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INFORMATION SYSTEMS INSTITUTIONALIZATION IMPACT ON THE INTENTION TO COMMIT CORRUPTION IN BRAZILIAN PUBLIC HEALTH ORGANIZATIONS

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1. INTRODUCTION

Corruption is a major problem that occurs in all countries, whatever their political, economic or legal system, although the intensity and scale may differ (Brol, 2016). Its consequences affect bureaucratic policies, complicate regulations and procedures and, above all, waste economic resources (Aladwani, 2016).

One of the main consequences of corruption is that it can slow a country's growth either due to lack of investment or to financial misappropriation, causing internal inefficiencies in the market, further affecting the population and accentuating poverty and low economic development (Habib & Zurawicki, 2002). It mainly affects lower social classes citizens (Rose-Ackerman, 1999), which is why corruption is considered negative and unfair from a social perspective (Brol, 2016).

Corruption has been studied in public organizations (Tanzi & Davoodi, 1998), private organizations (Borini & Grisi, 2009), and more broadly, in society (Carraro & Damé, 2007). Within such studies, the analysis may occur at a macro level up to a micro level, considering countries (Gouvea, Montoya, & Walsh, 2013), organizations (Garcia, 2003) or society and the individual.

In the literature, there are very different approaches towards the study of corruption, examining several dimensions, in particular, the legal, the economic, the political, the cultural and the administrative. Each of these dimensions provides insights into the corruption vulnerabilities and the possible ways to reduce its occurrence or intensity.

There are a number of vulnerabilities in relation to corruption, such as lack of planning, weak management, lack of enforcement, poor enforcement of laws, overly centralized public administration (Nishijima, Postali, & Rocha, 2017), ineffective information systems (Barros & Rodrigues, 2017), and lack of effectiveness in controlling the organization (Rodrigues, Santos, & Faroni, 2018). These vulnerabilities can lead to undesirable events, such as bribery or kickbacks, among other types of corruption. However, such vulnerabilities are often treated merely as pertaining to the honesty of individuals (D'Souza, Aragão, & Luca, 2018), focusing only on behavior and a lack of morals and ethics, while failing to adequately take into account institutional management measures (Olivieri, Martinelli, Massucatto, & Silva, 2018).

Corruption is unlikely to be substantially reduced without changing the way governments operate (Tanzi, 1998). Lack of control, for example, is strongly related with corruption, especially when the rules of internal controls are unclear (Oliveira, 2006). It is necessary to Improve management, however, not only in areas focused on fraud prevention, but throughout the organization (Olivieri et al., 2018).

An efficient means of improving management is the adoption of management information systems (MIS). In public organizations, of particular note are the best services for citizens, and efforts to achieve greater transparency, open government and participation, supported by information and communication technology (ICT) (Srivastava, Teo, & Devaraj, 2016).

One way of achieving those goals is to create control tools that enable improved management (Olivieri et al., 2018). This justifies the study of institutionalization, which in the case of this article focuses on health MIS. Nevertheless, the simple adoption of information

systems by public organizations does not guarantee the effectiveness of the services or that, as a consequence, vulnerabilities to corruption will be reduced to corruption.

Brazil has suffered from acts of corruption for many years, which some of the most notorious cases are the budget dwarfs, monthly allowances and car wash operation. The current estimated cost to the public coffers of the fifteen largest corruption cases in Brazil are around 207.37 billion reais (Basilio, 2015; CGU, 2020). Nevertheless, one sector where there is a considerable amount of corruption is public. In Brazil, data from the Comptroller General of the Union (CGU) show that, since 2003, 416 investigative operations have been conducted, involving an estimated loss to the public coffers of more than R$ 5 billion. And that about 28% of the operations (118) involve money intended for health (CGU, 2020).

Many cases of corruption in the health sector occur due to the lack of adequate management of the resources received. However, having a system in place is not enough, rather, the adherence on the part of employees must be high, it must be recognized for its importance, generate value in decision making, and the process must be documented, that is, it be institutionalized.

Considering the complexity of the health sector, the public health management policies completely affect the private sector and turn the subject an international matter, provided health sector suppliers are usually multinational companies. This research focuses on the public area, investigating the impacts of the health management digitalization, represented here by the adoption of a health MIS, on the corruption practices from a behavioral perspective. In this context, the objective of this article is to verify the relationship among Management Information Systems (MIS) institutionalization, corruption vulnerabilities and the intention to commit acts of corruption.

2. THEORETICAL BACKGROUND

This section presents the theoretical precepts that guide this study.

2.1 Corruption Vulnerabilities

Literature includes several definitions regarding corruption. Heeks (1998) affirms the global nature of the problem, and adds that corruption is the induction to error by bribery or other illegal or improper means. Lambsdorff (2002) highlights that corruption is a malevolent arrangement, which is intended to break established rules to obtain private benefits, between one or more individuals with a third party. The author also highlights the presence of a principal agent, who has control over rewards, penalties and legal systems.

In the present article corruption is conceived as acts in which the power of public officials is used for personal gain in a way that violates the rules in force (Jain, 2001). These rules can be both legislation, and what is considered appropriate in a given population group, according to cultural aspects. The acts refer to several types of financial and administrative infractions, such as bribes, misappropriation, nepotism, abuse of authority and extortion (Rose-Ackerman, 1999), in addition to embezzlement, theft, abuse of power and favoritism, exploiting conflicts of interest and the absence of adequate policies to prevent such acts (UNODC, 2004). It should be mentioned that such a violation of rules may occur due to vulnerabilities. A vulnerability is a weakness that can be exploited by threats (Stoneburner, Goguen, & Feringa, 2002) that allows an incident to occur, in relation to an asset that processes or manipulates information.

Ionescu (2016) demonstrates that the smaller the amount of manual labor, the lower the level of corruption, and concluded that wider dissemination of information can decrease corruption. Increasingly, ICTs and information are being used to support management through information systems, first, due to the emergence of new paradigms resulting from the

progress of ICT, and second, due to the globalization and growing influence of non-governmental organizations (Rossel & Finger, 2007).

2.2 Institutionalization of Health Management Information Systems

The implementation of information systems is a way to improve management, however, it is a long process that requires maturation and acculturation (Lapointe & Rivard, 2007). In practice, organizations strive to complete and institutionalize technology and systems projects (Purao, Desouza, & Becker, 2012).

A process of maturation is necessary for the system to become institutionalized, which provides important contributions to the organization's management, through interactions in the cultural and political context, as well as the processes resulting from employee action (Fachin & Mendonça, 2003). The adoption of ICTs, including information systems (King et al., 2011), can be understood through institutional factors. Normative, regulatory and cognitive factors influence the adoption of ICTs in public administration (Scott, 2008). For which reason, the institutionalization of MIS may be influenced by the context in which they are inserted.

2.3 Theoretical Model

In organizations, according to Filgueiras e Melo Aranha (2011), institutional standards are not equally applied, that is, there is no universal procedure. For the authors, it is essential to value and ensure mechanisms for institutional change that improve procedures, especially with regard to the application of institutional rules, in the direct relationship with citizens. Among these mechanisms are ICTs, and especially MIS, as their progress is an important aspect for the modernization of public service management, improving internal control (Barros & Rodrigues, 2017).

Based on this foundation, the following hypothesis was established:

H1 = The greater the institutionalization of health information systems, the greater the internal control.

When it comes to institutionalization, Fountain (2004) highlights that the institutional perspective is suitable for analyzing the relationships between ICTs, organizations, and institutional and social arrangements. In the governmental context, ICTs have been used to increase efficiency and reduce bureaucracy in public organizations (Meijer & Bolívar, 2016). Among the many ICTs, MIS have the potential to improve information management, the service to citizens, the organization of processes, and shorten queues and reduce bureaucracy (Barbosa et al., 2016).

Thus, based on these concepts, the following hypothesis was established:

H2 = The greater the institutionalization of health management information systems, the greater the reduction in bureaucracy.

Together with reducing bureaucracy, accountability is another important factor in management. According to Kluvers e Tippett (2010), accountability is the responsibility of public agencies to ensure good management of public money. One of the purposes of accountability is the participation of civil society in public affairs (Puppim de Oliveira, 2017) in a more direct way (Barros & Rodrigues, 2017). That participation is intended to improve the efficiency of public resources, through good management. The management of public resources must be controlled, and that control can be achieved with the use of MIS.

According to Amuna et al. (2017), the role of MIS is to facilitate user operations and control daily tasks, in order to improve the quality of the services offered. Well-defined and documented processes lead to good management and a clear understanding of the roles and responsibilities of civil servants (Taylor & Buranelli, 2007).

Based on this, the following hypothesis was established:

H3 = The greater the institutionalization of health information systems, the greater the accountability.

Transparency is closely related to accountability. Transparency, when applied to public management, is much more than making the population aware of management conduct in a public organization (Mendes et al., 2008; Galvão, 2016a). Transparency can provide better organizational management (Jardim, 2008).

Effective management is achieved through defined processes and roles and also by means of ICTs. When information systems are socially disseminated, that is, institutionalized, they have the capacity to produce new controls and organizational process paradigms, as well as to ensure citizens the access to information (Jardim, 2008).

From this, the following hypothesis was established:

H4= The greater the institutionalization of health information systems, the greater the transparency.

ICTs, through institutionalized IS, tend to improve transparency, accountability, internal control and reduce bureaucracy. The expected improvement lies in the management of the public agency's daily activities, however, indirectly it can contribute to the reduction of corruption.

Four factors can lead to corruption: skills, confidence, access, and control (Heeks, 1998). These factors can be related to heath information systems and their role and contribution on reducing vulnerability to corruption.

The system can be seen to provide a form of control, since many organizations do not excel in terms of competence and internal administration, as they often have poor management practices and poorly qualified human resources, which can lead to corruption and inefficiency in the government (Sodré & Alves, 2010). According to Olivieri et al. (2018), corruption will decrease if the opportunities for corruption are minimized. And one to do that is to create internal control tools that improve management.

Based on that concept, the following hypothesis was established:

H5 = The greater the internal control, the lesser the intention to commit acts of corruption.

In addition to internal control, individual behavior can be affected by vulnerable bureaucratic systems that can lead to corruption, even when that behavior is based on ethical principles and beliefs (Santos et al., 2013). Environments involving an excessive number of bureaucratic procedures can encourage acts of corruption between companies and public agents, in order to reduce the unreasonable time required for all the bureaucratic steps (Carraro, Menezes, Canever, & Fernandes, 2011). According to Reis (2015), excessive regulations and qualifications, and the precariousness of documents, are common practices that encourage corruption.

Based on this, the following hypothesis was established:

H6 = The greater the reduction in bureaucracy, the lesser the intention to commit acts of corruption.

High levels of bureaucratization can even affect accountability and consequently acts of corruption. According to Correia et al. (2015a), increased transparency and accountability in public management can inhibit corruption, especially due to the pressure exerted by citizens. However, it is necessary to facilitate access to public information. Accountability influences public transparency and, consequently, contributes to the fight against corruption (Mendes et al., 2008). Especially when it is clear who is responsible for what, to whom, and when (Benedicto, Júnior, Pereira, & Andrade, 2013). Accountability involves the manager's desire to make the organization's information available, offering greater interactivity and usefulness to other stakeholders, in the quest for more open dialogue (Pinho, Iglesias, & Souza, 2005).

Based on this, the following hypothesis was established:

H7 = The greater the accountability, the lesser the intention to commit acts of corruption.

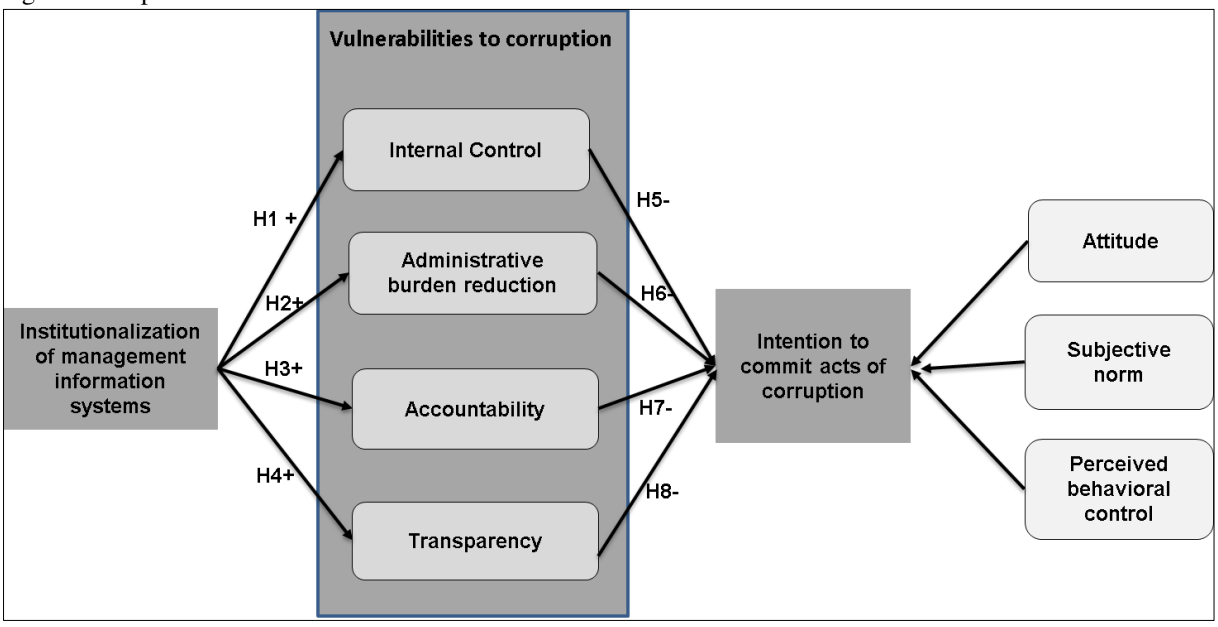
Business transparency increases the likelihood of discovering corrupt actions (Halter, de Arruda, & Halter, 2009). For Sacramento e Pinho (2007), in a public organization, transparency is an instrument that can be used to reduce the intention to commit acts of corruption and increase democracy between the state and society. In Brazil, transparency in public administration is a fundamental condition for advancing the process of consolidating democracy and reducing corruption (Pereira, 2005).

Based on these concepts, the following hypothesis was established:

H8 = The greater the transparency, the lesser the intention to commit acts of corruption.

Figure 1 presents the summary of the proposed model with the constructs and established hypotheses.

Figure 1: Proposed theoretical model



Captions: Research constructs and hypothesis illustration

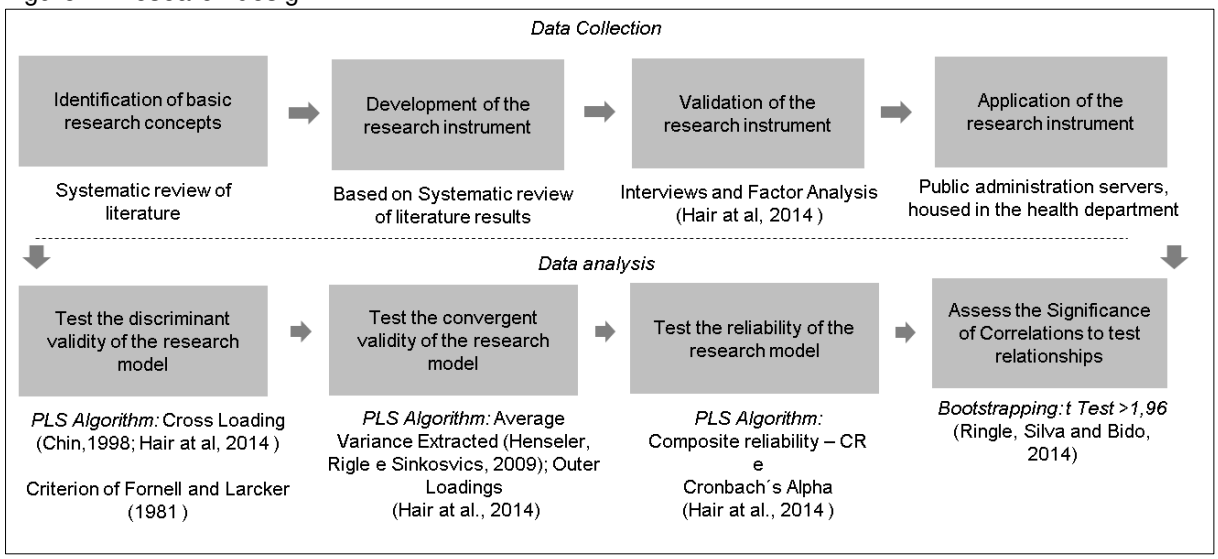
The next section describes the methodological procedures adopted in testing the model.

3. RESEARCH METHOD

This is a descriptive and exploratory cross-sectional study, with a mixed focus, with regard to the nature of the data, and due to the data collection and analysis techniques used. Figure 2 shows the main methodological steps used in this study.

The theoretical lens adopted is Institutional Theory as described by Tolbert e Zucker (1996), according to which institutionalization is a set of typified actions that are made habitual by specific actors and as the levels of institutionalization advance, the social relations tend to become stronger. As well as institutional theory, the article also used the Theory of Planned Behavior - TPB (Ajzen, 1991) adapted to the model called corrupt action (Rabl & Kuhlmann, 2008).

Figure 2: Research design



Captions: Research steps identifying each collection and analysis strategy, natural for data collection and data analysis

3.1. Phase 1 – Descriptive Phase

A systematic review was conducted to identify the vulnerabilities to corruption linked to the Brazilian public sector. The search involved ten stages, divided into three phases, namely, planning, conducting, and reporting the review (Brereton, Kitchenham, Budgen, Turner, & Khalil, 2007). Ten databases were used in the survey, which initially identified 525 articles, of which, following the review stages, 227 remained for analysis.

After having found 33 possible vulnerabilities, a first discussion was held, with four scholars in the field (one post-Ph.D., one Ph.D. and two Masters). The discussions and analysis resulted in a grouping according to the evidence and explanation of each of the vulnerabilities, which left 15 vulnerabilities.

The first five vulnerabilities in the theoretical model were selected, first, because they are the most important, representing more than 56% of the total. Moreover, the four vulnerabilities (ineffective control, excessive bureaucracy, lack of adequate accountability and auditing, and ineffective or absent transparency) refer to management and are interconnected or associated with IS.

3.2. Phase 2 – Exploratory Phase

3.2.1. Building the research instrument

The data collection instrument was developed based on the proposed model. After creating the instrument, a pre-test involving eight specialists was carried out (Converse & Presser, 1986; Gil, 2009; Krosnick, 2018). A pilot test was carried out among public administration employees, using a printed form containing 87 valid responses. The number of participants in the pilot test was defined with the help of the free software G* Power 3.1.9 (Faul, Erdfelder, Buchner, & Lang, 2009).

With the aim of improving the data collection instrument, validation procedures were performed using SPSS® software. The Kaiser-Meyer-Olkin (KMO), Cronbach's alpha and Principal Components Analysis (PCA) tests were conducted. The KMO was acceptable, 0.829 (Hair, Anderson, & Tatham, 1987) and reliable, with a Cronbach's Alpha of 0.937 (Hair, Hult, Ringle, & Sarstedt, 2014). The PCA (with varimax-rotation) was performed without defining

the number of factors to be extracted (Hair et al., 2014). The value showed that 14 factors correspond to 89.68% of the total explained variance.

3.2.2. Data analysis technique

SmartPLS® software was used in the structural equation modelling with partial least squares estimation (PLS-SEM). The relationships between the constructs and their indicators of Composite Confidence, Average Variance Extracted (AVE) and Discriminant Validity were analyzed (Hair et al., 2006).

Using a printed questionnaire, the survey was conducted with the health department staff of municipalities in the State of Paraná, Brazil, and the result was 355 valid cases.

Within the SmartPLS®, convergent validity was performed to check the Average Extracted Variance (AVE) (Henseler, Ringle, & Sinkovics, 2009) and the discriminant validity (Hair et al., 2014), using Cross Loading (Ringle, Silva, & Bido, 2014). Additionally, the Fornell and Larcker criterion (Fornell & Larcker, 1981) was used to compare the loads to the squared values of the Average Variances Extracted (AVE) for each factor.

Next, Pearson's determination coefficients (R2) were noted (Ringle et al., 2014). Convergent validity analysis through the AVEs was also conducted, using Fornell and Larcker criterion. After that, the values of internal consistency (Cronbach's Alpha) and Composite Reliability (CC) were checked (Hair et al., 2014).

The Student's *t* test was used to check the data values and the ones obtained using the resampling technique, for each correlation between the latent and observed variables, through the Bootstrapping module, which presents the *t* test values instead of the p-values. Values above 1.96 have high degrees of freedom (Ringle et al., 2014).

The last analysis tested the Stone-Geisser indicator or the predictive validity (Q2), which assessed the model's prediction quality or the accuracy of the adjusted model, which needs to present a value above zero (Hair et al., 2014). Another analyzed item was the Cohen indicator, which represents the size of the effect (f2) or to what extension each construct is important to the model adjustment (Ringle et al., 2014). Finally, path analysis was undertaken, defining them as the beta values of simple or ordinary linear regressions (Braga Junior, Satolo, Gabriel, & Silva, 2014). To ensure the validity of the model, it was necessary to adapt and consequently eliminate 12 observable variables.

4. RESULTS

There are several vulnerabilities in relation to corruption in Brazil. One result of this study was the identification of fifteen vulnerabilities to corruption in the systematic review of the literature, namely: ineffective control; corrupt behavior of public and political agents; excessive bureaucracy; lack of accountability and adequate audits; ineffective or absent transparency; impunity; a fragile political electoral system; low citizen participation; ineffective public governance; the 'finding a way, no matter what' practice of doing business; a widespread perception of corruption in relation to government institutions; misuse of public agents' discretionary power; high tolerance of illegal behavior; weak citizen-government relationship and inequalities.

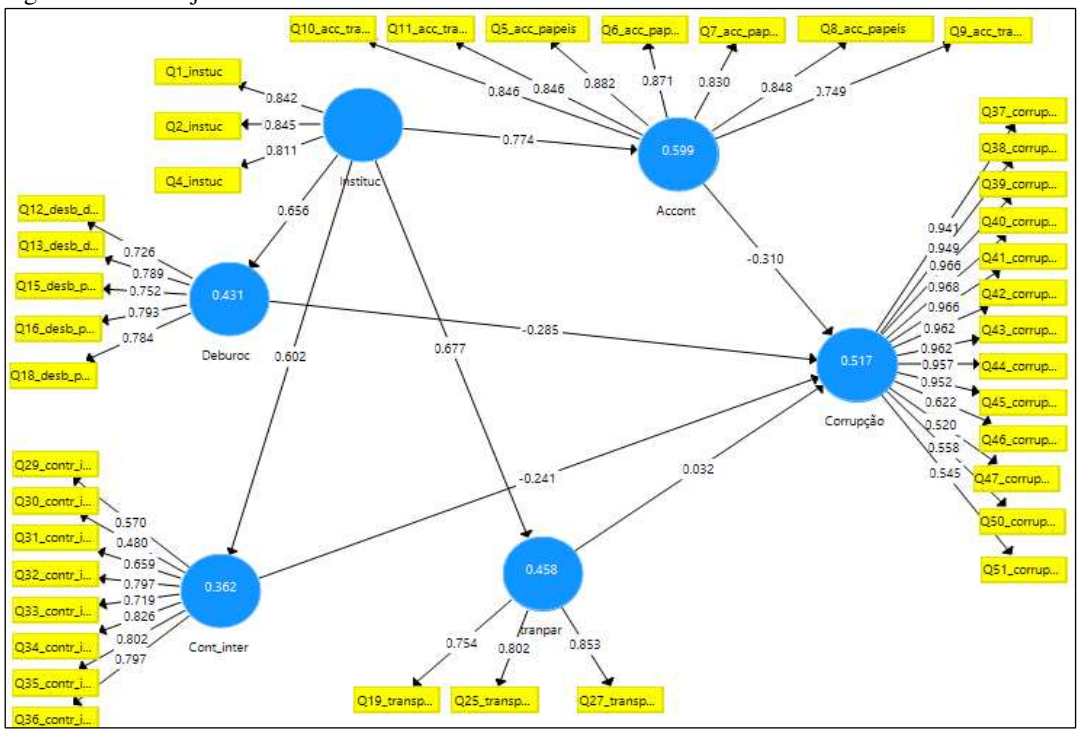
The vulnerabilities, Internal Control, administrative burden reduction, Accountability and transparency were tested in the model. The test results and the reference values described in the literature, as recommended by each author, are shown in Table 1, based on Ringle et al. (2014).

Table 1: Reference values for the Quantitative Tests

Function	Criterion – Procedure– indicator	Model values	Reference
Convergent Validity	AVE > 0.50	Accountability (0.705) Internal control (0.513) Corruption (0.733) Administrative burden reduction (0.592) Institutionalization (0.693) Transparency (0.647)	(Henseler et al., 2009)
Discriminant Validity	Higher loads in the original Latent Variables than in others	Adequate in the constructs themselves	(Chin, 1998)
	Square roots of AVE values> in Pearson correlations, between constructs	Accountability (0.840) Internal control (0.716) Corruption (0.856) Administrative burden reduction (0.769) Institutionalization (0.833) Transparency (0.804)	(Fornell & Larcker, 1981)
Model reliability	Cronbach's Alpha> 0.70 and Composite Reliability> 0.70	Accountability (0.930), (0.944) Internal control (0.862), (0.891) Corruption (0.964), (0.971) Administrative burden reduction (0.827), (0.879) Institutionalization (0.779), (0.872) Transparency (0.731), (0.846)	(Hair et al., 2014)
Evaluation of significance, correlations and regressions	Student's *t* Test>1.96	Accountability -> Corruption (3.415) Internal control -> Corruption (3.949) Administrative burden reduction -> Corruption (3.778) Institutionalization ->Accountability (29.933) Institutionalization -> Internal control (11.674) Institutionalization -> Administrative burden reduction (13.715) Institutionalization ->Transparency (14.314) Transparency -> Corruption (0.511)	(Hair *et al.*, 2014)
Evaluates that portion of variance of endogenous variables explained by the structural model	R^2> 0.02 small effect R^2> 0.13 medium effect R^2> 0.26 large effect	Accountability (0.599) Internal control (0.362) Corruption (0.517) Administrative burden reduction (0.431) Transparency (0.458)	(Cohen, 1988)
Evaluation of the usefulness of each construct in adjusting the model	Effect size f^2> 0.02 small effect f^2> 0.15 medium effect f^2> 0.35 large effect	Constructs Valid, except "Transparency" com 0.001.	(Hair *et al.*, 2014)
Evaluates the accuracy of the adjusted model	Predictive validity Q^2 or Stone-Geisser>0 indicator	Accountability (0.389) Internal control (0.170) Corruption (0.341) Administrative burden reduction (0.239) Institutionalization (0.371) Transparency (0.276)	(Hair *et al.*, 2014)

The final model adjusted in SmartPLS® is shown in Figure 3.

Figure 3: Final adjusted model



Captions: Result of the analysis of the constructs and their latent variables in Smart PLS

Vulnerabilities somehow end up affecting citizens, especially those most in need, that is, citizens from the lower social classes (Rose-Ackerman, 1999), who need state assistance, such as education and health.

In Brazil, public health is provided and regulated by the Unified Health System - SUS. Many Brazilians need assistance from the SUS and, therefore, public resources for health must be very well applied. But unfortunately, this is not always the case, just consider the investigations and operations carried out by the CGU. More than a quarter of the total investigations carried out by the agency involved money allocated to the health sector, which can be explained exactly by the large amount allocated in the annual budget. On average, the federal government spends about 3.8% of the country's GDP on health, a figure that reached 147.43 billion reais in 2019, according to the transparency portal ("Portal da Transparência," 2020). According to the Federal Constitution, each municipality must invest 15%, and each state 12%, of its health budget.

Managing those resources requires good management from the public organization, that is, effective management, with the purpose of managing financial resources, to serve the population in an appropriate way. However, due to the COVID-19 pandemic, the rules of public contracting were temporarily more flexible. This extreme situation changed the focus from being in compliance with all regulations to fast response, and consequently reduced the internal and external controls. With this flexibilization, opportunist companies raised aiming at profiteering out of public resources to attend population. Overbilling evidence over 1.5 billion BRL on masks, vaccines and other supplies are being investigated (CGU, 2020).

The management must have mechanisms to avoid misuse of resources through acts of corruption, such as: misappropriation, kickbacks, improper favoring, and bribes, among others. One such mechanism may be the adoption of a management IS, which, as a result of the increased internal control, accountability, transparency, and reduced bureaucracy, diminish the public official's intention to commit an act of corruption.

As evidenced in this article, the more institutionalized a health management IS, the greater the internal control within the health department. According to Barros e Rodrigues (2017), an institutionalized management IS contributes to decision making, that is, the information generated by the system permits quick decisions, positively affecting internal control.

As a result of this article, it is also possible to state that the greater the institutionalization of health management IS, the greater the reduction in bureaucracy. One way to reduce bureaucracy is to replace paper services with electronic services, through the efficiency and intelligence of MIS. Thus, it is necessary to create ways to reduce the bureaucracy involved in processes and not just let the bureaucracy become digitized. Evidently, a certain level of bureaucratization is necessary, as bureaucracy seeks impartiality, providing greater rigidity in order to bring greater efficiency to the public sector (Campelo, 2010). The institutionalization of MIS enhances that process.

It is evident in this article that the greater the reduction of bureaucracy, the lower the intention to commit acts of corruption. Decentralization, automation, and simplification of processes are vital elements for this relationship since it is necessary to make transaction more agile and more resolute. Corruption when studied from the point of view of bureaucracy, involves a private agent and a public agent, and one aspect is the bureaucratic and often time-consuming procedures.

Efficiency in the public sector is also related to accountability. According to Bresser-Pereira e Grau (2006, p. 47) "accountability is an efficient instrument to improve public services and develop the state's capacity to respond to citizens' demands", and MIS play a role in facilitating user operations and controlling everyday tasks (Amuna et al., 2017), in order to improve the quality of the services offered and provide good quality accounts. The good relationship found between MIS and accountability shows that accountability occurs, partly due to the access to information by the population and partly due to the clarity in the roles and responsibilities of civil servants (Nakagawa, 1998).

Accountability in public management can inhibit corruption, mainly due to the pressure exerted by citizens, however, there must be easy access to public information (Correia et al., 2015). In this study, the proposed intention to commit acts of corruption is strongly related to management, due to the administrative rules and procedures performed by civil servants in order to follow, ignore or circumvent those rules. However, accountability contributes exactly at this point, since it influences public transparency and, consequently, contributes to the fight against corruption (Mendes et al., 2008), in addition to making it clear who is responsible for a given task, to whom the public official needs to respond, and when he needs to be held accountable (Benedicto et al., 2013).

Although transparency is extremely important, no significant relationship with the intention of committing acts of corruption was found. A very important factor here is that for the adjustment of the model, practically all questions related to citizen participation had to be excluded, that is, the respondents do not consider that society participates in their workplaces and consequently in their activities.

Transparency may be absent for two reasons. First due to the issue of technology, in the sense of having necessary investments. The second reason may be the unwillingness on the part of government, because in this case it would expose the problems, and mainly the wrong attitudes of their government. The lack of information in this case means the population that needs public health is at the mercy of the goodwill of the executors, mainly because those that depend on the SUS are often humble people with low levels of education.

With greater control of processes, mainly through the use of institutionalized MIS, there is also a greater chance of perpetrators being caught committing an act of corruption. The biggest problem in relation to corruption is the form of control, as many municipalities

have poor management practices and also have poorly qualified human resources, which can lead to corruption and inefficiency in the government (Sodré & Alves, 2010). Furthermore, control can also be flawed due to the size of the government, as the demand for corruption is likely to be lower in a country with a small government (Ray & Das, 2015).

On the other hand, in smaller cities control is often hampered by the scarcity of financial resources and the complexity of establishing control. Often, small municipalities do not have the resources available to create and/or improve systematic internal control mechanisms (Galvão, 2016a), or to create control tools that, preventively, concomitantly, and subsequently establish an environment that is hostile "to fraud and corruption" (Ramos, 2010). However, this issue requires further discussion, because, when looking at the descriptions of the CGU's investigations, one realizes that many of the acts of corruption occur in small municipalities, with relatively large resources. To illustrate, a small municipality in the state of Rondônia approximately R$ 18 million was misappropriated between 2011 and 2015, while the annual revenue was R$ 20 million (CGU, 2020).

Thus, corruption at the local level in Brazil, as in many other countries, has become a general concern (Rose-Ackerman, 1999). Despite being a very old assertion, it remains true, and unfortunately in Brazil, this situation is very current.

> Corruption will decrease as the opportunities that lead to its occurrence diminish. This statement, although simple, has the power to indicate the way forward: to create control tools that, preventively, concomitantly and subsequently, establish an environment hostile to fraud and corruption (Ramos, 2010, p. 21).

The study by Rabl e Kuhlmann (2008) identified three main factors that influence the decision-making process: the individual's attitude towards corruption, the subjective norm, and the perceived behaviors. The attitude and the subjective norm explain almost half of the intention to misbehave related to corruption, having the attitude the highest rate, practically explaining the corruption model (Rabl & Kuhlmann, 2008).

Individuals favor behaviors believed to have desirable consequences and disfavor those behaviors linked to undesirable consequences (Ajzen, 1991). Decision making has a direct relationship with behavioral attitudes, since judgments regarding what is favorable or unfavorable will be based on decisions taken by the person himself. And here lies the problem, because a person, and in the context of this study, a civil servant, executes his intention to behave according to the opportunity presented. According to Sobral e Islam (2013), even if the person is willing to act ethically, when he perceives an opportunity that will provide him an advantage, he tends to take it, even if it is ethically questionable.

It is crucial to establish effective control mechanisms to reduce opportunities for corruption. These mechanisms can provide higher transparency and a reasonable probability of detecting corrupt acts by providing adequate documentation and records in the work environment, complemented by institutional control and support tools that assist in identifying corruption (Rabl & Kuhlmann, 2008).

MIS can provide support to achieve these goals. In the initial, or pre-institutional, stage (Tolbert & Zucker, 1996), MIS tend to have an imitative characteristic, with their use being optional, a high operational failure rate and, importantly, generating little value in decision making. In the semi-institutional stage (Tolbert & Zucker, 1996), the use of the system is formally or informally agreed as a rule and most groups recognize its importance and the failure rate is average. However, there is still a low adherence on the part of employees.

The institutionalization of MIS results in more clearly understood norms and rules and an internalized organizational identity that is more fluidly disseminated among employees with more fluidity, leading people to work together, and mainly to constantly seek the

institutionalization of the processes within the public organization. As institutionalization levels advance, social relations tend to become stronger (Tolbert & Zucker, 1996).

The findings in the article corroborate those of Rabl e Kuhlmann (2008), namely, that an MIS can contribute to reducing the intention to commit acts of corruption.

5. FINAL REMARKS

The main aim of the article was to propose a model of relationships between MIS, vulnerabilities to corruption and the intention to commit acts of corruption. Elements from two theories were used to elaborate the basis of the model was built and tested: Institutional theory (Tolbert & Zucker, 1996); and the theory of planned behavior TBP (Ajzen, 1991), which was used as the basis for the model called "corrupt action" (Rabl & Kuhlmann, 2008).

As part of the result, the vulnerabilities to corruption in Brazilian public organizations were identified and categorized. As a further result, the article also highlighted the relationship of the institutionalization of MIS with the intention to commit acts of corruption in Public Organizations. The tests carried out show this relationship exists, that is, MIS, when institutionalized, reduce the individual's intention to commit acts of corruption.

Thus, this relationship has been proven, since the system positively affects the tested vulnerabilities (internal control, administrative burden reduction, accountability and transparency) and the vulnerabilities of internal control, administrative burden reduction and accountability reduce the intention to commit acts of corruption.

The findings of this study provide contributions at the theoretical level for scholars and practical level for public administrators. Accordingly, the first contribution to theoretical and the research field is the identification of the constructs of vulnerability to corruption, namely, internal control, administrative burden reduction, accountability and transparency. Another theoretical contribution is the positive relationship of MIS with each of the vulnerabilities to corruption, proving that the institutionalized systems reduce the vulnerability to corruption, by increasing internal control, accountability, transparency and administrative burden reduction. The third theoretical contribution is the demonstration of the existence of a relationship by which the greater internal control, accountability and reduction in bureaucracy, the smaller the intention to commit acts of corruption.

The fourth theoretical contribution is the identification of the non-significant relationship between the "transparency" and the "Intention to commit acts of corruption", showing that, at least in the health departments of municipalities in Paraná, transparency is not fully implemented. The absence of a relationship between "transparency" and "intention to commit acts of corruption", contradicts the opinion of Odriozola, Sánchez e Etxeberria (2012) that transparency is a tool against corruption. A fifth theoretical contribution is the list of vulnerabilities to corruption found in the literature, which can be understood to represent Brazil's main weaknesses in relation to corruption.

As a practical contribution, it is possible to gauge the level of institutionalization of the MIS used, in order to ensure good management within the organization. As confirmed in the article, institutionalized MIS have a direct positive relationship with internal control, with accountability and reduced bureaucracy.

Another contribution is the list of vulnerabilities found, which can be useful to public authorities seeking to improve their processes for reducing corruption. Nevertheless, the main practical contribution is to show the importance of institutionalizing an MIS, both for the public and private sectors. According to the findings of this study, MIS have a strong relationship with the individual's decreased intention to commit acts of corruption, as it increases control, accountability and also affects bureaucratic processes.

In fact, the study findings may directly impact public organizations, for example, the fact of having an institutionalized MIS improves the control of public management, enabling the prevention of favoritism when awarding service provision contracts, undue payments to corrupt employees and the waste of medical and hospital supplies. In other words, reducing the opportunities for corruption by increasing control, accountability and reducing bureaucracy and consequently reducing the intention to commit acts of corruption in the public sector.

The study's limitations are related to the predictive capacity of the proposed model, which requires further exploratory tests as well as confirmatory tests to improve the model's relationships. The model only considered the most cited vulnerabilities in the systematic literature review, discarding those less frequently cited. Moreover, there is no a practical validation of the vulnerabilities used in the model. Finally, it was limited to the health departments of the seven largest municipalities in the state of Paraná.

Future studies can be carried out in other contexts, such as the education sector, as it is the ministry that receives the second highest level of funds from the federal government. Another proposed context is the realization of the survey in the area of health in other states, but mainly, in smaller municipalities.

Another study that could be carried out would be the empirical test of the list of vulnerabilities to corruption according to the perception of the general population and also the perception of public officials. In such a study, the transparency vulnerability could be isolated from the proposed model in order to clarify why the relationship is not significant with the intention to commit acts of corruption.

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