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VAT: The effectivity of electronic tax compliance in the face of the determinants of the tax gap

IVA: A eficiência da conformidade tributária digital em face dos determinantes do tax gap

IVA: La eficiencia del cumplimiento tributario digital frente a los determinantes del tax gap

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Abstract
The quest to reduce the informational asymmetry between tax authorities and taxpayers, increasing tax compliance, was one of the main intentions with the implementation of SPED in Brazil. Thus, the need arose to understand its efficiency, as well as its impact on revenue. In this context, this study focused on assessing whether the implementation of SPED had an impact on the ICMS tax gap, from the perspective of tax auditors, using the PLS-SEM structural equation modeling technique. As a result, the significant influence of the tax gap determinants presented in the literature and SPED on the ICMS tax gap was observed, with emphasis on more agile and comprehensive inspections, greater access to taxpayer information, influence on the taxpayer's decision to reduce the portion of amounts to be withheld and the identification of those who declare amounts lower than those due, contributing with legislators and tax authorities in the development of policies to optimize collection.
Keywords: Tax gap; SPED project; Tax compliance

Resumo
A busca pela redução da assimetria informacional entre fisco e contribuintes, aumentando a conformidade tributária, foi uma das principais pretensões com a implementação do SPED no Brasil. Surgiu, assim, a necessidade de avaliar sua eficiência, bem como o seu impacto na arrecadação. Nesse contexto, este estudo concentrou-se em avaliar se a implementação do SPED impactou o *tax gap* do ICMS, sob a ótica dos auditores fiscais, utilizando a técnica de modelagem de equações estruturais PLS-SEM. Como resultado, observou-se a influência significativa dos determinantes do *tax gap* apresentados na literatura e do SPED no *tax gap* do ICMS, com ênfase para as fiscalizações mais ágeis e abrangentes, maior acesso às informações dos contribuintes, influência na decisão do contribuinte em reduzir a parcela dos valores a sonegar e a identificação daqueles que declaram valores menores que os devidos, contribuindo com legisladores e autoridades tributárias no desenvolvimento de políticas para otimização da arrecadação.
Palavras-chave: Gap tributário; SPED; Conformidade fiscal

Resumen
La búsqueda de reducir la asimetría de información entre las autoridades tributarias y los contribuyentes, aumentando el cumplimiento tributario, fue una de las principales intenciones con la implementación de SPED en Brasil. Por lo tanto, surgió la necesidad de comprender su eficiencia, así como su impacto en los ingresos. En este contexto, este estudio se centró en evaluar si la implementación de SPED tuvo un impacto en la brecha tributaria ICMS, desde la perspectiva de los auditores fiscales, utilizando la técnica de modelado de ecuaciones estructurales PLS-SEM. Como resultado se observó la influencia significativa de los determinantes de la brecha tributaria presentados en la literatura y SPED sobre la brecha tributaria del ICMS, con énfasis en fiscalizaciones más ágiles y completas, mayor acceso a la información del contribuyente, influencia en la decisión del contribuyente de reducir la porción de montos a retener y la

identificación de quienes declaran montos inferiores a los adeudados, contribuyendo con los legisladores y autoridades fiscales en el desarrollo de políticas para optimizar la recaudación.
Palabras clave: Brecha Fiscal; Proyecto SPED; Cumplimiento Tributario

1 Introduction

Driven by an environment of economic and political crisis, recent acts of the Brazilian federal government brought to light one of the main challenges faced the political leaders in their mandates: the uncontrollable increase in public spending. The creation of new taxes or the increase of existent ones (historically, the natural alternatives to cover expenses) are no longer accepted peacefully by taxpayers, motivated by the high tax burden. The government, therefore, continues to seek a reduction in the difference between the tax liability, according to the legislation, and the amount that is actually paid, in an attempt to restrict the omission of taxable values through the reduction of asymmetry between tax authorities and taxpayers.

In the literature, a tax gap is defined as the difference between the amount of tax payable by taxpayers under current tax legislation, and the amount collected (Mazur & Plumley, 2007). According to McManus and Warren (2006), the tax gap has been the object of estimates since the 1990s, because it represents taxes owed that prevent the government from maximizing its collection, showing, in numbers, the tax collection inefficiency. OECD and emerging countries have developed models capable of estimating the tax gap, and many have widely disseminated the results, using them as indicators of organizational and individual performance.

With the antagonism between governments and taxpayers, the main action to reduce the tax gap is to reduce the informational asymmetry between them. This reduction is based on the effort of tax authorities to continuously search for more information from the taxpayers. However, recent legal changes allowed the implementation of an electronic tax compliance project, known as SPED - Public Digital Bookkeeping System, involving tax documents, with pilot projects starting in 2006 and mandatory starting in 2008, and accounting and tax bookkeeping as of 2008, implemented in the state of São Paulo as of 2009, requiring taxpayers to send digitally, at regular intervals, the composition of their accounting and tax balances at a level of detail that would supposedly allow the inspection authorities to verify the origin of all operations carried out by taxpayers.

This research seeks to deepen the understanding of the tax gap and to contribute to the existing literature on the subject using a scenario planned and designed electronically to identify fraudulent and hidden transactions. The research is based on the work by Allingham and Sandmo (1972), who established a paradigm supported by the taxpayer's decision about what part of their revenues they will report to tax authorities evaluating the possibility of inspection and the penalties related to hiding information. Thus, the objective of this study seeks to assess, from the perspective of tax auditors, whether the technological innovations introduced by SPED impacted the ICMS tax gap, a state VAT (value-add tax).

In view of the presented scenario, the analysis of the tax gap from the tax auditors' perspective (considering that they are the main users of the information prepared and sent through the electronic tax compliance), allows a new approach to the studies of the subject, until now based on the taxpayer, who is the responsible for the divergences in information. The analysis by the tax auditors generates information about the outcome of the process and not only the expectations, besides being the only agent or instrument with the ability to evaluate and measure if the enforcement mechanism used helps to reduce the tax gap. The choice of ICMS tax auditors, a tax classified as VAT and which has the most representative collection of the Brazilian GDP, collaborates in filling the gap on the tax gap in taxes on consumption (VAT) and, being Brazilian, in an emerging economy.

For this study, the term "technological innovations" should be considered as the digital techniques used by tax authorities to capture, manage and store information generated by taxpayers, in the quest to reduce information asymmetry. During the period of entry into SPED, the information generated by taxpayers was stored by themselves, on paper or electronically, with the obligation to deliver it to the tax authorities in a reduced form, by sending periodic declarations. After the implementation of SPED, all information on its operations is sent to the tax authorities in real time, allowing for greater depth and scope in its analyses.

This work contributes to the literature on the tax gap, especially regarding the possibility of using electronic tax compliance as a tool. For government officials and public managers, the study contributes by showing the possibility of using the tax gap estimate to assess the legal framework regarding taxes and collection, allowing targeted actions to avoid tax evasion and to direct the efforts to collect more contributions, without the need for new taxes or an increase of current ones.

The work contributes by approaching the increasing amount of information made available to the tax authorities by using electronic tax compliance as a tool to reduce informational asymmetry (between authorities and taxpayers). The study collaborates with the emerging literature on tax evasion and the reduction of the tax gap, covering not only literature on accounting, but also on economics, public finance, and law.

The results of this study provide new information to the literature on the tax gap, especially about taxation on consumption (VAT). Also, it offers insights for new lines of research on proposing measurement models based on the perception of the tax auditor, the identification of variables that affect the tax gap for economies that opt for the tax model based on consumption, and by showing that the implementation of electronic tax compliance tools have helped to reduce the tax gap.

2 Literature Review and Theoretical Foundation of The Hypotheses

2.1 Tax gap

In an scenario in which the tax authorities require taxpayers to calculate the taxes due, the emergence of the tax gap is encouraged, defined as the difference between the amount of tax due by taxpayers under the terms of current tax legislation and the amount that it is timely collected from the government (Mazur & Plumley, 2007), consisting of three components: inability to submit declarations, declarations presented with amounts lower than the actual amounts and inability to pay the amounts declared. In other words, the tax gap is the difference between the taxpayer's tax liability provided for in the legislation and the amount of tax that is paid voluntarily and within the established period.

With greater intensity from the 1970s onwards, different approaches were used to understand tax evasion, one of the components of the tax gap. This is the case of the work of Allingham and Sandmo (1972), considered by many to be a landmark in studies on tax evasion for presenting a first representative model of evaluation on the subject and, thus, serving as the basis for several studies. This evaluation model was based on the taxpayer's decision between declaring all his income to the tax authorities or declaring an income lower than the actual one and, in the case of the latter being his decision, the success of the strategy would be linked to the occurrence or not of an inspection, not being the choice of strategy, therefore, a trivial decision, when considering the risk involved. The work contributed to introduce some insights into the structure of the problem of tax evasion.

To understand the relevance of the tax gap in revenue, the OECD member countries with the largest tax gap proportional to GDP are Italy (13.5%), Estonia (12.9%) and Romania (12.1%), and the smallest are Luxembourg (1.7%), New Zealand (2%) and Canada (2.2%), with an average of 7.7% of GDP (Raczkowski & Mróz, 2018).

Below, the main determinants of the tax gap presented in the literature will be addressed, which are legislation, more specifically with regard to penalties, tax compliance, inspection and technology.

2.2 Legislation

The most representative study on penalties was the publication of Becker (1968) which, based on the theory of crime, sought to identify how much resources and punishment would be necessary to apply different types of legislation, noting that the ideal punishment should be ruled by the cost of capture and sentence of offenders. Allingham and Sandmo (1972) also followed this technique by applying Becker's (1968) proposal to cases of tax evasion, showing that the political procedures to intimidate the trend of tax evasion, one of the components of the tax gap, are the applied rates, the penalty rates and inspection expenses. Thus, the decision to evade will be based, among other factors, on the size of the penalty to be applied if fraud is discovered.

It is noted that, with the predominance of the works of Becker (1968) and Allingham and Sandmo (1972) as references to studies on the tax gap, scientific advice in general values that the battle against tax evasion is based on inspections and high penalties to stimulate rational contributors, with a view to optimizing the usefulness of honestly contributing with their participation (Kirchler; Kogler; & Muehlbacher, 2009). Therefore, the use of penalties is associated with the search to control tax evasion, and consequently, the tax gap.

In this line, the use of penalties is also used to encourage tax compliance, that is, the objective is for taxpayers to follow the tax legislation. However, these penalties are linked to the need to discover the non-compliance, in which case inspections are relevant (Morse, 2008). It may happen, on the other hand, that taxpayers overestimate the probability of a non-compliance being detected and its penalty, which would tend to increase compliance and the expected cost of evasion (Lederman, 2018).

Faced with these concepts, it should be noted that a penalty system that adequately defines tax compliance, but which does not actually work, has only symbolic value. A penalty system that effectively promotes taxpayer conduct that does not result in taxpayer compliance is useless (Doran, 2009).

Considering the indications of the predominant current of the tax gap literature, which points out tax penalties with the exclusive function of encouraging tax compliance which, in turn, influences the tax gap levels, the following hypotheses are suggested:

H1a: *The increase in penalties provided for in tax legislation reduces the tax gap.*

H1b: *The increase in punishments and enforcements contribute to the increase in tax compliance.*

2.3 Tax compliance

Tax compliance has an extremely intrinsic relationship with the tax gap, while in many opportunities the definition of tax compliance is given by the definition of the tax gap itself (Fiscalis, 2016), which is corroborated by the fact that the concept of tax gap, although defined in different ways, in most cases was developed by tax agencies with the aim of capturing tax revenue lost due to non-compliance (Gemmell & Hasseldine, 2012).

The main element of tax compliance is information and aware of its importance for the development of adequate tax policies and elimination of the tax gap, some countries require taxpayers, in addition to their own declarations, to provide information from third parties such as employees, other companies or the sector financial, which corresponds to 95% of the information obtained, making it difficult to practice illegal activities (Raczkowski, 2015). Empirical evidence supports that the existence of third-party tax information, especially associated with a type of withholding tax, leads to high tax compliance, with the reverse also true (Alm & Soled, 2017).

The compliance gaps that affect the tax gap are tax evasion, the most common, tax avoidance and amounts declared by taxpayers, but which were not actually collected (Murphy, 2019). Among these, the results presented by the Internal Revenue Service - IRS already indicated that the largest component of the tax gap is related to declared amounts smaller than the real ones, emphasizing that compliance is greater when there are reports and/or withholding of information from third parties (Fiscalis, 2016).

In the same reasoning, the basic model of individual compliance behavior implies that rational individuals tend to declare income lower than the real one in cases where the information of third parties with whom they relate and the sources of income of employers are imperfect (Alm, 2019). In other words, the most obvious way to increase tax compliance is to demand information from third parties so that it can be confronted (Lederman, 2010).

The literature shows an intrinsic relationship between tax compliance and the tax gap, and their cause and effect is so strong that sometimes the concepts intersect, suggesting that the more representative the tax compliance, the greater the narrowing of the tax gap. Thus, it refers to the following hypothesis:

H2: *Increasing tax compliance requirements through SPED is effective in reducing the tax gap.*

2.4 Inspection

Considering that the traditional inspection model is based on economic crime theory and, as such, treats taxpayers as potential fraudsters and evaders, reducing the tax gap is based on repressive measures such as inspections and penalties (Raczkowski & Mróz, 2018). As a result, the importance of inspection is not to indicate that there are many taxpayers who are evading taxes, but that few have successfully escaped (Lederman, 2018).

The existence of inspections positively affects tax compliance, not only observed in practical studies, but also in empirical studies. A present inspection can increase the expected future punishment for non-compliance, considering that a bad performance suggests to the company that there is a probability of future inspection and detection increases. In such cases, enforcement increases the incentive for compliance. It is also considered, based on studies by Becker (1968), that increasing the frequency of inspections increases the probability of detection, also increasing tax compliance (Telle, 2013).

However, it must be considered that technology in inspections allows the tax authorities to have sufficient and up-to-date information on taxpayers, allowing the use of information from the public and private sectors, including information from the financial sector (Bird & Zolt, 2008).

Despite this, the aggregation of data on inspections is not capable of providing accurate information on tax evasion due to the fact that it focuses on suspicious declarations of non-compliance and, if this focus is successful, the aggregation will overestimate the size of evasion. Thus, the most accurate image comes from random inspections (Slemrod, 2019).

In cases where inspections are known to be revenue-driven, taxpayers react to avoid a more rigorous inspection by reducing their declared revenue to the limit just below the eligibility threshold that would leave them susceptible to this type of inspection. This reaction is heterogeneous among taxpayers according to the traceability of their transactions, indicating that monitoring and information requirements are complementary to increase tax compliance (Almunia et al., 2018).

In the case of monitoring VATs, as well as their inspection, the main feature is the analysis of the paper trails of relations with third parties, trails that are stronger when compared to other taxes, generating more information for the tax authorities and facilitating the collection of taxes. In countries with tools that allow tracking online revenue, such as the system implemented in Brazil, even more information can be provided (Pomeranz, 2015).

With the position of the literature that deals with the subject, two research hypotheses are suggested:

H3a: *SPED-based inspections are more efficient in reducing the tax gap.*

H3b: *The increase in inspections based on SPED induces taxpayers to increase tax compliance.*

2.5 Technology

Good tax administration is not only defined by collection, but also how this collection is carried out in order to collect the revenue stipulated in the legislation in the fairest and most efficient way possible. Not least, tax administrations have focused on the adoption of new information technologies, and it is inconceivable to believe in a modern tax administration that performs its tasks efficiently without the use of information technology (Bird, 2015). Among the functions of the tax administration is to gather information from various sources, public or private, in order to compare it with the information transmitted by the taxpayer. Despite this, all this volume of information is not useful without an efficient monitoring system or technological structure for data collection and storage (Bird & Zolt, 2008).

Thus, tax administrations have always had the basic issue of finding a way to gain access to more information on taxpayers and their activities, which until then were not complete, complete and timely. This was significantly affected by technology, increasing the flow of information available, obviously concentrated in developed countries, but also appearing in developing countries with the support of international organizations, such as the International Monetary Fund - IMF and the World Bank. This information improved the ability to collect taxes by improving the ability to track and analyze the trails of all transactions that leave some kind of trace in the electronic system (Alm, 2021).

Technological advances have allowed for notable improvements in the efficiency of the tax administration process, about ease of processing and increased accuracy. The possibility of using electronic declarations allows the cross-referencing of information with third parties and more efficient targeting of inspection efforts. Empirical evidence supports that the existence of third-party tax reports improves tax compliance, and the reverse is also true (Alm & Soled, 2017).

Given the above without the use of technology, tax authorities need to obtain data from several independent sources to find cases of non-compliance, limiting the performance of detecting tax evasion, as well as the productivity of inspections. With the use of data mining, for example, using techniques with a scientific approach, in addition to saving resources, a large amount of tax data is generated based on standards that can improve the accuracy rates in the screening of tax evasion reports in potential. Thus, voluntary compliance rates are expected to improve, as taxpayers will be aware that their tax returns can be analyzed quickly and scientifically (Wu et al., 2012).

In this way, it is noted that the digital age impacts all aspects of the global economy, and it would not be different with the tax gap, and not surprisingly, the number of tax administrations that estimate it is growing. Measuring the tax gap transparently demonstrates the formatting of tax policy, collection performance and taxpayer behavior on broad issues of economic growth, tax sustainability and fiscal effort. These estimates can bring transparency and understanding to once complex issues that have arisen in the digital age and, based on the evidence, facilitate changes in the design, legislation and administration of tax policy (Warren, 2019).

With the record in the literature that technology enables access to detailed data on taxpayers, analysis of their behavior, and the possibility of crossing with information from third parties, associated with the listed considerations about tax compliance and inspection, two hypotheses are suggested of research:

H4a: *The increase in technology brought with SPED impacts the reduction of the tax gap.*

H4b: *The increase in technology brought with SPED influences the increase in tax compliance.*

3 Methodology

3.1 Hypotheses

The first step of a research is the declaration of the objective, which directs the main path to follow, followed by the hypotheses, which present the proposals (Creswell, 2021). Given the tax gap literature and its main determinants (legislation, tax compliance, inspection and technology), associated with the intention of this study, the hypotheses listed in Table 1 were developed.

Data collection was carried out through the application of electronic questionnaires sent to the tax auditors of the State of São Paulo, the State with the highest GDP in the federation at a single moment, and it is not of interest for this study to extend the analysis of perception over time. The State of São Paulo was elected based on its GDP, which is the highest among the states in the federation. The questionnaires had their structure based on the 10-point Likert scale, aiming to increase the sensitivity of the analyses.

3.2 PLS (Partial Least Squares)

The data analysis was conducted using the PLS (Partial Least Squares) model, adopted due to the need to evaluate unobservable variables (Latent Variables – LV). The structural equation modeling – SEM is a set of multivariate techniques that combine characteristics of factorial analysis and regression, making it

possible to simultaneously analyze the relationship between measurement and latent variables, as well as the relationship between latent variables (Hair et al. 2014).

Table 1
Research hypotheses

Hypotheses	Expected coefficient	Authors
H1a: The increase in penalties provided for in tax legislation reduces the tax gap.	(+)	Allingham and Sandmo (1972) and Kirchler; Kogler, and Muehlbacher (2009).
H1b: The increase in punishments and enforcements contribute to the increase in tax compliance.	(+)	Morse (2008); Doran (2009); and Lederman (2018).
H2: Increasing tax compliance requirements through SPED is effective in reducing the tax gap.	(+)	Allingham e Sandmo (1972); Lederman (2010); Raczkowski (2015); Fiscalis (2016); Alm and Soled (2017); and Alm (2019).
H3a: SPED-based inspections are more efficient in reducing the tax gap.	(+)	Bird and Zolt (2008) and Raczkowski and Mroz (2018).
H3b: The increase in inspections based on SPED induces taxpayers to increase tax compliance.	(+)	Telle (2013) and Slemrod (2019).
H4a: The increase in technology brought with SPED impacts the reduction of the tax gap.	(+)	Bird (2015) and Warren (2019).
H4b: The increase in technology brought with SPED influences the increase in tax compliance.	(+)	Alm and Soled (2017) and Alm (2021).

Source: elaborated by the author.

Based on the determinants of tax gap found in the literature, we elaborated a structural model for the presentation of the constructs and their relations with the tax gap, considering that the tax gap reduction is a latent variable, which was measured from 4 dimensions with 28 questions, added to the 17 questions to measure its indicators. In the PLS approach, dependent variables are viewed as latent variables or constructs, which are ideas that cannot be measured directly. Thus, multiple indicators should be obtained for these variables, and one of the many tools used for this is data collection (Chin, Marcolin, & Newsted, 2003).

3.2.1 Indicators, coefficients expected from the hypotheses, and the relationship between the constructs

Based on the literature on tax gap and its determinants, the indicators presented in tables 2 to 6 were prepared. The indicators presented in the tables above, when transformed into questions, formed the basis of the questionnaire sent to the tax auditors. Before this procedure, this questionnaire was applied to a group of 30 non-random tax auditors, in order to validate the elaborated questions, a procedure that validated the questionnaire without reservations. It should be noted that such questions were carefully handled so as not to address specific topics to the taxing entity chosen for analysis, allowing the questionnaire to be reapplied in other entities.

Table 2
Statements for the construct 'Tax gap'

Statements for the construct 'Tax gap' (ξ)	Authors
TG01. The effectivity of the legal enforcement to reduce the tax gap	Alm and Mckee (2006) and Alm et al. (2010).
TG02. The delivery of the tax return promotes the reduction of tax evasion	Goncalves et al. (2016) and Johnson; Masclet; and Montmarquette (2014).
TG03. Identification of informal companies that do not present their tax return by examining the tax return from third parties.	Mazur and Plumley (2007); Toder (2007); and Morse (2008).
TG04. The tax return allows identifying taxpayers who informed lower values in comparison to what is required in the legislation.	Mazur and Plumley (2007) and Toder (2007).
TG05. Use of technology to extract and analyze information from tax returns to reduce the tax gap.	Lederman (2010) and Johnson; Masclet; and Montmarquette (2014).
TG06. Inconsistencies of information presented in the tax return are identified promptly and adequately.	Lederman (2010) and Johnson; Masclet; and Montmarquette (2014).
TG07. The information available in the tax return allows expanding the inspections.	Lagioia et al. (2011) and Alm and Mckee (2006).
TG08. The information in the tax return allows agile inspections.	Lagioia et al (2011) and Alm e Mckee (2006).
TG09. The ethical work of tax auditors is essential to reduce tax evasion.	McManus and Warren (2006).
TG10. Intimidation of tax evader through monitoring the tax return.	Morse (2008) and Johnson; Masclet; and Montmarquette (2014).
TG11. The tax return improves the identification and understanding of the reasons why there is no full tax compliance.	Morse (2008) and McManus and Warren (2006).

Statements for the construct 'Tax gap' (ξ)	Authors
TG12. The tax return allows identifying taxpayers that are unable to present tax return, by analyzing the transactions with third parties.	Lederman (2010) and Morse (2008).
TG13. The tax return is efficient to help increasing tax collection.	Lederman (2010) and Toder (2007).
TG14. The most efficient tax return forces the tax evader to develop more sophisticated tax planning.	Lederman (2009) and Toder (2007).
TG15. Without severe penalties, the tax return becomes inefficient to combat tax evasion.	Allingham and Sandmo (1972); Alm and Mckee (2006); and Alm et al. (2010).
TG16. The tax return increased the exchange of information between the tax agencies.	Morse (2008) and Johnson; Masclet; and Montmarquette (2014).
TG17. Improving the efficiency of the tax return increases the quality of information available for inspection.	Goncalves et al. (2016) and Faria et al. (2011).

Source: elaborated by the authors.

Table 3
Statements for the construct 'Legislation'

Statements for the construct 'Legislation' (η1)	Authors
LG18. Taxpayers interpretation of the legislation.	Lederman (2010).
LG19. Efficiency of the penalties.	Allingham and Sandmo (1972); Alm and Mckee (2006); and Alm et al. (2010).
LG20. Limitation to the information in the tax return.	Lederman (2010).
LG21. Limitation of the inspections obtained via ancillary obligations.	Alm et al. (2010).
LG22. Taxpayers use their knowledge about the legislation to pay fewer taxes.	Lederman (2010) and MacManus and Warren (2006).
LG23. The current tax system facilitates that larger taxpayers pay, proportionally, fewer taxes.	Lederman (2010) and Hoopes; Mescall; and Pittman (2012).
LG24. The model of tax legislation makes it difficult for the taxpayer to fulfill their tax obligations.	McManus and Warren (2006).
LG25. The model of tax legislation is not clear regarding the normative hierarchy.	Lederman (2010).
LG26. Tax auditors have a reasonable interpretation of the tax legislation.	McManus and Warren (2006).

Source: Elaborated by the authors.

Table 4
Statements for the construct 'Tax Compliance'

Statements for the construct 'Tax Compliance' (η2) – includes taxpayer behavior (CC)	Authors
TC27. More information made available by the SPED Project.	Goncalves et al. (2016).
TC28. Taxpayers are operating in the informal economy pay taxes.	Toder (2007).
TC29. Tax compliance motivated by the probability of being fined.	Allingham and Sandmo (1972).
TC30. Treatment of the informal economy.	Toder (2007); McManus and Warren (2006); and Keen and Smith (2006).
TC31. Quality of the information hindered by the number of obligations.	McManus and Warren (2006). Feld and Frey (2007).
CC42. Reduction of tax evasion by increasing cordiality in the services.	Morse (2008) and Feld and Frey (2007).
CC43. Effects of ethics in the decision-making about paying taxes.	McManus and Warren (2006) and Cummings et al. (2009).
CC44. Good governance shows the taxpayer the importance of paying tax as a civic duty.	Morse (2008); McManus and Warren (2006); and Alm, Sanchez, and Juan (1995).
CC45. The perception of a corrupt society promotes fiscal evasion.	McManus and Warren (2006).

Source: elaborated by the authors.

Table 5
Statements for the construct 'Technology'

Statements for the construct 'Technology' (η3)	Authors
TEC32. Development of technological tools to analyze tax returns.	Johnson; Masclet; and Montmarquette (2014).
TEC33. Possibility to monitor taxpayers via the tax return.	Johnson; Masclet; and Montmarquette (2014) and Alm and Mckee (2006).
TEC34. Electronic access to tax return information.	Johnson; Masclet; and Montmarquette (2014) and Alm and Mckee (2006).
TEC35. Precise diagnosis of the taxpayers using the tax return.	McManus and Warren (2006); and Alm and Mckee (2006).

Source: elaborated by the authors.

Table 6
Statements for the construct 'inspection'

Statements for the construct 'inspection' (η4)	Authors
FS36. The auditing scripts cover the analysis of the information of the SPED.	Lagioia et al. (2011).
FS37. Small divergences are not significant in the evaluation of tax compliance.	Toder (2007).
FS38. The SPED Project changed the profile of the notices given to taxpayers.	Lagioia et al. (2011).
FS39. The tax return increases the amounts of fines due to tax violation.	Lederman (2010) and Allingham and Sandmo (1972).
FS40. The ancillary obligations available to tax authorities allow better planning of the inspections.	Lagioia et al. (2011).
FS41. There is training available for auditors to identify fraud or errors through ancillary obligations.	Lagioia et al. (2011).

Source: elaborated by the authors.

Figure 1 shows the influence that the variables representing the main determinants of the tax gap have on this variable, as well as the indirect influence of the variable "Tax Compliance" on "Reduction of the tax gap". It is a reflective model, in which each relationship points to the hypothesis it represents.

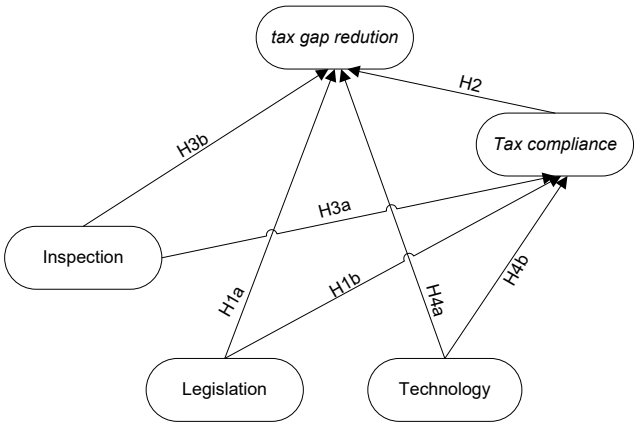

Figure 1 - Relationship between latent variables
Source: elaborated by the authors.

4 Results and Analysis

4.1 Descriptive statistics

The questionnaire was forwarded and forwarded after 10 days by email by the syndicate of tax auditors of the state of São Paulo (SINAFRESP) between January and February 2018 to all tax auditors active in the period, which at the time totaled 2,904 individuals, totaling a sample of 174 valid responses. The quantification of the minimum sample for analysis was calculated using the G*Power software, which indicated a minimum sample of 74 cases.

The answers revealed that the respondent tax auditors are predominantly aged between 31 and 50 years old (64%); male (83%); and entered the career via public selection process after the year 2006 (55%). They worked directly in inspection activities for less than ten years (67%) and did not have previous experience in the private sector in professions related to tax or accounting, including consulting or advising (72%). The respondents were not trained in areas traditionally related to tax, such as accounting, economy, administration, and law (48%), did not hold a graduate degree or specialization in accounting or other tax-related area (62%), and are in regional offices of the tax authority in the interior of the state (81%).

4.1.1 Statistics of the answers

Table 7 presents the results obtained in the questionnaires, showing the means, minimum and maximum values, medians, and standard deviations (SD). Considering the average calculated between the indicators, the results obtained reveal that, in the perception of tax auditors, the indicator with the greatest agreement among respondents is that a corrupt society encourages tax evasion (CC45). The perception of ethics by the taxpayer contributes to his decision to collect taxes.

Table 7
Perception of tax gap reduction

Indicator	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree	Mean	Min.	Max.	Median	SD
TG01	13%	23%	25%	30%	9%	5,45	1	10	6	2,31
TG02	5%	19%	18%	48%	10%	6,25	1	10	7	2,1
TG03	2%	11%	14%	48%	25%	7,19	1	10	7	1,97
TG04	3%	5%	14%	52%	26%	7,34	1	10	8	1,98
TG05	13%	27%	29%	25%	6%	5,1	1	10	6	2,27
TG06	22%	31%	25%	16%	6%	4,5	1	10	4	2,38
TG07	5%	9%	17%	41%	28%	7,04	1	10	7	2,23
TG08	5%	7%	14%	42%	32%	7,24	1	10	8	2,19
TG09	2%	5%	16%	33%	44%	7,76	1	10	8	2,18
TG10	9%	20%	31%	34%	6%	5,68	1	10	6	2,18
TG11	18%	28%	36%	17%	1%	4,56	1	10	5	2,02
TG12	2%	18%	32%	36%	12%	6,22	1	10	6	2,02
TG13	3%	11%	29%	39%	18%	6,68	1	10	7	2,01
TG14	2%	3%	16%	49%	30%	7,59	1	10	8	1,8
TG15	8%	21%	22%	32%	17%	6,05	1	10	6	2,5
TG16	13%	20%	25%	24%	18%	5,8	1	10	6	2,67
TG17	3%	7%	13%	48%	29%	7,42	1	10	8	1,9
LG18	10%	44%	25%	18%	3%	4,69	1	10	4	1,96
LG19	18%	34%	31%	13%	4%	4,45	1	10	4	2,07
LG20	23%	29%	22%	12%	14%	4,76	1	10	4	2,75
LG21	53%	28%	11%	5%	3%	2,91	1	10	2	2,11
LG22	16%	24%	31%	21%	8%	5,14	1	10	5	2,37
LG23	1%	9%	14%	39%	37%	7,64	1	10	8	2,17
LG24	1%	2%	4%	30%	63%	8,75	1	10	9	1,61
LG25	5%	13%	30%	31%	21%	6,45	1	10	7	2,3
LG26	1%	2%	8%	34%	55%	8,45	2	10	9	1,68
TC27	3%	2%	16%	45%	34%	7,61	1	10	8	1,88
TC28	0%	8%	28%	40%	24%	7,1	3	10	7	1,86
TC29	6%	26%	32%	32%	4%	5,47	1	10	6	1,95
TC30	54%	38%	7%	1%	0%	2,44	1	7	2	1,34
TC31	4%	10%	14%	39%	33%	7,29	1	10	8	2,29
TEC32	40%	32%	14%	11%	3%	3,47	1	10	3	2,23
TEC33	16%	25%	22%	32%	5%	5,11	1	10	5	2,35
TEC34	64%	25%	8%	2%	1%	2,24	1	9	2	1,62
TEC35	25%	34%	29%	10%	2%	4	1	9	4	2,08
FS36	11%	25%	33%	28%	3%	5,22	1	10	5	2,09
FS37	12%	20%	33%	23%	12%	5,49	1	10	5	2,37
FS38	3%	12%	32%	41%	12%	6,44	1	10	7	1,89
FS39	2%	13%	48%	28%	9%	5,97	1	10	6	1,8
FS40	3%	9%	27%	47%	14%	6,65	1	10	7	1,91
FS41	36%	35%	20%	8%	1%	3,4	1	9	3	2,06
CC42	11%	23%	33%	25%	8%	5,36	1	10	5	2,35
CC43	3%	7%	16%	46%	28%	7,29	1	10	8	2,13
CC44	4%	7%	8%	28%	53%	7,99	1	10	9	2,25
CC45	0%	0%	4%	25%	71%	8,97	1	10	9	1,33

Source: research data.

This perception confirms the study by McManus and Warren (2006), which suggests that dissatisfaction with the government and its spending, apathy and corruption encourage the tax gap, and is also in line with the study by Cummings et al. (2009), which suggests that there is an increase in tax compliance with individual perceptions of good governance. The next two indicators with the highest average

of agreement refer to the legislative complexity, which proves to be an obstacle for taxpayers to maintain their tax compliance (LG24), as well as being an obstacle to the interpretation of tax auditors and the perception that the volume of tax legislation impacts the interpretation of tax auditors (LG26). These perceptions prove the applicability of the study by Mcmanus and Warren (2006), in which they cite the complexity of tax legislation as a driver of the tax gap.

The answers with less agreement among respondents, there is the perception of the lack of limits imposed by internal rules for the use of SPED information (LG21). Considering the position of the tax auditors themselves regarding the tools made available by the tax administration (TG05 and TG06), there is a significant limit to SPED's efficiency regarding access to this information and how to treat it. There is still high disagreement that the tax administration is efficient in dealing with the informal economy (TC30), a factor that, once known by taxpayers, can encourage new participants to the informal market, generating a growth in the tax gap, even agreeing that taxpayers choose by informality to collect less taxes (TC28). Finally, also in line with the limitations of the LG21 proposition, the tax auditors disagree about the fact that they have unrestricted electronic access to all information sent by the taxpayer through SPED (TEC34).

4.2 Evaluation of the structural equation modeling (outer model)

This section analyzes the proposed measurement model from the perspective of partial least square (PLS) adjustment estimation models. For this study, the convergent validity will be evaluated by the method of Fornell and Larcker (1981), which indicates that the AVEs (average variance extraction) must present values greater than 0.50 and the internal consistency, evaluated by the composite reliability, must present as a satisfactory parameter value greater than 0.60 (Hair et al., 2014). Based on these assumptions, the model was adjusted by shifting the indicators that did not fit the values considered acceptable, as suggested by Ringle, Silva and Bido (2014), so that the minimum quality index of the stroke was achieved, culminating in the displacement of indicators TG01, TG04, TG09, TG11, TG14, TG15, LG20, LG22, LG23, LG24, LG25, LG26, TC28, TC29, TC30, TC31, FS37, CC42, CC43 and CC45. Thus, the adjusted structural equation model is shown in figure 2.

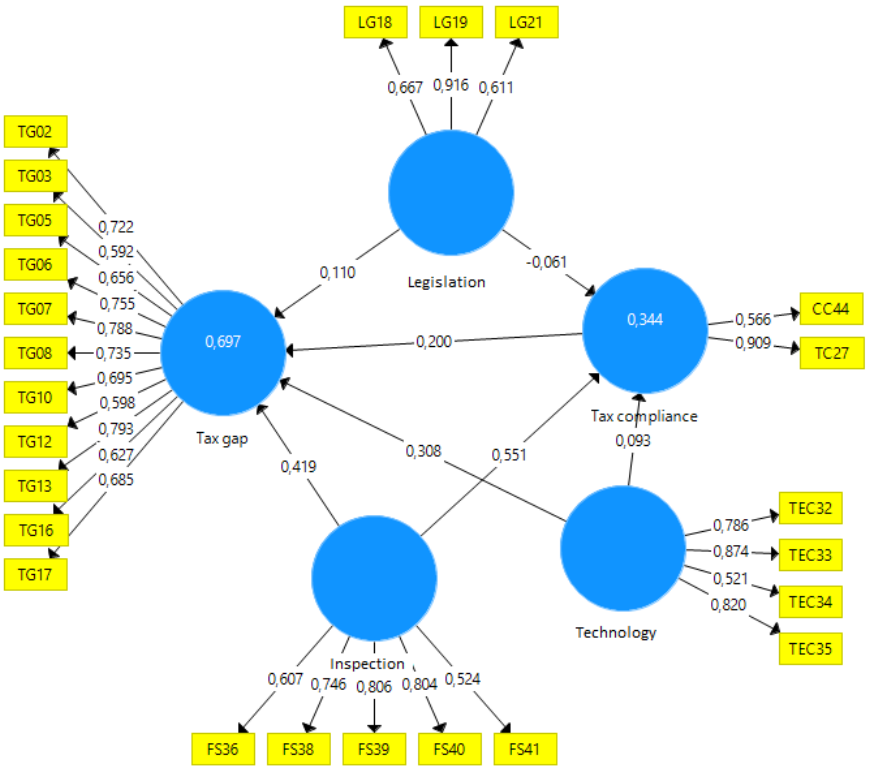

Figure 2 – Structural equation modeling after adjustments
Source: research data.

Although there are AVE values below the cutoff standard for the latent variables “Inspection” (0.499) and “Reduction of the tax gap” (0.488), the small divergence does not compromise the guarantee of convergent validity at the level of the constructs, that is, having the AVE reached its minimum index for the variables in the model. Regarding the internal consistency of the model after the adjustments, the composite reliability started to meet the established cut-off standard (CC >0.6) for all constructs.

The assessment of discriminant validity, using the cross-load method, used to analyze whether the model’s latent variables are independent of each other (Hair et al., 2009), indicated confirmation of validity

without adjustments using the criteria of Fornell and Larcker (1981), which compares the square roots of the AVEs of the latent variables with the correlations between the latent variables, considering the criterion that the square roots must be greater than the correlations between the latent variables. Exceptions occurred only for indicators FS36 and FS41, which were suppressed. Even though adjustments were made, the value of the correlation between the latent variables “Inspection” and “Reduction of the tax gap” (0.704) persisted to be slightly higher (approximately 0.9%) than the square roots of the “Reduction of the tax gap” (0.698). However, such a difference does not compromise the structural model.

The collinearity of the model was evaluated using the Collinearity Statistic (VIF) index, which considers acceptable results with results between 0.2 and 5 (HAIR et al, 2014) and no inconsistencies were identified between the values that would harm the model.

Regarding the analysis of the structural model (inner model), it was possible to verify the validity of the coefficient of determination (R^2), the predictive relevance (Q^2) and the size of the effect (f^2). In the case of the validity of Pearson’s coefficient of determination (R^2), used to evaluate the portion of the variance of the endogenous variables that are explained by the structural model (Ringle; Silva; & Bido, 2014), values of R^2=2% are considered as small effect, R^2=13% as medium and R^2=26% as large (Cohen,1999). In the proposed model, the coefficients indicated that, in the case of the “Tax compliance” variance, 34.4% are explained by the independent variables, and in the case of “Tax gap reduction”, 69.7%. These values demonstrate that there was a large effect on the portion of the variance of the endogenous variables that is explained by the SEM (structural equation model), confirming the quality of the adjusted model.

The predictive relevance (Q^2) is used to analyze how close the model came to its expectation (Ringle; Silva; & Bido, 2014). For analysis of the results, the predictive relevance of the model is indicated by Q^2 values greater than zero for a given reflective endogenous latent variable and, if the value is equal to one, the model would be considered perfect and would reflect reality without error (Hair et al., 2014). For the construct “Tax gap reduction” the value found was 0.127 and for the construct “Tax compliance” it was 0.231. The effect size (f^2) demonstrates how important each construct is for the adjustment of the model, considering as a metric 0.02 a low value, 0.15 a medium value and 0.35 a large value (ringle; Silva; & Bido, 2014). The effect size values found were all acceptable (Inspection: 0.177, Penalties: 0.109, Tax gap reduction: 0.053, Tax compliance: 0.129 and Technology: 0.322).

4.2.1 Path coefficients

This configuration is explained by the fact that the research encompasses linear correlations and regressions, which leads to the need to evaluate the significance of the relations (p≤0.05), because the null hypothesis (H_0) for the correlation cases is r=0 and the H_0 for the regression cases is l’=0 (path coefficient = 0). When p>0.05, the H_0 are accepted, and the inclusion of the latent variables or indicators in the SEM should be reconsidered.

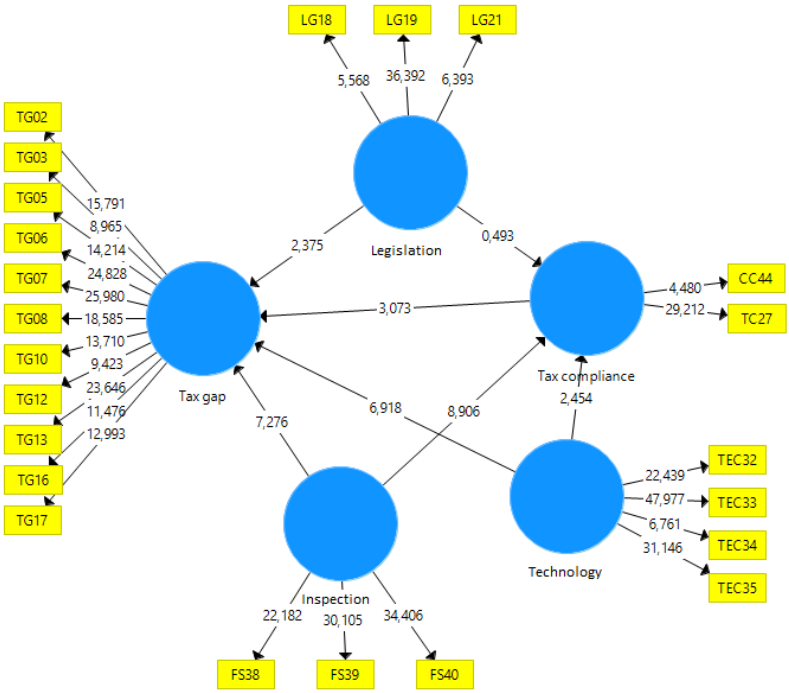

Figure 3 - Structural equation modeling with values of the Student’s t-test
Source: research data.

This is because SmartPLS calculates Student's t-tests between the original values of the data and those obtained by the resampling technique for each relationship of correlation between indicators and latent variables and for each relationship between latent variable (LV-LV). The software displays the t-test values and not the p-values. The interpretation considered that, for high degrees of freedom, values above 1.96 correspond to p-values ≤ 0.05 (between -1.96 and +1.96 corresponds to the probability of 95% and outside this interval 5%, in a normal distribution) (Ringle; Silva; & Bido, 2014). Figure 3 presents the results generated by the software.

The software presents the compilation of the evaluation of the structural model of the latent variable by the coefficient of the regression and t-statistics, as in table 8 below.

Table 8
Evaluation of the structural model of the latent variable: coefficient of the regression and t-statistics

Variable of 2nd. order => variable of 1st. order	Hypotheses	Result	T Statistics (|O/STDEV|)	P Values
Legislation => perception of tax gap reduction	H1a	Confirmed	2.375	0.018
Legislation => tax Compliance	H1b	No Confirmed	0.493	0.622
Tax compliance => perception of tax gap reduction	H2	Confirmed	3.073	0.002
Increase inspection => perception of tax gap reduction	H3a	Confirmed	7.276	0.000
Increase inspection => tax compliance	H3b	Confirmed	8.906	0.000
Use of technology => perception of tax gap reduction	H4a	Confirmed	6.918	0.000
Use of technology => tax compliance	H4b	Confirmed	2.454	0.014

Source: Research data.

The table demonstrates that the latent variable "Legislation" is sufficient to explain the latent variable "Tax gap reduction" (t=2.375). This hypothesis H1a addresses the legislation, as a regulatory and punitive text, which is one of the main elements predicted in the tax gap literature to influence the taxpayer's decision on the practice of tax evasion (Allingham & Sandmo, 1972). Lederman (2010) agrees that the tax legislation is one of the main factors influencing the tax gap and cites as examples the use of simulations for the lower collection of taxes and practices within the limit of legality. The result suggests that tax auditors have the perception that current legislation has been efficient in reducing the tax gap.

However, the same latent variable "Legislation" is not enough to explain the indicator "Tax compliance" (t=0.493), hypothesis H1b. The result suggests that in the perception of tax auditors, current legislation is not efficient in requiring taxpayers to fulfill their ancillary obligations and increase the portion of revenue attributed to the tax calculation base, which may be associated with a penalty system classified as useless, for not promoting taxpayer compliance (Doran, 2009).

In the case of the latent variable "Tax compliance", this is responsible for explaining the latent variable "Reduction of the tax gap" (t=3,073), hypothesis H2, confirming the studies in which they cite the close relationship between tax compliance and tax gap, and informational asymmetry, caused by non-compliance, is treated as one of the main components of the tax gap (Fiscalis, 2016; Alm & Soled, 2017; Murphy, 2019).

Regarding the perception of the influence of the latent variable "Inspection" on the latent variable "Reduction of the tax gap" (t=7,276), hypothesis H3a, the result confirms the study by Allighan and Sandmo (1972), who cite the probability of inspection as fundamental factor in the taxpayers' decision to evade taxes, inspection is treated as an essential pillar in the decision. The latent variable "Tax Compliance" is explained by the indicator "Inspection" (t=8.906), hypothesis H3b, confirming the study by Telle (2013) which indicates that present inspection can increase the expected future punishment for non-compliance, as well as Almunia et al. (2018) and Pomeranz (2015).

The latent variable "Reduction of the tax gap" is also explained by the indicator "Technology" (t=6,918), under the perception of the tax auditors that its use can contribute to the reduction of the tax gap. Hypothesis H4a deals with the informational asymmetry between tax authorities and taxpayers, but suggests that the analysis of taxpayer information through statements sent electronically by taxpayers with whom he relates can reduce the asymmetry (Lederman, 2010).

And finally, the latent variable "Technology" also explains the "Tax Compliance" indicator (t=2,454). Hypothesis H4b proposes that the implementation of SPED increases the volume of information gathered by the government that is capable of being confronted (Bird & Zolt, 2008).

5 Final Considerations

Research on the tax gap, especially those associated with VAT in emerging economies, is still incipient, mainly because studies on the subject mostly address income taxes, as these are the ones most relevant to developed countries in revenue. The same incipience can be associated with studies on SPED, which were intended to understand its effects on companies and not on tax authorities, not observing the purpose of its implementation, since the latter are the users to which it originated the implementation of SPED. The results show that the SPED project brought changes in the VAT tax gap, according to the tax

auditors' perception. Given this context, the purpose of this study was to assess, from the perspective of tax auditors, whether the technological innovations introduced by SPED had an impact on the ICMS tax gap. As a result, it was possible to notice a wide repertoire of insights originated by the perception of these users materialized in the responses to the indicators pointed out by the tax gap literature and some of its determinants. As if this material originated from descriptive statistics were not enough, the analysis using the SEM confirmed the hypotheses developed based on the literature on the relationships between the tax gap and its determinants, with the exception of only one hypothesis, results that were previously discussed.

These results bring as their main contribution the indication that SPED proves to be an important instrument for reducing information asymmetry between tax authorities and taxpayers, encouraging the reduction of the tax gap, but that there are still several gaps to be deepened, as is the case of the influence of taxpayers' behavior on the determinants of the tax gap, a subject still shallow in the literature.

It also contributes significantly to the development of public policies by considering that the use of more detailed information from taxpayers allows for better tax collection planning, enabling more accurate budgets and targeting tax efforts.

Faced with such results, the gap regarding greater knowledge of the tax gap and the search for new responses to existing literature, especially those derived from the work of Allingham and Sandmo (1972), was addressed based on the response of tax auditors, bringing elements that best subsidize the development of public policies aimed at reducing the tax gap. Regarding the search for answers about increasing the efficiency of tax compliance after the implementation of SPED, there was no confirmation that the legislation had this effect, since little legal change, specifically regarding penalties, was carried out for its implementation, but the hypothesis that greater tax compliance was responsible for reducing the tax gap, in the opinion of the tax auditors, was confirmed. Regarding this aspect of tax compliance efficiency, the tax auditors' responses to the indicators brought remarkable aspects of behavioral responses, an important foundation for the development of new tax policies.

Finally, it is suggested that, for future research, the determinants be tested individually, in order to detect the psychological, social, economic or moral factors that lead the taxpayer to have an evasive behavior. Cultural issues may also be involved, as well as different perceptions of risk and dissatisfaction with governments.

It is also recommended that evasion opportunities be analyzed considering the form of taxation, the tax burden and tax incentives dedicated to taxpayers.

5.1 Limitations of the study

In general, there are limitations regarding the context and territorial analysis. It was developed to verify the influence of a specific event (SPED project), and the data collection occurred with the tax auditors of only one of the Brazilian states, which does not allow generalization to other contexts or governments.

Regarding the structural equation modeling, the analysis of results on the latent variable tax compliance may have been compromised when considering that only two indicators remained, among the initial nine, after adjustments made to meet the cutoff established for the convergent validity.

About the studied population, tax auditors from the State of São Paulo, it should be considered that there are an approximate number of 2,904 actives and that this research was elaborated based on the answers of 174 respondents. Therefore, a new application of the questionnaire may generate results different from those indicated in this work.

Finally, there is a limitation on the deductive studies used to form research hypotheses, since the existing literature does not specifically address the issues explored in this research.

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