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# Tax benefits and sustainability: a study of municipalities in the state of Santa Catarina

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The relationship between tax benefits and sustainability is not well explored in empirical research, despite the importance of measuring and monitoring the effectiveness of tax expenditures. This article aims to analyze the influence of the ICMS tax benefits – tax on the circulation of goods and the provision of transport and communication services – on the sustainability of municipalities in the state of Santa Catarina. Structural equation modeling examined a set of secondary panel data collected between 2005 and 2017. Although the results point to statistically significant relationships, it appears that tax benefits promote economic sustainability to a high degree; social sustainability to a moderate degree; and environmental sustainability to a low degree.

**Keywords:** tax benefits of ICMS; tax expenditure; municipalities; sustainability; triple bottom line.

## Benefícios fiscais e sustentabilidade: um estudo dos municípios catarinenses

A relação entre benefícios fiscais e sustentabilidade não tem sido objeto de muitas pesquisas empíricas, apesar da importância da mensuração e do acompanhamento da efetividade dos gastos tributários. Assim, o objetivo deste artigo é analisar a influência dos benefícios fiscais de ICMS – imposto sobre circulação de mercadorias e prestação de serviços de transporte e de comunicação – na sustentabilidade dos municípios catarinenses. Para tanto, com base num conjunto de dados secundários em painel, coletados entre 2005 e 2017, emprega-se a modelagem de equações estruturais. A despeito de os resultados apontarem relações estatisticamente significativas, constata-se que os benefícios fiscais, em grau elevado, promovem a sustentabilidade econômica; em grau moderado, a sustentabilidade social; e, em grau baixo, a sustentabilidade ambiental.

**Palavras-chave:** benefícios fiscais de ICMS; gastos tributários; municípios; sustentabilidade; *triple bottom line*.

## Beneficios fiscales y sostenibilidad: un estudio en los municipios catarinenses

La relación entre los beneficios fiscales y la sostenibilidad no ha sido objeto de mucha investigación empírica, a pesar de la importancia de medir y monitorear la efectividad de los gastos tributarios. Por lo tanto, el objetivo de este artículo es analizar la influencia de los beneficios fiscales del ICMS – impuesto sobre la circulación de bienes y la provisión de servicios de transporte y comunicación – sobre la sostenibilidad de los municipios catarinenses. Para ello, con base en un conjunto de datos secundarios en panel, recopilados entre 2005 y 2017, se emplea el modelado de ecuaciones estructurales. Aunque los resultados apuntan a relaciones estadísticamente significativas, parece que los beneficios fiscales, en un alto grado, promueven la sostenibilidad económica; en un grado moderado, la sostenibilidad social; y en un grado bajo, la sostenibilidad ambiental.

**Palabras clave:** beneficios fiscales de ICMS; gastos tributarios; municipios; sostenibilidad; *triple bottom line*.

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## 1. INTRODUCTION

The effectiveness of the tax benefits policy of the tax on the circulation of goods and the provision of transport and communication services (ICMS) is a recurring and controversial theme, considering the amount of tax waiver involved and the absence of periodic, careful and multidimensional assessment of the impacts of these benefits (Abraham, 2019; Afonso, 2014; Freitas, 2016; Pellegrini, 2014). Notwithstanding, the benefits that tax exemptions can bring to socioeconomic development should not be overlooked (Botelho, Abrantes & Fialho, 2019).

In this article, the concept of tax expenditures is adopted, which obtained scientific knowledge from Surrey's studies (1970), in the beginning of the 1970s, to make indirect public spending more transparent, treating them, in government budgets, similarly to direct public spending (Lester, 2017; Pellegrini, 2014). Tax expenditures is an alternative to direct public spending, especially given the lack of financial resources to provide essential services to the local population, which are municipal governments' responsibility (Buissa, Bevilacqua & Morais, 2017; Gomes, Osborne & Guarnieri, 2020).

It is, in this context, that the tax benefits and sustainability are unified, reaching the municipalities, which enjoy (or support) the positive (or negative) effects of the productive activity. Thus, tax extrafiscality is configured as an instrument for internalizing externalities and for facing structural problems in society, such as economic injustices, extreme poverty and the persistent degradation of the environment (J. Sachs, 2017; Wedy, 2018). Nevertheless, governments must adopt optimal tax and spending policies (Kalambokidis, 2014); otherwise, the proliferation of tax benefits can erode the tax bases, especially in developing countries, causing distortions such as favoring imports over local purchases (Caldeira, Geourjon & Rota-Graziosi, 2020).

In this article, it is used the concept of triple bottom line (TBL), which summarizes the three main dimensions of sustainability – economic prosperity, social justice and environmental quality – (Elkington, 1998), in a balanced and equitable way (Alhaddi, 2015), making the TBL evolve into a proxy for the sustainability construct (Isil & Hernke, 2017). The 2030 Agenda (Organização das Nações Unidas [ONU], 2015) – conceived as a global action plan for sustainable development – is also based on the "prosperity, people and planet" tripod.

Furthermore, there is a lack of studies on the potential for collecting value added tax (VAT) – a category from which ICMS originally descended and to which it belongs (Carrazza, 2015) – and its impact on governmental institutions debts and *deficit* (Ufier, 2017), as well as in relation to the conditions under which tax expenditures are most effective (Kasdin, 2018). In addition, more empirical evidence is needed regarding the effectiveness of tax benefits in developing countries (Parys & James, 2010).

Therefore, in this article, ICMS tax expenditures in Santa Catarina are analyzed – composed of the amounts of tax waiver, presented in the Budget Guidelines Laws –, considering the aggressive policy of that state's tax benefits, especially in attracting investments and ventures within the scope the fiscal war (Daros & Secchi, 2013; Macedo & Angelis, 2013). For example, in Santa Catarina, the estimated ICMS tax waiver amount in 2019 was 5.8 billion reais (Lei nº 17.566, de 7 de agosto de 2019), representing 2.26% of the state gross domestic product (GDP), 20.5% of the state budget revenue and 35% of the annual tax revenue.

The studies by Accordino (2020), Chicumbi (2018), He et al. (2019), Klemm and Parys (2012), Parys and James (2010), Porto and Memory (2019), Qi, Peng and Xiong (2020), Rezende, Dalmácio and Rathke (2018), Rezende, Peralta, Rosa and Rezende (2019), as well as Sá and Silva (2019), however, point out that tax exemptions are important instruments for attracting investments and enterprises, as well as for promoting sustainability in the TBL concept. Thus, based on these studies, we start from the thesis that the ICMS tax benefits positively influence the sustainability of Santa Catarina's municipalities.

This research, however, when restricting itself to the effects of the tax benefits granted in Santa Catarina, does not consider the exemptions' effects on the other units of the federation – such as collection losses and distortions in resource allocation efficiency –, considering that the ICMS is comprehensive and dynamic, with the tax policy of each state directly influencing the development of the others, especially in the context of tax competition, so called "fiscal war" (Brandão, 2014; Nascimento, 2008; Oliveira, 2015; Rezende, 2020).

Finally, in view of the above, the article aims to analyze the influence of the ICMS tax benefits on the economic, social and environmental sustainability of the current 295 municipalities in Santa Catarina. For this purpose, the structural equation modeling technique is employed, based on a structure of secondary panel data, collected between 2005 and 2017.

## 2. THEORETICAL FRAMEWORK

The choice of literature considered, in addition to the state of the art of knowledge about tax benefits and sustainability, in national and foreign works, the (unique) characteristics of the ICMS, whose initialism holds at least five different taxes - on mercantile operations, on transport services, on communication services, on lubricants and fuels, on minerals (Carrazza, 2015) –, unlike a modern VAT – in force in several South American, European and Asian countries (Balthazar, 2008) –, which levies uniformly over a broad base of goods and services (Appy, Santi, Coelho, Machado & Canado, 2020).

### 2.1 State intervention and tax expenditures

From the First World War onwards, in the face of economic crises that forced governments to take action to remedy market failures, there was talk of state intervention (Caliendo, 2013; Sunstein, 2014). Nowadays, it can and should be used to internalize the externalities of productive activity, through stimuli and punishments, aiming to make certain actions more (or less) attractive to individuals and organizations (Buissa et al., 2017).

Among the instruments of state intervention, the Federal Constitution (1988) allows the realization of tax expenditures, also known as tax benefits or indirect public expenditures, to achieve economic and social objectives, involving the inducing function of the most beneficial tax rule in relation to the standard tax system (Buissa et al., 2017; Lester, 2017). In other words, tax benefits and waivers are two different sides of the same coin, making up tax extrafiscality (Correia, 2016).

Therefore, many developing countries have endeavored to simplify their system, expanding the tax base, reducing tax rates and increasingly employing tax expenditures (Caldeira et al., 2020).

However, to remedy market failures and promote social justice, governments need to adopt optimal tax expenditures policies (Kalambokidis, 2014). For this reason, empirical research on the sustainability of fiscal policy and the effectiveness of tax benefits for domestic and foreign investments, especially in developing countries, is becoming increasingly important (Feld, Köhler & Wolfinger, 2020; Parys & James, 2010).

By the way, a study by Armbruster and Hintermann (2020) analyzed, in countries of the Organization for Economic Cooperation and Development (OECD), the strategic interaction of the regional and federal governments, as well as the fiscal externalities resulting from inter-regional tax competition (spillovers), concluding by the importance of correcting fiscal externalities through the tax transfer system. In Germany, for example, the rates and calculation basis of the main taxes are fixed by the federal government, while collection is the responsibility of the federal units, characterizing fiscal federalism as more cooperative and centralized, less competitive and decentralized (Feld et al., 2020). In view of this, in Brazil, a wide tax reform is needed, covering state, municipal and federal taxes, for the implementation of a cooperative fiscal federalism, which promotes uniform and sustainable regional development, providing above all to the municipalities, sufficient tax collection for satisfactorily fulfill its constitutional duties.

In fact, although the primary function of taxes is to obtain financial resources for the State to exercise its constitutional functions, they can also be used to intervene in economic, social and environmental aspects, stimulating or discouraging certain activities, such as goods and services and the development of localities and regions (Cavalcante, 2017). Soon, the Brazilian State, in order to implement public policies, incorporated the idea of tax expenditure. Thereafter, however, it renounces a portion of its tax collection (Buissa et al., 2017). Tax waivers, in fact, can be effective or potential, considering that, in general, the calculation methods used by researchers and governments do not consider the positive externalities of tax benefits, such as the movement of the economy, attraction of investments, improvements in public infrastructure, the generation of jobs and income.

Although there is no single definition of tax expenditure, it can be considered an indirect public expenditure, realized through the granting of tax benefits to specific taxpayers, corresponding to a deviation from the basic structure of the tax (Buissa et al., 2017; Cavalcante, 2017; Pellegrini, 2014). This is the typical case of ICMS tax benefits, as this tax was designed to be essentially a revenue collection tool. According to the Federal Revenue of Brazil (RFB, 2018), tax expenditures must: 1) compensate for expenses incurred by taxpayers with services not served by the State; 2) compensate for actions complementary to the typical State functions, developed by civil entities; 3) promote equalization of income between regions; 4) encourage a specific sector of the economy.

The way tax expenditures are used, however, is a contradictory matter, with several pros and cons. According to Surrey (1970), even if the problems arising from tax expenditures are overcome – for example, tax waivers, competitive imbalances, unexpected profits (windfall profits) –, there are other disadvantages in their employment, such as difficulties in budget control and in the establishment of public priorities, in addition to the compromise of the tax structure itself. Thus, Surrey (1970) recommends, first, the analysis of alternatives related to direct public expenditures and, later, if it

turns out that the most viable option is tax expenditures, the verification of the benefits obtained and the mechanisms for compensating for the tax waiver. Meanwhile, public managers, when faced with the trade-off between equity and efficiency, end up not following the prescriptions of the optimal taxation theories (Kalambokidis, 2014). In practice, the fact that public managers are subject to the dictates of tax policy, to the influences of parliamentarians and to the pressures of the so-called "rent-seekers" can compromise decision-making and the adoption of the most appropriate tax policy to promote the common good. Proof of this is the great asymmetry between the beneficiaries of federal tax expenditures, which aggravates regional inequality – 29.6% of the total of these tax expenditures are destined to the wealthiest municipalities in Brazil, with the highest GDP *per capita*, while 2.4% for the poorest municipalities (Ministério da Economia, 2019).

According to Kasdin (2018), a positive point is that tax expenditures operate without a bureaucratic structure of resource allocation and, when compared to programs based on mandatory and discretionary expenditures, they present greater durability, which is an important factor in the context public budget, as a trade-off indicator between resolution and responsiveness to changes in economic sectors. However, according to Lester (2017), when assessing tax expenditures programs, it is necessary, in a cost-benefit structure, to distinguish measures that have economic goals from those that have social goals.

As these are general guidelines related to tax expenditures, still, there may be contexts to which they do not apply (Surrey, 1970), such as the persistent financial crisis in Brazilian states and municipalities. In this context, tax expenditures represent a viable alternative in the implementation of public policies, provided that tax exemptions are properly monitored, in order to avoid privileges to economic sectors and national regions (Botelho et al., 2019; Buissa et al., 2017; Rezende et al., 2019).

In Brazilian budget laws, meanwhile, the regionalized statements of the effect on revenues and expenses in granting or expanding tax benefits, when they exist, do not provide detailed explanations about the method of calculating and compensating for tax waivers (Pellegrini, 2014). This, however, is not just a Brazilian problem, since tax expenditures in the United States, for example, are rarely discriminated against in public budgets and, in general, do not need reauthorization, consequently receiving fewer evaluations and ballots than direct public spending (Kalambokidis, 2014).

Furthermore, given the multiple variables to be considered, there are difficulties in assessing the results of tax benefits, in addition to the simple calculation of the amount of tax waiver, resulting in uncertainties about the degree of satisfaction of this tax policy and the perpetuation of tax expenditure (Buissa et al., 2017). According to Pellegrini (2014), there are basically two methods to calculate the tax waiver: the initial loss, simpler, which considers only the amount that was not collected, considering everything else constant; and the final loss, more complex, which considers the chain effects, arising from the introduction of a certain tax expenditure, such as the behavioral changes of taxpayers.

In addition, by encouraging the private sector through the granting of tax benefits, the Public Power can neutralize the risks inherent in business, discouraging the economy, a fact called by Sunstein (2014) as regulation paradox, especially when measuring the cost-benefit of public policy covers a wide scale and it is not possible to clearly identify what needs to be done. It is worth

mentioning, though, that the tax benefits, in comparison with government subsidies, represent the best option, considering that they compel companies to carry out projects only when there is a prospect of economic return, since they must respect the commitments agreed with the public power grantor (Porter, 1989). These are, indeed, counterparts in favor of certain activities of public interest, the development of municipalities with low HDI or strategic regions, or, still, the making of financial contributions in favor of public funds of an economic, social or environmental nature. In any case, as Cavalcante (2017, p. 200) points out, tax benefits must be "granted with caution and after a rigorous analysis of budgetary impacts, since, without control or in excess, they cause imbalances in the economy, causing more damages than benefits".

### 2.2 Triple bottom line concept in the scope of Public Power

Contemporary challenges have revealed the importance of finding the right measure of state intervention to foster sustainable development, through the adoption of strategic thinking and the assessment of global impacts, such as facing the externalities of productive activity and the difficulty of preserving common assets (Freitas, 2016). Thus, when interacting with the complex systems of the economy, society and the natural environment, with the establishment of public policies that strengthen the local community, sustainable development imposes the goals to be pursued and achieved by all nations (Freitas, 2016; J. Sachs, 2017).

The Public Power, therefore, must question the patterns of economic development and adopt policies aimed at sustainable development, which surpassed the level of desirable to become a requirement (Moura, 2015; Silva, Rebouças, Abreu & Ribeiro, 2018). But, according to Zhou, Liu and Cao (2014), in developing countries, such as Brazil, until a certain level of income is reached, economic growth occurs regardless of the conservation of the environment. Nevertheless, a study by Soares and Almeida (2018), investigating the decoupling of the environmental impact of economic growth under five dimensions – atmosphere, land, water, biodiversity and sanitation –, concluded that Brazilian economic growth has been accompanied by improvements in terms of environmental problems, except in the land dimension.

Sustainability is an interdisciplinary concept in constant evolution, contingent on cultural, temporal and local contexts, covering systemic dimensions and multiple criteria related to the economy, society and the environment (Nobre & Ribeiro, 2013). Consequently, the triple bottom line (TBL) concept, created by Elkington (1998), in the 1990s, incorporates the three main dimensions of sustainability: economic prosperity, social justice and environmental quality. In the original conception of TBL, Elkington (1998) considered the profit, people and planet constructs, represented by simultaneous and integrated lines: the economic (impact of business practices on the economic system), the social (conduct of beneficial and fair business practices in relation to work and the community) and the environmental (including the adoption of business practices that do not compromise environmental resources for future generations).

Since then, by making sustainability a part of the business agenda, TBL has reformulated the management discourse, providing the appropriate balance and importance to its three dimensions (Alhaddi, 2015; Isil & Hernke, 2017). In short, the dimension of economic prosperity encompasses public and private actions, which must be centered on the appropriate trade-off between efficiency and

equity for the efficient management of economic resources, the balance between the production of goods and services, in addition to fair distribution of wealth (Freitas, 2016; I. Sachs, 2008). The social justice dimension, in turn, covers fundamental social rights, such as an adequate level of social homogeneity, full employment, quality of life and equal access to social services (I. Sachs, 2008). The dimension of environmental quality, finally, encompasses the double ethical imperative: synchronic solidarity with the current generation and diachronic solidarity with future generations (I. Sachs, 2008). This double imperative can be achieved with the aid of taxation with environmental purpose, which, by means of a greater tax burden, discourages conduct harmful to the environment and, by granting tax benefits, encourages conduct that promote protection or conservation the environment (Cavalcante, 2012).

Although the TBL concept was created for business management, currently considering the profound paradigm shift that is taking place towards a mentality based on planetary unity, it is also used in the public sphere (Elkington, 2020). In addition, in Brazil, the dimensions of the TBL are linked to the constitutional principle of the responsibility of the Public Power for the solidary implementation of development, socially inclusive and environmentally clean, in order to ensure the right to present and future well-being (Freitas, 2016).

The 2030 Agenda (ONU, 2015) highlights the need for effective participation of municipal governments in sustainable development, also emphasizing the urgency of a restructuring of taxation in developing countries, with the adoption of fiscal policies that guarantee greater social equity and environmental preservation. In addition, Gomes, Osborne and Guarnieri (2020) note that, as a public organization, municipal governments should have as their main objective the provision of services to the local population.

Tax policy, therefore, plays an important role in catalyzing inclusive economic growth in the Latin American and Caribbean region, based on the multidimensional nature of sustainable development (Organização para a Cooperação e o Desenvolvimento Econômico [OCDE], ONU, Centro Interamericano de Administrações Tributárias [CIAT], & Banco Interamericano de Desenvolvimento [BID], 2020). Notwithstanding, in the sustainability debate, research on the effects of direct public spending has been prioritized, neglecting those related to tax expenditures, which are fundamental extra-fiscal instruments in promoting sustainable development (Redonda, 2016).

There is also a link between taxation, innovation and sustainable development, since the more a government seeks to guarantee the birth, growth, survival and competitiveness of innovative and sustainable companies, the more it should invest in tax rules that support them (Accordino, 2020). For this reason, several countries have reduced the tax burden of value added taxes (VAT), like the ICMS, aiming at non-distributive goals, such as support for intensive labor in industries, the reduction of the tax burden imposed on low-income families and the internalization of environmental externalities (OCDE, 2020). In addition, VAT tax benefits encourage companies in many ways to invest in the social dimension and the circular economy, in addition to favoring local supply in the provision chain (Killian & O'Regan, 2018).

Also highlighted in the scenario of sustainable development are green taxes or ecotaxation, which are ecologically oriented taxes (Trennepohl, 2011). However, contrary to what happens in certain European countries, in Brazil, the emission of polluting gases cannot be taxed, for example, since taxes cannot be a sanction for an illegal act, as provided for in the National Tax Code (CTN) (Cavalcante, 2012). Despite this legal limitation, the use of extrafiscality in ICMS aimed at preserving

(or conserving) the environment has been common, as is the case with the Ecological ICMS, created in the state of Paraná in 1991, which constitutes not a new tax, but a constitutional apportionment mechanism for ICMS collection among municipalities, which considers in this apportionment, in addition to economic and social criteria, the environmental one (Moura, 2015; Trennepohl, 2011).

Despite the importance of extrafiscality for sustainable development, tax exemptions applied to value added taxes are often misdirected, as they end up offering greater benefits, in absolute terms, to the wealthiest families (OCDE, 2020). In other words, it is the usual problem of the regressiveness of indirect taxes. Thus, in the face of an unstable and highly inequitable economic scenario like the Brazilian one, it is necessary the State to adopt a sustainable economic model, and, therefore, it must opt for progressive taxation and the improvement of control in the granting of tax benefits (Mélo & Oliveira, 2019). Moreover, it is necessary to verify how the substitution of public investments for subsidies and tax exemptions may have affected the performance of the Brazilian economy, allowing the debate on fiscal policy to transcend the sphere of ideological speculation and focus on analysis based on solid empirical evidence (Gobetti & Orair, 2017).

### 2.3 Tax war and ICMS benefits in Santa Catarina

It is worth clarifying, to begin with, that the ICMS descends from the ICM – tax on operations related to the circulation of goods –, provided for in the 1967 Federal Constitution, which, in turn, has its roots in the IVC – tax on sales and consignments – of the 1946 Federal Constitution (Carrazza, 2015). All of these taxes, however, are descended from value added tax (VAT), based on the principle of non-cumulativity. According to Balthazar (2008), VAT, although understood as such, was not originally conceived in France; it is, in fact, the result of an evolutionary normative process, the beginning of which can be attributed to the creation, in Belgium, of the "fee on payments", through the Law of December 31, 1917.

Soares, Gomes and Toledo (2011, p. 460) highlight the importance of the ICMS "in fiscal policy and public budgets, especially in those smaller municipalities, in which its existence depends, in good part, on this source of funds". Along these lines, in Brazil, since the 1980s, due to the absence of an effective national regional development policy, the states started to grant ICMS tax benefits, in order to attract enterprises to their territories, aiming, with this, to increase economic movement and generate more jobs, in a competition known as fiscal war (Afonso, 2014; Buissa et al., 2017).

The fiscal war, however, has led to the establishment of competitive federalism, instead of cooperative federalism, in addition to causing legal uncertainty in taxpayers who enjoy tax exemptions, in the face of retaliation by the tax authorities of states that feel harmed. According to Rezende (2020, p. 73), "the maintenance of the state tax competence of a notoriously national tax is combustion for a war clearly opposed to the cooperation signaled by the Federal Constitution of 1988". Therefore, according to Oliveira and Chieza (2018), it is necessary to eliminate the mechanisms of the fiscal war and transform the main state and municipal taxes into a VAT, with a broad and structured field of incidence based on the principle of collection at destination, and at the same time reduce the National Tax System regressivity with the increased participation of taxes on income and wealth.

It is, in this sense, that Appy, Santi, Coelho, Machado and Canado (2020) propose a tax reform that includes the progressive replacement of the current five Brazilian taxes on goods and services

(ICMS, ISS [tax on services of any nature], IPI [tax on industrialized products], PIS [Social Integration Program] and Cofins [Contribution to the Financing of Social Security]) by the so-called Tax on Goods and Services (IBS), provided for in the Proposed Amendment to Constitution No. 45 (PEC 45) (Proposta de Emenda à Constituição nº 45, de 3 de abril de 2019), which focuses on the purchase operation for consumption and prohibits the granting of tax benefits, whose collection and inspection are shared between the Union, the states and the municipalities.

In view of this conflicting federative panorama, Complementary Law No. 160 (Lei Complementar nº 160, de 7 de agosto de 2017) was enacted, which allowed the validation of the ICMS tax benefits granted without the prior signing of an authorizing agreement in the National Council for Finance Policy (Confaz). Nevertheless, this complementary rule conferred legality to tax benefits that were previously considered unconstitutional, a fact that reveals the difficulty in converging the interests of the federation with the individual interests of the states (Rezende, 2020).

In Santa Catarina, the *locus* of this study, the granting of the tax benefit known as presumed credit is responsible for the greater amount of tax expenditures (tax waiver), when compared to the granting of the tax benefits for the reduction in the tax basis and exemption. For example, in the state of Santa Catarina, in 2019, the amount of ICMS tax waiver totaled 5.7 billion reais, divided as follows: presumed credit, 4.1 billion; reduction in the tax basis, 920 million; and exemption, 689 million (Lei nº 17.566, de 7 de agosto de 2019).

As stated in the Budget Guidelines Law (Lei nº 17.566, de 7 de agosto de 2019), however, the value of the ICMS tax waiver is potential, which means that Santa Catarina did not fail to effectively collect 5.7 billion reais, because, when calculating the tax waiver, other variables are not considered, such as the fact that certain companies have set up, remained or expanded their business in the state thanks exclusively to the granting of tax benefits. In other words, Santa Catarina uses the initial loss method to estimate the tax waiver, and not the final loss method, which considers the chain effects of the ICMS tax benefits (Pellegrini, 2014).

Despite the negative externalities, especially in the sphere of the fiscal war, several studies point to positive effects on the policy of granting tax benefits, as explained below.

At the international level, Accordino (2020) analyzed the tax benefits granted in Italy, concluding that they promote increased demand for goods and services, as well as the creation and growth of innovative companies, committed to promoting sustainable development. Chicumbi (2018) assessed the impacts of exemptions on an industrial tax in Angola, concluding that they resulted in the attraction of investments, the generation of jobs, the increase in GDP and the reduction of regional asymmetries. Likewise, Parys and James (2010) evaluated the tax benefits granted in sub-Saharan African countries, concluding that the increase in legal certainty, the reduction of the complexity of the tax system and, to a lesser extent, the reduction of taxation help in attracting investments. He et al. (2019) investigated the relationship between environmental taxes and economic and environmental performance in China, concluding that taxation should be reduced to encourage the emergence of sustainable, low-carbon, high-tech industries. Similarly, Qi et al. (2020) found that the tax benefits of VAT in China boost the capacity for regional corporate innovation, in addition to scientific and technological development. Kleinbard (2010), in contrast to Surrey's (1970) understanding, concluded that, in the United States, tax expenditures can be the most efficient means of granting government

subsidies, to the point of becoming dominant instruments in the implementation of discretionary public policies. Finally, Klemm and Parys (2012), in the context of Latin America and the Caribbean, found robust evidence that the granting of long-term tax benefits are effective instruments to attract international investments.

At the national level, Botelho et al. (2019) evaluated the tax benefits policies in relations with regional development, concluding that exemptions with a focus on specific regions obtained better results, when compared to those of national scope. Likewise, Porto and Memória (2019), when investigating the effects of federal tax incentives, provided for in Law No. 11.196, of 2005, concluded that there was an increase in investments in research and development, in addition to generating value for society. Rezende et al. (2018), when analyzing the relationship between federal, state and municipal tax benefits, as well as corporate decisions regarding investments and results, concluded that the exemptions had a positive impact on the generation of value for the benefited companies.

At the state level, Rezende et al. (2019), based on the south-Mato Grosso municipality of Três Lagoas, investigated whether the ICMS tax benefits contribute to value creation, concluding that there was an increase in tax collection and a substantial increase in the transfer of the ICMS constitutional share, in addition to attracting a significant number of companies to the locality and considerable economic return for the benefited companies. Finally, Sá and Silva (2019) analyzed the industrial deconcentration project, developed in the metropolitan region of Curitiba, located in the state of Paraná, anchored in the granting of ICMS tax benefits, concluding that the project was efficient in forming the local industrial space, despite not presenting the same result in other regions of the state.

### 2.4 Research hypotheses and theoretical model

Given the conclusions of the studies by Accordino (2020), Chicumbi (2018), He et al. (2019), Klemm and Parys (2012), Parys and James (2010), Porto and Memória (2019), Qi et al. (2020), Rezende, Dalmácio and Rathke (2018), Rezende, Peralta, Rosa and Rezende (2019), as well as Sá and Silva (2019), described in sub-item 2.3, which show positive results in the relationship between tax expenditures, attraction of enterprises and sustainability in the TBL concept, the following research hypotheses are formulated, which are interrelated:

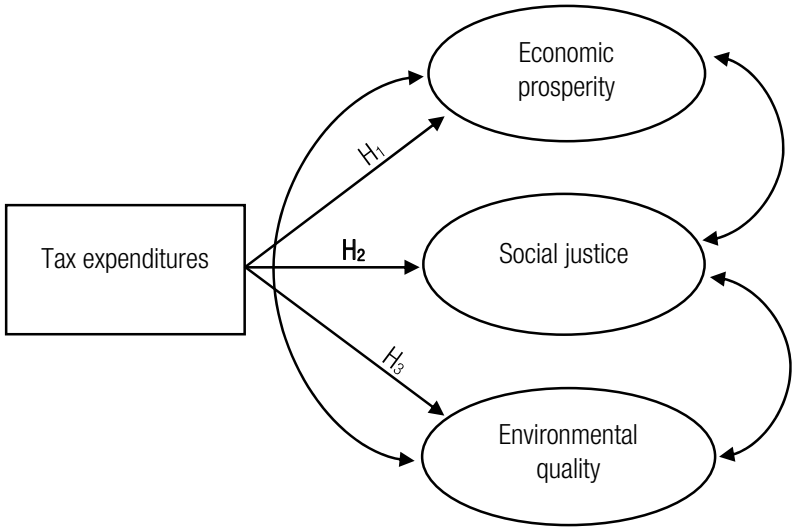
Hypothesis $H_1$: "ICMS tax expenditures are *positively* related to the economic prosperity of Santa Catarina's municipalities".

Hypothesis $H_2$: "ICMS tax expenditures are *positively* related to the social justice of Santa Catarina's municipalities".

Hypothesis $H_3$: "ICMS tax expenditures are *positively* related to the environmental quality of Santa Catarina's municipalities".

In Figure 1, the theoretical research model is presented, and the referred research hypotheses are graphically indicated.

**FIGURE 1 THEORETICAL MODEL**




**Source:** Elaborated by the authors.

Considering that the goal of this article is to analyze the influence of ICMS tax benefits on the sustainability of Santa Catarina's municipalities, the theoretical model (Figure 1), designed based on the theoretical foundation of this research, presents the (observable) variable "tax expenditures" (Buissa et al., 2017; Caldeira et al., 2020; Lester, 2017; RFB, 2018; Surrey, 1970), composed of the total (estimated) ICMS tax waiver amounts, described in the State Budget Guidelines Laws (LDO) of Santa Catarina. Regarding the sustainability of the municipalities, the theoretical model presents the constructs "economic prosperity", "social justice" and "environmental quality", anchored in the TBL concept (Alhaddi, 2015; Elkington, 1998; Isil & Hernke, 2017). Thus, the model conceived, although based on the theories related to tax extrafiscality and sustainability in the TBL, is innovative and experimental, given that it presents a set of multiple and integrated relationships, linked to a relevant issue, both empirical and theoretical, as exposed throughout the theoretical foundation: tax expenditures *versus* economic, social and environmental sustainability.

## 3. METHOD

This research is classified as theoretical-empirical, with longitudinal design and period specified beforehand, using the quantitative method, through hypotheses formulation (Sampieri, Collado & Lucio, 2013). The literature review was carried out by consulting book chapters, academic articles, technical studies and legislation. The research universe consists of the current 295 municipalities in the state of Santa Catarina, and the data used were collected in the period from 2005 to 2017. The year 2005 was chosen as the beginning because the data on the ICMS's collection is only available from that date, and 2017 was chosen as the final year because part of the data from the Brazilian Institute of Geography and Statistics (IBGE) is made available with a lag of one to two years.

The transient cut of the research constitutes a cluster of time series and cross-sectional data, resulting in a panel data set, and to be considered balanced, the number of periods T must be T1 = T2 = T3 = Tn, and the number of observations in the database (N) must be equal to nT (Fávero & Belfiore, 2017). In this research, however, the data panel is considered unbalanced, since the 13-year period is not the same for all observation units. In addition, the research data were tabulated in the panel data structure *id jv*, in whereas *id* represents the unit of analysis and *jv* represents the period, constituting a short panel, considering that the number of observations (M) in the cross section is greater than that of time periods (T), that is, M > T [295 > 13] (Fávero & Belfiore, 2017). Feld et al. (2020), Klemm and Parys (2012), Parys and James (2010), as well as Qi et al. (2020), similarly, also used time series models, with panel data, to analyze the influence of tax policy on economic development and multidimensional sustainability.

The variables referring to the triple bottom line (Table 1), obtained from secondary sources, part of them of a dichotomous nature, were defined based on the theoretical foundation, in particular: 1) in the studies by Silva et al. (2018), which addresses the construction of a sustainable development index in the municipalities of Brazilian state of Ceará, and Malheiros, Coutinho and Philippi (2012), which presents a conceptual approach to sustainability indicators; 2) in the reference work by J. Sachs (2017), *The era of sustainable development*; and 3) IBGE's sustainable development indicators (2015).

Next, Table 1 describes the variables that make up the constructs "economic prosperity", "social justice" and "environmental quality", which represent the dimensions of municipal sustainability.

**TABLE 1 VARIABLES THAT COMPOSE THE RESEARCH CONSTRUCTS**

| Constructs | Description of variables | Source |
|---|---|---|
| Economic prosperity | $Y_1$ – Gross added value (in reais, natural log) | IBGE |
| | $Y_2$ – Electricity consumption (in kWh, natural log) | Celesc |
| | $Y_3$ – Vehicle fleet (number, natural log) | Denatran |
| | $Y_4$ – Population ( number, natural log) | STN |
| | $Y_5$ – Current expenses (in reais, natural log) | STN |
| | $Y_6$ – Current income (in reais, natural log) | STN |
| | $Y_7$ – Share of Municipality Participation Fund (in reais, natural log) | STN |
| | $Y_8$ – Collection with ICMS (in reais, natural log) | SEF |
| Social justice | $Y_9$ – Number of deaths | IBGE |
| | $Y_{10}$ – Firjan Municipal Health Development Index | Firjan |
| | $Y_{11}$ – Firjan Municipal Education Development Index | Firjan |
| | $Y_{12}$ – Firjan Municipal Development Index for Employment and Income | Firjan |
| | $Y_{13}$ – Cooperatives or associations of waste pickers (dichotomous - [0.1]) | SNIS |
| | $Y_{14}$ – Social work of city halls for waste pickers (dichotomous - [0.1]) | SNIS |

*Continue*

| Constructs | Description of variables | Source |
|---|---|---|
| Environmental quality | $Y_{15}$ – Public cleaning and solid waste management (dichotomous - [0.1]) | SNIS |
| | $Y_{16}$ – Urban drainage and rainwater management (dichotomous - [0.1]) | SNIS |
| | $Y_{17}$ – Public health guarantee (dichotomous - [0.1]) | SNIS |
| | $Y_{18}$ – Water supply (dichotomous - [0.1]) | SNIS |
| | $Y_{19}$ – Sanitary sewage (dichotomous - [0.1]) | SNIS |
| | $Y_{20}$ – Mechanisms of participation and social control (dichotomous - [0.1]) | SNIS |

**Notes:** Initials/acronyms: IBGE (Brazilian Institute of Geography and Statistics); Celesc (Santa Catarina Power Plants); Denatran (National Traffic Department); STN (National Treasury Secretariat); SEF (State Secretariat of Finance of Santa Catarina); Firjan (Federation of Industries of the State of Rio de Janeiro); SNIS (National Sanitation Information System).
**Source:** Elaborated by the authors.

In relation to the variables that make up the construct "economic prosperity, a set of variables relevant to municipal economic sustainability is used, such as tax revenue, added value, population, electricity consumption, vehicle fleet, current expenses and income (IBGE , 2015; Malheiros et al., 2012; Silva et al., 2018), not limited to the mere GDP *per capita*, because, according to J. Sachs (2017, p. 28), "the increase in GDP *per capita* is far to be a perfect indicator of well-being ".

As for the variables of the "social justice" construct, they reflect public policies that, together, generate homogeneous inclusion and social development in the municipalities. Thus, the studies by Malheiros et al. (2012), J. Sachs (2017) and Silva et al. (2018) highlight the relevance of the selected indicators. It should be noted that the variables "cooperatives or associations of waste pickers" and "social work of city halls for waste pickers" are important indicators, considering that Law No. 12.305 (Lei nº 12.305, de 2 de agosto de 2010), which institutes the Policy National Solid Waste (PNRS), delegates to municipalities the integrated management of solid waste generated in the respective territories (art. 10), prioritizing access to federal resources to those municipalities that implement selective collection with the participation of cooperatives or other forms of association of pickers of reusable and recyclable materials (art. 18, II). In addition, the PNRS, by setting bold goals to address environmental and social problems related to urban waste, foresees the inclusion of waste pickers in the reverse chain of recyclable materials in all municipalities (Teodósio, Dias & Santos, 2016).

Finally, with respect to the variables that make up the "environmental quality" construct, they encompass a set of actions aligned with good environmental preservation and conservation practices, especially given the fact that the 1988 Federal Constitution delegates the provision of services to the municipalities of essential local public services (art. 30, V), as is the case with public cleaning, solid waste management, water supply and sanitary sewage (IBGE, 2015; Malheiros et al., 2012; J. Sachs, 2017; Silva et al., 2018). It is also observed that the variable "mechanisms of participation and social control" refers to the establishment of mechanisms and controls of a social nature, a precondition for the implementation of public basic sanitation policy (Decreto nº 7.2017, de 21 de julho de 2010).

Regarding the (observable) variable "tax expenditures", it is a proxy composed of the sum of the annual (estimated) amounts of (potential) ICMS tax waiver, derived from the granting of presumed credit, reduction in the tax basis and exemption, published in the Santa Catarina LDOs between 2006 and 2016. In the appropriation of the amounts of tax waiver, for each of the 295 municipalities in

Santa Catarina, the annual value added indexes – used by the State in the constitutional transfer of ICMS collection to the municipalities – were applied, published by the State Secretariat of Finance of Santa Catarina, about 25% of the amount of the tax waiver obtained in the LDO.

The monetary data of this research were deflated by the FGV IGP-DI index (base year 2017), and continuous variables were treated with the use of natural logarithms, aiming to reduce the scale of the variables and the heterogeneity.

To analyze the relationships between the variable "tax expenditures" and the constructs "economic prosperity", "social justice" and "environmental quality", the generalized structural equation modeling (SEM) technique was used, based on covariance. The SEM application is recommended for empirical research in administration, since it allows the measurement of latent constructs and the simultaneous testing of theories with multiple dependency relationships, being characterized as an extension of confirmatory factor analysis (CFA) and a multiple regression (Bido, Silva, Souza & Godoy, 2010; Hair, Black, Babin, Anderson & Tatham, 2009). In this same alignment, Hall and Kanaan (2020) opted for the structural equation model to estimate the effects of local tax choices (trade-offs) on the economic development of 215 municipalities in the state of Texas, in the United States, whose data, obtained from secondary sources, covered the period between 2011 and 2015, which provided a substantial amount of variables for the SEM and ensured a meaningful investigation.

Considering that the variables of this research were predefined based on the theoretical framework, the CFA was initially applied, using the maximum likelihood estimator, generally employed in the pooled structure models with clustering (case of this research), which allows the control of heterogeneity (Fávero, 2013). The number of variables observable in this research is in accordance with the prescriptions of Hair et al. (2009, p. 601): "[...] the latent constructs must be indicated by at least three measured variables, with four or more being preferred".

Despite the several attempts and adaptations made to the model, however, the results were not satisfactory, since the informational structure of this research has dichotomous variables and missing values, generating the problem of non-concavity (Bertolai, 2009). To overcome this problem, the constructs "economic prosperity", "social justice" and "environmental quality" were independently estimated, which made it possible to work the data in panel format, considering the heterogeneity of the municipalities, in addition to making it possible to obtain more robust results regarding the standard deviation of errors.

After estimating the model through the CFA, it was verified whether the variables behaved according to theoretical expectations (Aranha & Zambaldi, 2008; Hair et al., 2009), resulting in Model 1. Then, Model 1 was refined by excluding variables with standardized factor loads below 0.5 (Hair et al., 2009; Figueiredo & Silva, 2010), resulting in Model 2.

Thereafter, the effects of the adjustments that resulted in Models 1 and 2 were compared, selecting the most appropriate model for this research, based on the results of the general adjustment (Hair et al., 2009). In addition, the internal consistency of the constructs was verified through the application of tests of composite reliability, analysis of extracted variance and discriminant validity (Prado, 2006).

## 4 RESULTS ANALYSIS AND DISCUSSION

Table 2 presents the results of the confirmatory factor analysis (CFA), according to Models 1 (original) and 2 (refined), with respect to the variables that make up the constructs "economic prosperity", "social justice" and "environmental quality ".

**TABLE 2 RESULTS FROM ESTIMATION OF THE VARIABLES THAT COMPOSE THE RESEARCH CONSTRUCTS**

| Constructs | Description of the variables | Model 1 | Model 2 |
|---|---|---|---|
| Economic prosperity | $Y_1$ – Gross added value | 0.979 | 0.979 |
| | $Y_2$ – Electricity consumption | 0.661 | 0.661 |
| | $Y_3$ – Vehicle fleet | 0.976 | 0.976 |
| | $Y_4$ – Population | 0.974 | 0.974 |
| | $Y_5$ – Current expenses | 0.860 | 0.860 |
| | $Y_6$ – Current income | 0.973 | 0.973 |
| | $Y_7$ – Share of Municipality Participation Fund | 0.917 | 0.917 |
| | $Y_8$ – Collection with ICMS | 0.905 | 0.905 |
| Social justice | $Y_9$ – Number of deaths | 0.852 | 0.870 |
| | $Y_{10}$ – Firjan Municipal Health Development Index | 0.182 | - |
| | $Y_{11}$ – Firjan Municipal Education Development Index | 0.152 | - |
| | $Y_{12}$ – Firjan Municipal Development Index for Employment and Income | 0.432 | 0.426 |
| | $Y_{13}$ – Cooperatives or associations of waste pickers | 0.601 | 0.588 |
| | $Y_{14}$ – Social work of city halls for waste pickers | 0.445 | 0.436 |
| Environmental quality | $Y_{15}$ – Public cleaning and solid waste management | 0.740 | 0.740 |
| | $Y_{16}$ – Urban drainage and rainwater management | 0.701 | 0.701 |
| | $Y_{17}$ – Public health guarantee | 0.995 | 0.995 |
| | $Y_{18}$ – Water supply | 0.994 | 0.994 |
| | $Y_{19}$ – Sanitary sewage | 0.894 | 0.894 |
| | $Y_{20}$ – Mechanisms of participation and social control | 0.835 | 0.835 |

**Source:** Elaborated by the authors.

Looking at Table 2, it is worth noting that all variables of the "economic prosperity" and "environmental quality" constructs have coefficients greater than 0.5, a result that indicates that these variables adequately represent the constructs. As there was no exclusion of variables in these

constructs, which were independently estimated, the results obtained, both in Model 1 and 2, are identical. Notwithstanding, in the "social justice" construct, the variables $Y_{10}$ – Firjan Municipal Development Index for Health (0.182) – and $Y_{11}$ – Firjan Municipal Development Index for Education (0.152) – have coefficients much lower than 0.5, which resulted excluding these variables in Model 2 (Figueiredo & Silva, 2010; Hair et al., 2009). As for the variable $Y_{12}$ – Firjan Municipal Development Index for Employment and Income (0.432) –, despite the coefficient slightly below 0.5, it was decided to keep it in Model 2 due to its theoretical importance to compose the construct "social justice" and the restriction of the degrees of freedom of this construct (Bomfim, Almeida, Gouveia, Macedo & Marques, 2011; Figueiredo & Silva, 2010).

Table 3 shows the CFA results in estimating each construct in relation to the variable "tax expenditures", as well as estimating the covariance between the constructs.

**TABLE 3 RESULTS FROM CONSTRUCTS' ESTIMATES IN RELATION TO THE VARIABLE "TAX EXPENDITURES" AND THE COVARIANCE BETWEEN THE CONSTRUCTS**

| Variable | Constructs | Model 1 | Model 2 |
|---|---|---|---|
| Tax expenditures | Economic prosperity | 0.823 | 0.823 |
| | Social justice | 0.656 | 0.647 |
| | Environmental quality | 0.152 | 0.152 |
| Covariance | | | |
| Economic prosperity, Social justice | | 0.5060 | 0.5050 |
| Economic prosperity, Environmental quality | | -0.0698 | -0.0697 |
| Social justice, Environmental quality | | -0.0272 | -0.0382 |

**Source:** Elaborated by the authors.

Even with the exclusion of the variables $Y_{10}$ – Firjan Municipal Development Index for Health – and $Y_{11}$ – Firjan Municipal Development Index for Education –, there are few variations in the coefficients estimated in the two models (Table 3). Thus, to verify the internal consistency of the constructs and, consequently, to investigate which of these two models should be used in the structural equation model, tests of composite reliability (CR), analysis of extracted variance (AEV) and discriminant analysis were applied (Tables 4 and 5).

**TABLE 4 RESULTS FROM COMPOSITE RELIABILITY AND ANALYSIS OF EXTRACTED VARIANCE TESTS**

| Constructs | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | CR | AEV | CR | AEV |
| Economic prosperity | 0.975 | 0.830 | 0.975 | 0.830 |
| Social justice | 0.613 | 0.255 | 0.681 | 0.369 |
| Environmental quality | 0.947 | 0.753 | 0.947 | 0.753 |

**Source:** Elaborated by the authors.

According to Hair et al. (2009) and Kline (2016), the coefficients for the composite reliability test must be equal to or greater than 0.7. This parameter is supported in both models (Table 4) with respect to the constructs "economic prosperity" and "environmental quality". However, as for the "social justice" construct, the coefficient is higher in Model 2, although slightly below 0.7. Regarding the analysis of extracted variance test, the coefficients must be equal to or greater than 0.5 (Hair et al., 2009; Kline, 2016). In the "social justice" construct, the coefficients are less than 0.5 in both models, but in Model 2 the coefficient is slightly higher (Table 4).

The results of the discriminant analysis test, which consists of comparing the square of the correlation between the constructs and the analysis of extracted variance from the constructs for the two models, are shown in Table 5.

**TABLE 5 RESULTS FROM DISCRIMINANT ANALYSIS TEST**

| Constructs | Model 1 | | | Model 2 | | |
|---|---|---|---|---|---|---|
| | EP | SJ | EQ | EP | SJ | EQ |
| Economic prosperity (EP) | 0.830 | | | 0.830 | | |
| Social justice (SJ) | 0.573 | 0.255 | | 0.564 | 0.369 | |
| Environmental quality (EQ) | 0.007 | 0.006 | 0.753 | 0.007 | 0.005 | 0.753 |

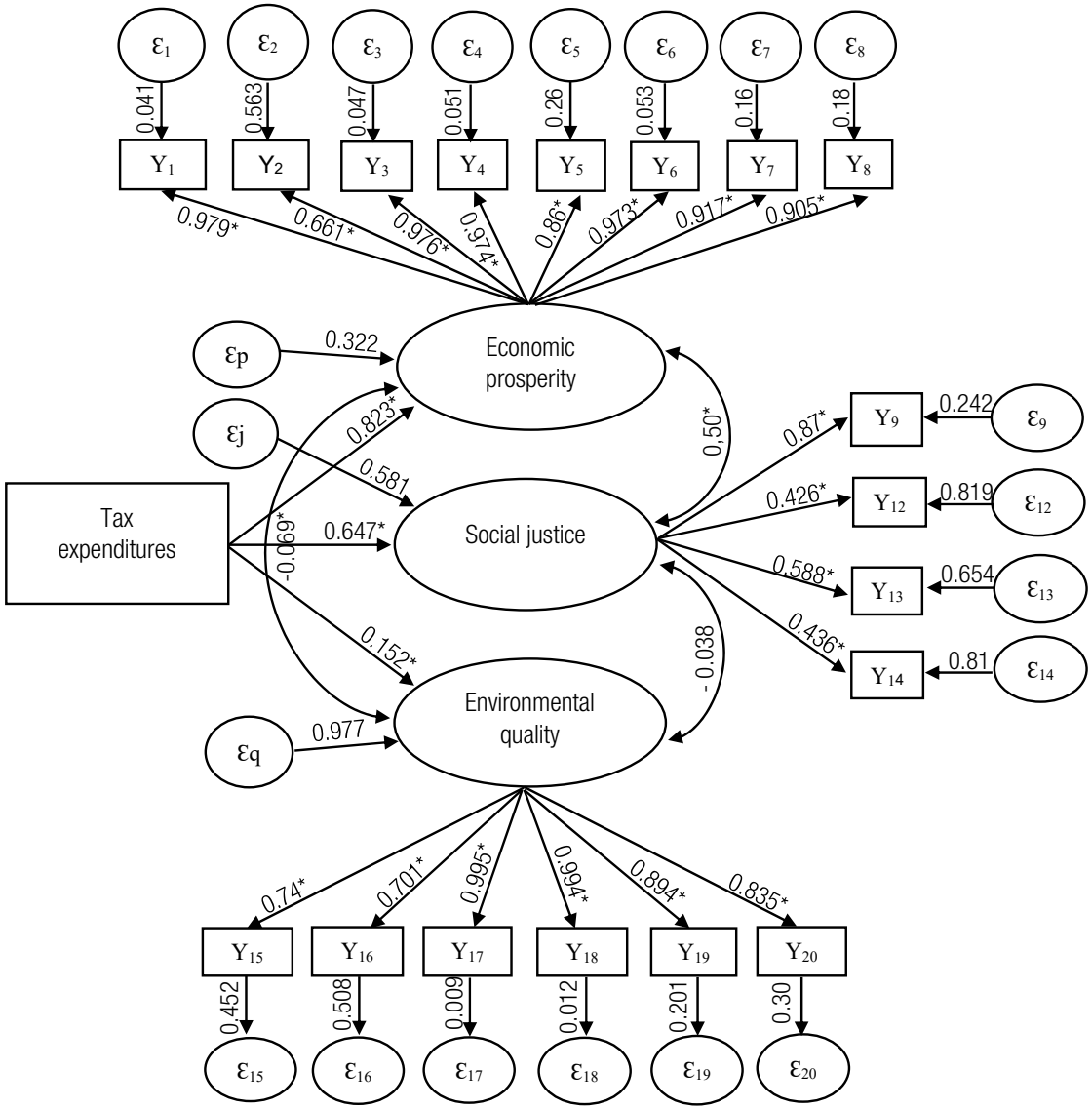
**Source:** Elaborated by the authors.

In a discriminant analysis, it is expected that the result of the analysis of extracted variance (AEV) diagonally is greater than that of the square of the correlation between the constructs, thus indicating that the variables of a given construct explain more about this construct than the other constructs of the model. However, it is observed in the results (Table 5) that, in both Model 1 and 2, the "economic prosperity" construct is more related to the "social justice" construct than that observed in the analysis of extracted variance from this construct (Table 4), suggesting that the variables of the "economic prosperity" construct are explanatory of the "social justice" construct. Nevertheless, this result can be justified by the fact that economic variables provide better access to health, safety and education (I. Sachs, 2008; J. Sachs, 2017).

Thus, for obtaining results of adjustments superior to Model 1, we opted for Model 2 to compose the structural equations model. Regarding the global adjustments of Model 2, the determination coefficient was 0.687, indicating that this model explains 69% of the data variability, which represents a satisfactory model prediction adjustment (Marôco, 2014; Schumacker & Lomax, 2016). In addition, the results of the stability analysis of systems of simultaneous equations indicate that all eigenvalues are within the unit circle, that is, that Model 2 has conditional stability (Marôco, 2014; Schumacker & Lomax, 2016).

In Figure 2, the results of the structural equation model are presented in diagram form.

**FIGURE 2 RESULTS FROM ESTIMATION OF THE STRUCTURAL EQUATION MODEL**




**Note:** (*) Statistical relationship with 95% reliability, considering the significance level of 5% (Barbetta, 2012).
**Source:** Elaborated by the authors.

As shown in Figure 2, the relationship between the variable "tax expenditures" and the construct "economic prosperity" has statistical significance and a high coefficient (0.823). Regarding the variable "tax expenditures" and the construct "social justice", the relationship is also statistically significant, but the coefficient (0.647) is lower than that found in the relationship between "tax expenditures" and "economic prosperity" (0.823). Regarding the relationship between the variable "tax expenditures" and the construct "environmental quality", despite presenting statistical significance, the coefficient is low (0.152), especially when compared to those obtained in the relationships between "tax expenditures" and "economic prosperity" (0.823), as well as between "tax expenditures" and "social justice" (0.647).

These results, therefore, indicate that tax expenditures are more linked to the economic dimension of municipal sustainability (Ministério da Economia, 2019; Soares, Gomes & Toledo, 2011), and it can be inferred that the granting of ICMS tax benefits – through attraction and maintenance of enterprises – moves the local economy, which corroborates the findings of Botelho et al. (2019), Chicumbi (2018), Klemm and Parys (2012), Rezende et al. (2018) and Rezende et al. (2019). Thus, hypothesis $H_1$ is confirmed ("ICMS tax expenditures are *positively* related to the economic prosperity of Santa Catarina's municipalities").

On the other hand, the results also show that tax expenditures have a secondary influence on the social dimension and have little influence on the environmental dimension. Regarding the social dimension, the results corroborate the findings of Accordino (2020), Killian and O'Regan (2018), suggesting at the same time the regressiveness of indirect taxes, such as ICMS (OCDE, 2020; Oliveira & Chieza, 2018), in addition to pointing out the need for tax reform (Appy et al., 2020; ONU, 2015). As for the environmental dimension, the results contradict the findings of He et al. (2019) and Killian and O'Regan (2018), as well as the findings by Trennepohl (2011) and Moura (2015), that extrafiscality within the scope of ICMS has been widely used for environmental purposes. These divergent results may be due to the fact that the Ecological ICMS has not yet been implemented in Santa Catarina. Therefore, it is necessary for the State to adopt a more holistic – and less economical – view regarding the criteria used in the granting of ICMS tax benefits, especially in the face of current climate changes and the devastation of the environment, which endanger the very survival of civilization (I. Sachs, 2008; J. Sachs, 2017). In any case, hypotheses $H_2$ ("ICMS tax expenditures are *positively* related to the social justice of Santa Catarina's municipalities") and $H_3$ ("ICMS tax expenditures are *positively* related to the environmental quality of Santa Catarina's municipalities").

Still in Figure 2, it can be seen that the variables that make up the "economic prosperity" construct have statistical significance and that most of the coefficients are high, with the variable $Y_1$ ("gross added value") being the one with the highest coefficient (0.979), and the variable $Y_2$ ("electricity consumption" [0.661]), the lowest. The high coefficients of the variables $Y_1$ ("gross value added") and $Y_8$ ("collection with ICMS") stand out, considering that the economic movement is the main variable in the calculation of the constitutional apportionment of ICMS. This result corroborates the findings by Rezende et al. (2019), that is, the ICMS tax benefits contribute to the increase in the collection of this tax and to its constitutional transfer to the municipality.

Still looking at Figure 2, it appears that all the variables that make up the "social justice" construct have statistical significance, but only the variable $Y_9$ ("number of deaths") has a high coefficient (0.87), while $Y_{12}$ ("Firjan Municipal Development Index for Employment and Income" [0.426])

has the lowest coefficient. As for the variables that make up the "environmental quality" construct, they have statistical significance, and most of the coefficients are high, with the variable $Y_{17}$ ("public health guarantee" [0.995]) presenting the highest coefficient, and $Y_{16}$ ("urban drainage and rainwater management" [0.701]), the lowest. The results obtained in variables $Y_{18}$ ("water supply" [0.994]) and $Y_{19}$ ("sanitary sewage [0.894]) corroborate the findings of Soares and Almeida (2018), which concluded that economic growth has been accompanied by improvements in water and sanitation dimensions.

Finally, with regard to covariance, the results (Figure 2) point to statistical significance and a moderate coefficient (0.50) between the constructs "economic prosperity" and "social justice". This result is in line with the fact that the 1988 Federal Constitution delegates to municipalities the provision of essential services to the local population, which require substantial financial resources (Buissa et al., 2017; Gomes et al., 2020). Conversely, the results of the covariance between the constructs "social justice and "environmental quality" do not point to statistical significance and reveal a low coefficient (-0.038). Likewise, the covariance between the constructs "economic prosperity and "environmental quality", although the results point to statistical significance, the coefficient is also low (-0.069). These results can be explained based on the findings of Zhou et al (2014), who conclude that developing countries, until they reach a certain level of income, grow without worrying about the quality of the environment.

## 5. FINAL CONSIDERATIONS

The researches that have been carried out on the effects of tax benefits, in general, do not analyze the dimensions of sustainability in an integrated manner, mainly emphasizing the economic dimension and, secondarily, the social and environmental dimensions, limiting themselves to discussing technical or legal arguments, which, although important, do not measure the impacts of tax expenditures.

In this article, therefore, we sought to address the issue of ICMS tax benefits and their influence on the sustainability of the current 295 municipalities in Santa Catarina, based on the concepts of tax expenditure and TBL, represented by the dimensions of economic prosperity, social justice and environmental quality.

To this end, based on the thesis that the ICMS tax benefits positively influence the sustainability of Santa Catarina's municipalities and the conception that tax expenditures must be subject to multidimensional impact sustainability assessment, a set of secondary panel data was elaborated, collected between 2005 and 2017, which were analyzed using the generalized SEM technique.

That done, although the results point to statistically significant relationships, it is concluded that tax expenditures promote, to a high degree, economic sustainability; to a moderate degree, social sustainability; and, to a low degree, environmental sustainability. Consequently, they also indicate that the granting of ICMS tax benefits in Santa Catarina favors economic aspects and that, in the case of the environment, the State Government invests little in tax extrafiscality in order to mitigate the harmful effects of global warming and devastation environmental. It is worth remembering that this study was limited to the analysis of the impact of tax benefits within the state of Santa Catarina, that is, it did not consider the effects of this Santa Catarina tax policy on other Brazilian states and municipalities.

Thus, in view of the analyzes presented so far, the urgency for tax administrations at all levels to evaluate, from the perspective of multidimensionality, the current methods employed in the

measurement of tax waivers and the impacts and effectiveness of tax expenditures for the sustainability of the Union, the states and the municipalities.

About the developed method – which can be adapted to other taxes and tax benefits – and the results obtained in this research, it is considered that they are relevant to public managers, since, by clarifying the effects of tax expenditures from a macro-development perspective, they help decision makers in the face of complex and difficult trade-offs, such as collecting taxes *versus* attracting or keeping companies in their territories. Furthermore, the statistical modeling method applied in this study can be used in all units of the federation, including the Union itself, since professionals from tax administrations, from all levels of government, may adopt it, including improving it or adapting it to your specific circumstances.

Considering the need for the national tax system to respond to the multidimensional assessment of sustainability of impacts, definitively incorporating the principle of sustainability (Freitas, 2016), this research contributes to the advancement of knowledge in the fields of tax extrafiscality and sustainable development, since studies on the impacts of tax benefits, in general, orbit in discussions of a legal nature. At most, such studies use descriptive statistics to try to measure the effects of tax benefits in the economic or business sphere, without considering the economic, social and environmental dimensions in an integrated manner. In addition, as noted by Alhaddi (2015), the literature has shown an inconsistent use of the term "sustainability", considering that several studies, when using it, refer only to one or two of its dimensions.

In summary, it can be said that the goal of this article has been achieved, since, based on the results obtained in the application of the SEM, has been demonstrated, both theoretically and empirically, the influence of the ICMS tax benefits on the economic, social and environmental sustainability of Santa Catarina's municipalities.

As for the limitations of the developed method, the existence of dichotomous data and missing values stands out, which generated the problem of non-concavity of the model. In addition, the annual time series were limited to the years 2005 to 2017, a period that can be considered short in the current context of rapid economic, social and environmental changes.

For future studies, it is suggested to analyze the impact of the ICMS tax benefits by segment or economic activity, investigating, in a comparative study, how long tax expenditures affect the economy. In this case, it is suggested to use variables covering all states, which will make it possible to verify the mutual impact of tax exemptions in the various units of the federation. Studies based on the tax reform proposal (PEC 45, 2019) are also encouraged, which provides for the replacement of five taxes levied on consumption, including ICMS, by IBS, which would have essentially revenue collection purpose, with the absence of extra-fiscal character.

## REFERENCES


Abraham, M. (2019). *Reflexões sobre finanças públicas e direito financeiro*. Salvador, BA: JusPodivm.

Accordino, P. (2020). Fiscal Policy for Sustainable Development: The Italian Way to Promote Innovative Entrepreneurship According to European Union Rules. In V. Mauerhofer, D. Rupo, & L. Tarquinio (Eds.), *Sustainability and Law: General and Specific Aspects* (pp. 201-219). Geneva, Switzerland: Springer Nature.

Afonso, J. R. R. (2014). *A renúncia tributária do ICMS no Brasil*. Washington, DC: Banco Interamericano de Desenvolvimento (BID).

Alhaddi, H. (2015). Triple Bottom Line and Sustainability: A Literature Review. *Business and Management Studies*, *1*(2), 6-10.

Appy, B., Santi, E., Coelho, I., Machado, N., & Canado, V. R. (2020). Tributação no Brasil: o que está errado e como consertar? In N. Yoshiaki (Org.), *Brasil sob reforma*. Rio de Janeiro, RJ: FGV.

Aranha, F., & Zambaldi, F. (2008). *Análise fatorial em administração*. São Paulo, SP: Cengage Learning.

Armbruster, S., & Hintermann. B. (2020). Decentralization with porous borders: public production in a federation with tax competition and spillovers. *International Tax and Public Finance*, *27*, 606-642.

Balthazar, U. C. (2008). A gênese do imposto sobre o valor agregado. *Revista Sequência*, *56*, 245-258.

Barbetta, P. A. (2012). *Estatística aplicada às ciências sociais*. Florianópolis, SC: Editora da Ufsc.

Bertolai, J. D. P. (2009). *Dinâmica monetária eficiente sob encontros aleatórios: uma classe de métodos numéricos que exploram concavidade* (Master Thesis). Fundação Getulio Vargas, Rio de Janeiro, RJ.

Bido, D. S., Silva, D., Souza, C. A., & Godoy, A. S. (2010). Mensuração com indicadores formativos nas pesquisas em administração de empresas: como lidar com a multicolinearidade entre eles? *Administração – Ensino e Pesquisa*, *11*(2), 245-269.

Bomfim, P. R. C. M., Almeida, R. S., Gouveia, V. A. L., Macedo, M. A. S., & Marques, J. A. V. C. (2011). Utilização de análise multivariada na avaliação do desempenho econômico-financeiro de curto prazo: uma aplicação no setor de distribuição de energia elétrica. *Revista Adm.Made*, *15*(1), 75-92.

Botelho, L. H. F., Abrantes, L. A., & Fialho, N. S. (2019). Reflexões sobre as aplicações de políticas de desonerações tributárias no desenvolvimento regional brasileiro. *Cadernos Gestão Pública e Cidadania*, *24*(79), 1-20.

Brandão, S. C., Jr. (2014). *Federalismo e ICMS: Estados-membros em "guerra fiscal"*. São Paulo, SP: Quartier Latin.

Buissa, L., Bevilacqua, L., & Morais, P. H. (2017). Incentivos fiscais de ICMS e renúncia de receita com o Regime de Recuperação Fiscal (RRF). *Revista Fórum de Direito Financeiro e Econômico (RFDFE)*, *6*(11), 127-143.

Caldeira, E., Geourjon, A-M., & Rota-Graziosi. G. (2020). Taxing aid: the end of a paradox? *International Tax and Public Finance*, *27*, 240-255.

Caliendo, P. (2013). Limitações constitucionais ao poder de tributar com finalidade extrafiscal. *Revista do Programa de Pós-Graduação em Direito da Universidade Federal do Ceará*, *33*(2), 171-206.

Carrazza, R. A. (2015). *ICMS*. São Paulo, SP: Malheiros.

Cavalcante, D. L. (2012). Tributação ambiental: por uma remodelação ecológica dos tributos. *Revista Nomos*, *32*(2), 101-115.

Cavalcante, D. L. (2017). A (in) sustentabilidade do atual modelo de incentivos fiscais com fins ambientais. In *Anais do 14º Congresso Nacional de Estudos Tributários do Instituto Brasileiro de Estudos Tributários*, São Paulo, SP.

Chicumbi, J. P. N. (2018). *Os benefícios fiscais do imposto industrial à economia angolana: estudos de caso dos municípios e da catumbela* (Master Thesis). Universidade Portucalense Infante D. Henrique, Porto, Portugal.

*Constituição da República Federativa do Brasil, de 5 de outubro de 1988*. (1988). Brasília, DF.

Correia, C. B., Neto. (2016). *O avesso do tributo: incentivos e renúncias fiscais no direito brasileiro*. São Paulo, SP: Almedina.

Daros, L. L., & Secchi, L. (2013). Jogos não cooperativos e a guerra fiscal entre os estados pelo

ICMS da importação: uma análise com enfoque no equilíbrio de Nash. In *Anais do 37º Encontro da Anpad*, Rio de Janeiro, RJ.

*Decreto nº 7.2017, de 21 de julho de 2010*. (2010). Regulamenta a Lei nº 11.445, de 5 de janeiro de 2007, que estabelece diretrizes nacionais para o saneamento básico. Brasília, DF.

Elkington, J. (1998). Accounting for the triple bottom line. *Measuring Business Excellence*, *2*(3), 18-22.

Elkington, J. (2020). *Green swans: the coming boom in regenerative capitalism*. New York, NY: Fast Company Press.

Fávero, L. P. L. (2013). Dados em painel em contabilidade e finanças: teoria e aplicação. *Brazilian Business Review*, *10*(1), 131-156.

Fávero, L. P. L, & Belfiore, P. (2017). *Manual de análise de dados*. Rio de Janeiro, RJ: Elsevier.

Feld, L. P., Köhler, E. A., & Wolfinger, J. (2020). Modeling fiscal sustainability in dynamic macro-panels with heterogeneous effects: evidence from German federal states. *International Tax and Public Finance*, *27*, 215-239.

Figueiredo, D. B. F., & Silva, J. A., Jr. (2010). Visão além do alcance: uma introdução à análise fatorial. *Opinião Pública*, *16*(1), 160-185.

Freitas, J. (2016). O tributo e o desenvolvimento sustentável. *Revista Novos Estudos Jurídicos*, *21*(3), 825-845.

Gobetti, S. W., & Orair, R. O. (2017). *Resultado primário e contabilidade criativa: reconstruindo as estatísticas fiscais "acima da linha" do governo geral* (Working Paper nº 2288). Brasília, DF: Instituto de Pesquisa Econômica Aplicada.

Gomes, R. C., Osborne, S.P., & Guarnieri, P. (2020). Influências dos *stakeholders* e desempenho do governo local: uma revisão sistemática da literatura. *Revista da Administração Pública*, *54*(3), 448-467.

Hair, J. F., Jr., Black, W. C., Babin B. J., Anderson, R. E., & Tatham, R. L. (2009). *Análise multivariada de dados*. Porto Alegre, RS: Bookman.

Hall, J. L., & Kanaan, D. Z. (2020). State Tax Policy, Municipal Choice, and Local Economic Development Outcomes: A Structural Equation Modeling Approach to Performance Assessment. *Public Administration Review*. Retrieved from https://doi.org/10.1111/puar.13165

He, P., Zhang, Y., Yuan, Y., Qiao, Y., Xin, L., & Zou, X. (2019). The Relationship between Environmental Taxation, Environmental Performance and Economic Growth: Comparative Study of Sweden and China 1985-2016. *Ekoloji*, *28*(107), 401-410.

Instituto Brasileiro de Geografia e Estatística. (2015). *Indicadores de Desenvolvimento Sustentável*. Rio de Janeiro, RJ: IBGE.

Isil, O., & Hernke, M. T. (2017). The Triple Bottom Line: A Critical Review from a Transdisciplinary Perspective. *Business Strategy and the Environment*, *28*(8), 1235-1251.

Kalambokidis, L. (2014). Creating Public Value with Tax and Spending Policies: The View from Public Economics. *Public Administration Review*, *74*(4), 519-526.

Kasdin. S. (2018). Budgeting Rules and Program Outcomes. *Public Administration Review*, *78*(5), 759-771.

Killian, S., & O'Regan, P. (2018). Taxation and Social Enterprise: Constraint or Incentive for the Common Good. *Journal of Social Entrepreneurship*, *10*(1), 1-18.

Kleinbard, E. D. (2010). Tax expenditure framework legislation. *National Tax Journal*, *63*(2), 353-382.

Klemm, A., & Parys, S. V. (2012). Empirical evidence on the effects of tax incentives. *International Tax and Public Finance*, *19*, 393-423.

Kline, R. B. (2016). *Principles and practice of structural equation modeling*. New York, NY: Guilford.

*Lei Complementar nº 160, de 7 de agosto de 2017*. (2017). Dispõe sobre convênio que permite aos estados e ao Distrito Federal deliberar sobre a remissão dos créditos tributários e a reinstituição de isenções, incentivos e benefícios fiscais ou financeiro-fiscais. Brasília, DF.

*Lei nº 12.305, de 2 de agosto de 2010*. (2010). Institui a Política Nacional de Resíduos Sólidos. Brasília, DF.

*Lei nº 17.566, de 7 de agosto de 2019*. (2019). Dispõe sobre as diretrizes orçamentárias para o exercício financeiro de 2019. Florianópolis, SC.

Lester, J. (2017). Reviewing federal tax expenditures. *Canadian Tax Foundation, Income Tax at 100 years*, *17*(1), 1-36.

Macedo, F. C., & Angelis, A. (2013). Guerra fiscal dos portos e desenvolvimento regional no Brasil. *Revista de Desenvolvimento Regional*, *18*(1), 185-212.

Malheiros, T. F., Coutinho, S. M. V., & Philippi, A., Jr. (2012). Indicadores de sustentabilidade: uma abordagem conceitual. In A. Philippi, Jr., & T. F. Malheiros (Coords.), *Indicadores de sustentabilidade e gestão ambiental*. Barueri, SP: Manole.

Marôco, J. (2014). *Análise de equações estruturais: fundamentos teóricos, software e aplicações*. Pêro Pinheiro, Portugal: ReportNumber Lda.

Mélo, L. G. G., & Oliveira, P. D., Netto. (2019). Os desafios para alcançar a sustentabilidade do Estado fiscal em período de crise econômica. *Revista Jurídica*, *1*(54), 481-498.

Ministério da Economia (2019). Secretaria de Avaliação, Planejamento, Energia e Loteria (Secap). *Boletim mensal sobre os subsídios da União: distribuição regional dos gastos tributários*. Brasília, DF: Author.

Moura, A. S. (2015). Imposto sobre circulação de mercadorias e serviços socioambiental: incentivos institucionais e legislação ambiental no Brasil. *Revista da Administração Pública*, *49*(1), 165-187.

Nascimento, S. D. (2008). Guerra fiscal: uma avaliação comparativa entre alguns estados participantes. *Economia Aplicada*, *12*(4), 677-706.

Nobre, F. S., & Ribeiro, R. E. M. (2013). Cognição e sustentabilidade: estudo de casos múltiplos no índice de sustentabilidade empresarial da BM&FBovespa. *Revista de Administração Contemporânea*, *17*(4), 499-517.

Oliveira, F. A., & Chieza, R. A. (2018). Auge e declínio da federação brasileira: 1988-2017. In Associação Nacional dos Auditores-Fiscais da Receita Federal do Brasil, & Federação Nacional do Fisco Estadual e Distrital (Eds.), *A Reforma Tributária necessária: diagnóstico e premissas*. São Paulo, SP: Plataforma Política Social.

Oliveira, L. M. V. S. (2015). Declaração de inconstitucionalidade de benefício fiscal de ICMS concedido sem prévio convênio Confaz e consequências práticas. *Revista Jurídica da Procuradoria-Geral do Distrito Federal*, *40*(1), 135-164.

Organização das Nações Unidas. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. New York, NY: ONU.

Organização para a Cooperação e o Desenvolvimento Econômico. (2020). *Tax Policy Reforms 2020: OECD and Selected Partner Economies*. Paris, France: OCDE.

Organização para a Cooperação e o Desenvolvimento Econômico, Organização das Nações Unidas, Centro Interamericano de Administrações Tributárias, & Banco Interamericano de Desenvolvimento. (2020). *Revenue Statistics in Latin America and the Caribbean: 1990-2018*. Paris, France: OCDE.

Parys, S. V., & James, S. (2010). The effectiveness of tax incentives in attracting investment: panel data evidence from the CFA Franc zone. *International Tax and Public Finance*, *17*, 400-429.

Pellegrini, J. A. (2014). *Gastos tributários: conceitos, experiência internacional e o caso do Brasil*. Brasília, DF: Núcleo de Estudos e Pesquisas do Senado Federal.

Porter, M. E. (1989). *A vantagem competitiva das nações*. Rio de Janeiro, RJ: Campus.

Porto, GS, & Memória, CV (2019). Incentivos para inovação tecnológica: um estudo da política pública de renúncia fiscal no Brasil. *Revista de Administração Pública*, *53*(3), 520-541.

Prado, P. H. M. (2006). Os modelos de equações estruturais em marketing. In D. Botelho, & D. M. Zouain (Orgs.), *Pesquisa Quantitativa em Administração*. Rio de Janeiro, RJ: Atlas.

*Proposta de Emenda à Constituição nº 45, de 3 de abril de 2019*. (2019). Altera o Sistema Tributário Nacional. Brasília, DF.

Qi, Y., Peng, W., & Xiong, N. N. (2020). The Effects of Fiscal and Tax Incentives on Regional Innovation Capability: Text Extraction Based on Python. *Mathematics*, *8*(7), 1-19.

Receita Federal do Brasil. (2018). *Demonstrativo dos Gastos Tributários (PLOA 2019)*. Brasília, DF.

Redonda, A. (2016). *Tax Expenditures and Sustainability: An Overview. Discussion Note*. Zurich, Switzerland: Council on Economic Policies.

Rezende, A. J., Dalmácio, F. Z., & Rathke, A. A. T. (2018). Avaliação dos impactos dos incentivos fiscais sobre os retornos e as políticas de investimentos e financiamento das empresas. *Revista Universo Contábil*, *14*(4), 28-49.

Rezende, E., Peralta, R., Rosa, L. P., & Rezende, A. J. (2019). Análise do custo fiscal efetivo das renúncias fiscais estaduais. *Tax and Accounting Studies*, *1*(24), 1-20.

Rezende, R. O. (2020). Benefícios e competição fiscal entre estados brasileiros: judicialização da "Guerra Fiscal" do ICMS no Supremo Tribunal Federal. *Revista Cadernos de Finanças Públicas*, *1*(1), 1-80.

Sá, D., & Silva, M. V. G. (2019). O papel do Estado no processo de formação industrial: o caso da região metropolitana de Curitiba. *Revista Brasileira de Estudos Urbanos e Regionais*, *21*(1), 189-202.

Sachs, I. (2008). *Desenvolvimento: includente, sustentável, sustentado*. Rio de Janeiro, RJ: Garamond.

Sachs, J. D. (2017). *A era do desenvolvimento sustentável*. Lisboa, Portugal: Conjuntura Actual.

Sampieri, R. H., Collado, C. F., & Lucio, M. P. B. (2013). *Metodologia de pesquisa*. Porto Alegre, RS: Penso.

Schumacker, R. E., & Lomax, R. G. (2016). *A beginner's guide to structural equation modeling*. New York, NY: Routledge.

Silva, J. F. B. A., Rebouças, S. M. D. P., Abreu, M. C. A., & Ribeiro, M. C. R. (2018). Construção de um índice de desenvolvimento sustentável e análise espacial das desigualdades nos municípios cearenses. *Revista de Administração Pública*, *52*(1), 149-168.

Soares, L. R., & Almeida, L. T. (2018). Desacoplamento de impactos ambientais no Brasil. *Revista Iberoamericana de Economía Ecológica*, *28*(2), 21-43.

Soares, M., Gomes, E. C. O., & Toledo, J. R., F. (2011). A repartição tributária dos recursos do ICMS nos municípios da Região Metropolitana de Curitiba. *Revista de Administração Pública*, *45*(2), 459-481.

Sunstein, C. R. (2014). O mundo real da análise de custo-benefício: 36 questões (e quase tantas respostas quanto). *Revista de Direito Administrativo*, 266, 13-47.

Surrey, S. S. (1970). Tax incentives as a device for implementing government policy: a comparison with direct government expenditures. *Harvard Law Review*, *83*(40), 705-738.

Teodósio, A. S. S., Dias, S. F. L. G., & Santos, M. C. L. (2016). Procrastinação da política nacional de resíduos sólidos: catadores, governos e empresas na governança urbana. *Ciência e Cultura*, *68*(4), 30-35.

Trennepohl, T. D. (2011). *Incentivos fiscais no Direito Ambiental*. São Paulo, SP: Saraiva.

Ufier, A. (2017). The effect of VATs on government balance sheets. *International Tax and Public Finance*, *24*, 1141-1173.

Wedy, G. (2018). *Desenvolvimento sustentável na era das mudanças climáticas*: um direito fundamental. São Paulo, SP: Saraiva.

Zhou, Z. Y., Liu, H., & Cao, L. (2014). *Food consumption in China*: the revolution continues. Northampton, Massachusetts: Edward Elgar Publishing.

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