et al.*, 2011).

The Criterion *empirical evidence* (EE)comprises communication services, from the phone, e-mail, etc., which can be used to exchange knowledge between client and outsourced information (Davenport & Prusak, 1998). These evidences are the records that can also be important service records by the outsourced company in accordance with the established contract (Johansson, 2015; Lin & Vaia, 2015; Alaghehband *et al.*, 2011).

The *inspection of services (FS)* is the criterion that represents the activity of systematic control of the object contracted by outsourcing, in the acquisition of goods, rendering of services or in the execution of works, to accompany its execution that must obey the specifications foreseen in the contract. The inspection seeks a degree or level of demand for the control of the contract, according to the criticality of the asset. Considering two outsourcing strategies: one with a single supplier and the other with multiple suppliers, an argument that always threatens to lose business between different suppliers, will induce each supplier to a higher level of performance and quality. With a single outsourcing provider, there is a strong relationship development. While the strategy of a single supplier leaves the company open to opportunistic bargaining and the vulnerability of performance failure, some argue that it can be effective in some situations (Ngwenyama, & Lee, 1997).

The Criterion *business focus* means how much the public company outsources IT seeking greater attention in its mission, and using outsourced IT to streamline and improve the public services it offers (Lacity *et al.*, 2017; Blaskovitch & Mintchik, 2011; Oshri *et al.*, 2008).

The Criterion *stakeholder engagement* represents companies engaged in associative collaboration, from participating in IT tenders, such as those that already provide outsourced services, and that obey the principles of legality, impersonality, morality, publicity and efficiency for companies. public companies (Joshi *et al.*, 2018; Moon *et al.*, 2006).

The *technical improvement* or expertise is the test based on the technical ability of the public company can get with the IT outsourcing to its internal departments, or in providing their services to the population (Joshi *et al.*, 2018; Lin & Hekkala, 2016; Currie & Guah, 2007).

The *opportunism* criterion is related to the use or bad faith that an outsourced company may have when it does not follow the principles of the bidding law in Brazil - Law 8666/1993, such as legality, impersonality, morality and advertising, for public companies (Soliño & Gago De Santos, 2016; Valéro, 2015; Williamson, 2008; Geyskens *et al.*, 2006).

Quality is the criterion which means the possibility of improvement of providing public services for IT outsourcing, across specialties and capabilities that the public company does not have, as well as the improvement of routines and processes (Lu *et al.*, 2018; Lin & Hekkala, 2016; Johansson, 2015).

The Criterion *cost reduction* relates to the strategy of the public company when it outsources a service or process not essential to its business, aiming at greater performance in the provision of public services (Langer & Mani, 2018; Fairchild, 2004; Domberger *et al.*, 2000).

Business *risk* is the criterion associated with the possibility of vulnerability to the business, during the management or execution of ITO, linked to the Uncertainty dimension. It can be present when ITO causes vulnerabilities, both in the corporate environment and in the provision of services to clients (Lacity *et al.*, 2017; Blaskovich & Mintchik, 2011; Young & Jordan, 2002).

The *knowledge transfer (CT)* is the criterion by which one identifies organization and learns the expertise from another organization (Hansen, 1999), making it a key issue for the work globally distributed, as global development projects (Kotlarsky & Oshri, 2005). Since 2010, studies on ITO no longer focus on the problem of the motivation of outsourcing in public companies, but mainly in the relationship with outsourced companies. (Liang *et al.*, 2016). In some cases, the acquisition of outsourced knowledge for the client is so important that there are specific contractual clauses and increased training costs. Excessive customer costs were caused more by the need for greater knowledge transfer than by the need to protect against supplier opportunism (Lacity *et al.*, 2011).

Table 4 shows the four main dimensions, the 16 criteria associated with each one, the keywords and the associated references.

Table 4. Dimensions, criteria and references for ITO.

Dimensions / Criteria	References
Performance	Langer & Mani, 2018; Lacity, Khan, & Yan, 2017; Poppo & Zenger, 2002
- Competitiveness	Lacity, Khan, & Yan, 2017; Soliño & Gago De Santos, 2016; Goo & Nam, 2007
- Technical improvement	Joshi, Bollen Hassink of Haes & Van Grembergen, 2018; Lin & Hekkala, 2016; Currie & Guah, 2007
- Cost reduction	Langer & Mani, 2018; Fairchild, 2004; Domberger, Fernandez, & Fiebig, 2000
- Focus on business	Lacity, Khan, & Yan, 2017; Blaskovich & Mintchik, 2011; Oshri, van Fenema, & Kotlarsky, 2008
Uncertainty	Langer & Mani, 2018; Lacity, Khan, & Yan, 2017; Poppo & Zenger, 2002
- Asset Specificity	Lioliou & Zimmermann, 2015; Alaghehband, Rivard, Wu, & Goyette , 2011; Lacity, Solomon, Yan, & Willcocks, 2011
- Duration of Contract	Martins, Santos, & Vils, 2017; Williamson, 2008; Aubert, Houde, Patry, & Rivard, 2003
- Business risk	Lacity, Khan & Yan, 2017; Blaskovich & Mitchik, 2011; Young & Jordan, 2002
- Criticality Service	Lacity Khan & Yan, 2017; Lacity, Solomon, Yan, & Willcocks, 2011; Poppo & Zenger, 2002
Monitoring	Wacker, Yang, & Sheu, 2016; Soliño & Gago De Santos, 2016; Goo & Nam, 2007
- Service Level Agreement	Lacityagreement,Khan & Yan, 2017; Schermann, Dongus, Yetton, & Krcmar, 2016; Susarla, 2012; Poppo & Zenger, 2002
- Empirical evidence	Soliño & Gago De Santos, 2016; Blaskovich & Mintchik, 2011; Geyskens, Steenkamp, & Kumar, 2006; Domberger, Fernandez, & Fiebig, 2000
- Knowledge Transfer	Langer & Mani, 2018; Wilkin, Couchman, Sohal, & Zutshi, 2016; Dibbern, Winkler, & Heinzl, 2008; Oshri, van Fenema, & Kotlarsky, 2008
- Audit services	Alaghehband, Rivard, Wu, & Goyette , 2011; Blaskovich & Mintchik, 2011; Kern, Willcocks, & Van Heck, 2002; Poppo & Zenger, 2002
Relationship	Langer & Mani, 2018; Park, Lee, Lee, & Koo, 2017; Miranda & Kim, 2006
- Quality	Lu, Hu, Bi, Huang, & Zhao, 2018; Lin & Hekkala, 2016; Johansson, 2015
- Communication	Lacity, Khan, & Yan, 2017; Moon, Choe, Chung, Jung, & Swar, 2016; Liang, Wang, Xue, & Cui, 2016
- Opportunism	Soliño & Gago De Santos, 2016; Williamson, 2008; Geyskens, Steenkamp, & Kumar, 2006
- Mutual Interest	Joshi, Bollen, Hassink, De Haes, & Van Grembergen, 2018; Moon, Choe, Chung, Jung, & Swar, 2016; Zitron, 2006

Source: Authors.

The public ITO does not have a uniformity of concepts in the literature, as it is a very comprehensive subject, which has different fields of activity, encompassing since the top management of companies with IT governance and planning strategic, through the management of specific IT contracts in public companies, with their own legislation, down to the lowest hierarchical levels such as managerial and operational, where IT outsourcing is managed.

It is necessary to consider an inherent difference between public and private companies, because they end up reflecting on how these different sectors deal with IT outsourcing and contract management. As such, it is natural to realize that the same criteria can appear in both contexts, but their criticality orders and their relative weights can differ significantly.

Current studies regarding IT outsourcing are mainly divided into two categories - that is, those focused on the strategic and intentional decision to outsource or those whose focus is the result of this process, or on the strategy carried out (Mintzberg & Waters, 1985; Du *et al.*, 2020). However, the literature lacks a discussion and interpretation of the various relevant criteria during outsourcing, since they affect strategies established in the execution of contracts, especially if linked to different hierarchical levels.

In this sense, this work aims to collaborate with the development of theory by focusing on this intermediate period - the inspection during the contractual execution of public IT. According to the data obtained, there was a general trend of opposition between the strategic and operational hierarchical levels, with different views on contractual management. By having a political-administrative profile, the strategic level follows more the bureaucratic aspects aligned with its role in the company, and as a manager it is concerned with establishing more regulated contracts and more restrictive clauses, in order not to suffer eventual opportunism from the outsourced company. In addition, it seeks to protect its position in the organizational structure - which is indicative of agency problems.

The literature review raised four main dimensions (except those linked to local legislation) that can have a significant impact on the public performance of IT outsourcing (Monitoring, Performance, Relationship and Uncertainty). The analysis carried out validate these criteria for the context of public agencies, but in a different order of criticality and weight. This may cause future studies to reconsider their results and results, since their

measured behavior may differ from what is expected in the literature due to this incompatibility.

5. Final Considerations

Most studies on public IT outsourcing do not consider the expenses and criticality of monitoring or supervising contracts with third parties for their success. On the other hand, IT outsourcing in the public sector does not receive as much attention from the scientific literature. This research points to the possibility that studies on public IT outsourcing suffer distortions in the application of theory and empirical measurement due to the adoption of private IT outsourcing without adaptation. It was observed that during the literature review it was found that most of the literature studies consider outsourcing private IT, with a gap for outsourcing studies in the public sector.

This research contributes in a practical way to broaden the understanding of ITO contract management and inspection in public companies, such as the relationship with supplier companies, the aspect of legal regulation, and the way in which contract managers and inspectors view ITO.

The understanding in the relationship between public ITO suppliers and public customers is broadened, since ITO suppliers gradually improve service provision (Du *et al.*, 2020), through contractual renewals or additive terms, which extend contract times, and a greater relationship between supplier collaborators and contract inspectors, providing a better understanding of the needs and profile of the public client.

On the other hand, this research corroborates with the literature in understanding about the great regulation of the Brazilian legislation in force for public ITO, resembling the strategy imposed by the environment (Mintzberg & Waters, 1985), creating limitations to the public company, compared to private companies which have contracts with greater flexibility, award clauses instead of just punitive clauses, impacting proactivity and increased profits.

Another contribution that stands out is the importance of the public ITO contract inspector, in having technical knowledge for the fulfillment of the execution, inspection and registration of contractual occurrences (da Costa, 2013), as the results of the Operational level are presented to the EAT criterion Asset specificity in the Uncertainty dimension.

The limitations of this research refer to its regionality: the data were collected in only one country (Brazil), as it is an advantage in terms of comparison (Brazil has very conservative legislation that does not allow flexible public-private partnerships as in other

countries), this can be a problem for replication. Another limitation is the fact that Brazil is going through a serious financial crisis that can affect high-level responses, with repercussions on academic production (Martins & Lucato, 2018; Martins *et al.*, 2017; Martins *et al.*, 2020). In a practical way, (Huff, 2008) suggests that, in a conservative way, beginning researchers stick to new contributions, but in properly established domains.

This research presents gaps for future research as a study of public IT outsourcing management considering contract assets that can be supervised, monitored or controlled, for a possible inclusion of more flexible contract clauses during the execution of the IT contract, emphasizing greater contractual management by stakeholders, and greater knowledge sharing between IT outsourcers and public companies.

On the other hand, although Brazilian laws do not specify a specific profile for the management and inspection of contracts, this study also contributes to the discussion of three different hierarchical views for the management and inspection of ITO contracts in public companies.

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