Exploring the influence of environmental and social standards in integrated management systems on economic performance of firms

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Abstract

Purpose – The purpose of this paper is to analyze the impact of the integration of management systems that include economic, social and environmental standards on economic performance.

Design/methodology/approach – The methodology consists of analyzing reports of certified companies and secondary data on economic performance indicators. Two sample groups of companies were compared against each other. The core group is composed of companies that have integration of certification on each triple bottom line (TBL) dimensions, economic, environmental and social (ISO 9001 and ISO 14001 and OHSAS 18001). The control group is composed of companies of the same size and sector (mirror sample) but without standards related to social and environmental dimensions. The comparative analysis of both core and control groups was performed based on non-parametric methods, such as the mood median test and structural equation modeling.

Findings – Several economic performance indicators of both groups were statistically analyzed and compared. The results show that companies with integrated management systems (IMS) (core group) on a TBL perspective showed better economic performance compared to other companies of the control group. Moreover, this study shows that the industry sector influences this relation, particularly in the energy, chemical and petrochemicals, services and transportation sectors.

Practical implications – For executives and managers, the results suggest that the amount invested in IMS in a TBL perspective increases the economic performance of companies, resulting in profitability, increased equity and sales growth. It reinforces the win–win perspective on sustainability in companies instead of the mindset on negative trade-offs on economics.

Originality/value – This research sheds light on controversies, discussed in the literature, concerning the positive vs negative effects on the economic performance of IMS, with social and environmental standards. The results show that economic performance is improved in companies of the core group.

Keywords Sustainability, Triple bottom line, Economic performance, Integrated management systems

Paper type Research paper

1. Introduction

"Manufacturing companies are now operating in less secure and more complex environments" (Thomas *et al.*, 2016) and the consumers are increasingly demanding sustainable products worldwide (Kara *et al.*, 2014). Thereupon are an increasing number of management systems standards related to the pillars of sustainable development (SD). Most of these standards "have common and/or similar requirements that, supported on the PDCA cycle, should be made compatible to potentiate the integration" (Rebelo *et al.*, 2015).

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These requirements include environmental management (EM), quality management and health and safety (Tsai and Chou, 2009). When aiming for SD, integrating these systems seems to come naturally (Oskarsson and von Malmborg, 2005) to sustainable and socially responsible organizations that have adopted the triple bottom line (TBL) perspective (Asif and Searcy, 2014; Mežinska *et al.*, 2015). Although SD is not a system *per se*, it is built into every level of the organization (Rocha *et al.*, 2007). As global warming and the finiteness of essential resources, for instance, have caused different stakeholder groups to adjust their expectations of firms, sustainability has become a key item on the management agenda, and its multifaceted nature is becoming increasingly clear (Faber *et al.*, 2005; Schrettle *et al.*, 2014). Moreover, corporate social responsibility (CSR) appears to be a focus of CEOs for whom "CSR can be a response to leaders' personal needs for attention and image" (Petrenko *et al.*, 2014).

In this context, "most scholars seem to agree that the best way for business to contribute to SD is to integrate their different management systems" (Siva *et al.*, 2016). Furthermore, many organizations have developed sustainable strategies. To achieve the goal of the "triple bottom line of sustainability," the implementation and quality standard (ISO 9001), as well as environmental (ISO 14001) and occupational health and safety (OHSAS 18001) systems, has become a significant activity (Zeng *et al.*, 2007).

There is also increasing pressure on enterprises to broaden the focus of sustainability accountability in business performance beyond mere financial performance (Lee and Farzipoor Saen, 2012), to analyze performance based on the TBL perspective, i.e. overall economic, environmental and social performance (Gimenez *et al.*, 2012; Streimikiene and Siksnelyte, 2016), and to understand the trade-offs among TBL pillars from a strategic perspective (Morioka and de Carvalho, 2016; Morioka and Carvalho, 2016).

Despite the apparent emphasis on integrated management systems (IMS) as a path toward sustainability, there is a lack of consensus regarding its impact on organizational performance, particularly from an economic perspective.

On the one hand, the literature pointed out the need for challenging the mindset that sustainability leads to raise costs and reduce those profits, moving beyond trade-offs and looking for creating shared value (Porter and Kramer, 2011). Some authors argue that an IMS can increase competitive advantage and contribute to organizations' SD (Jørgensen *et al.*, 2006; Zeng *et al.*, 2010), providing an opportunity to enhance the "competitiveness, development, and sustainable success of organizations" (Rebelo *et al.*, 2015). Furthermore, environmentally conscious and ecologically friendly strategies can help firms to attain superior financial performance (Hart, 1995; Sharma *et al.*, 2010; Tang *et al.*, 2016), as greening the different phases of the supply chain leads to an integrated green supply chain, which ultimately leads to competitiveness and improved economic performance (Rao and Holt, 2005). EM systems have a positive relationship with financial performance (Feng *et al.*, 2016), contributing "to better environmental performance, greater eco-efficiency, greener products, and more transparency for and acceptance by external environmentally concerned stakeholders" (Tsai and Chou, 2009); such systems can help reduce waste and promote reuse, which can improve financial returns (Gotschol *et al.*, 2014; Lioui and Sharma, 2012; Wagner and Blom, 2011; Wu *et al.*, 2015; Yang *et al.*, 2011) while also improving sales, customer satisfaction, corporate image and market share. Finally, these systems can have a positive impact on environmental performance (Manders, 2015; de Vries *et al.*, 2012). The Occupational Health and Safety standards known as Series 18001 (OHSAS 18001) create and maintain a safe working environment and the health of workers by targeting the social dimension of sustainability (Qi *et al.*, 2013), contributing to more efficient work processes, improving employee perceptions of the working environment and promoting greater recruitment attractiveness (Tsai and Chou, 2009).

On the other hand, there is an alert that TBL has been seemed in a favorably and uncritically way, leading to two core assumptions: win–win and firm-level sustainability (Isil and Hernke, 2017). From the TBL perspective, performance (and evaluations of performance) can encompass distinctive criteria and can present trade-offs (Morioka and de Carvalho, 2016; Morioka and Carvalho, 2016). Van Beurden and Gössling (2008) argue that corporate social and financial performance are related; however, in contrast to expectations, some empirical evidence demonstrates the significant negative effect of corporate social performance (CSP) and corporate financial performance (CFP) when used as indicators, depending on the industry sector (Baird *et al.*, 2012). Moreover, Ullmann (1985) detects inconsistent findings relating to social performance and economic performance due to the inappropriate definition of key terms and deficiencies in the empirical databases. So far, in studies of EM, scholars have generated little insight into the relationship between social dimensions and economic performance.

Mainly, achieving economic sustainability is one that has taken a more comprehensive perspective over the years (Pham and Thomas, 2011). Studies of economic performance reveal contradictory results; some studies have noted positive relations. For example, Psomas *et al.* (2013) suggest the relevant impact of social dimensions on economic performance. Others, such as Corbett *et al.* (2005), Corbett and Kirsch (2004), Dick *et al.* (2008), Jacobs *et al.* (2010), Lo *et al.* (2011), Melnyk *et al.* (2003b) and Zailani *et al.* (2012) investigate the impact of a list of certifications on financial performance. Other studies suggest that this link cannot be proven (Mežinska *et al.*, 2015) and that such standards will not automatically help companies achieve higher performance (Dick *et al.*, 2008; Karim and Bingi, 2015; Lo *et al.*, 2011). At worst, some studies show that standards do not effect. Although most reports indicate that certification is a significant investment (Casadesús and Karapetrovic, 2005), findings have shown that the money spent on certification has not adversely affected the profitability of firms. Finally, other studies have shown inconclusive results regarding whether sales or profitability improve after certification (Corbett *et al.*, 2005; Häversjö, 2000; Lima *et al.*, 2000; Naveh and Marcus, 2005; Simmons and White, 1999; Terziovski *et al.*, 1997; Wayhan *et al.*, 2010).

Thus, there is a significant research controversy on the understanding of the impact of IMS in TBL perspective on economic performance. Due to the need to better understand the relation among the IMS, particularly including social and environmental standards, and organizational performance, this study empirically analyzes the impact of the IMS on economic performance. The need to understand the unexpected effects of different industry sectors (Baird *et al.*, 2012) and firm sizes is also addressed.

To this end, this study design compares the economic performances of companies that use IMS – integrating environmental and social standards (core group) – against a control group. The core group is a sample of companies that have IMS, and we used as a proxy of IMS, companies that have ISO 9001 and ISO 14001 and OHSAS 18001 integrated certifications, i.e. one on each of TBL dimensions. The control group is composed of companies with the same characteristics, size and sectorial classification, but without IMS. Several available economic indicators were analyzed and compared, including net sales, adjusted profit income, net profit legal, net worth legal, adjusted net worth, networking capital, general liquidity, sales margin, financial turnover, current liquidity, total assets, return on equity (ROE) and ROA. Several statistical tests were performed using MINITAB 17® software to compare indicators of the economic performance of both groups and to explore the differences among groups. Based on this analysis, a research model is presented to explain the effect of IMS on economic performance; this model applies structural equation modeling (SEM) and uses software Smart PLS 2.0. The tested structural equation model showed strong links between IMS and debt, profitability, growth and equity. The different methodologies presented here contribute to investigating the research hypothesis using the studied samples, confirming that IMS leads companies to have better economic performance.

The remainder of the paper is organized as follows. Section 2 presents a discussion of IMS and economic performance; Section 3 details the methodology; Section 4 presents the discussion and results; and the final section reports the conclusions, namely whether the companies that use IMS exhibit better performance than the control companies.

2. IMS and economic performance in relation to the TBL sustainability perspective

A management system (MS) is "a mechanism that includes organizational structure, responsibilities and procedures, and the necessity to implement certain goals" (Tsai and Chou, 2009), while IMS can be defined as two or more MSs integrated into one system (Asif *et al.*, 2010, 2011); or different MSs (Beckmerhagen *et al.*, 2003) but directed to providing added value to the holistic operation of the company (Griffith and Bhutto, 2008).

Several standards for MSs can be identified, some of which are compatible with integration and aligned with quality MSs, as they "have common and/or similar requirements that, supported on the PDCA cycle, should be made compatible to potentiate the integration" (Rebelo *et al.*, 2015). This compatibility enables a company to achieve the internal and external benefits of IMS rather than managing a variety of MSs separately (Bernardo *et al.*, 2015).

The IMS can combine MSs – such as ISO 14001 and OHSAS 18001 – to establish the pillars of SD, thus helping production without harming the environment while also fostering the quality of life of employees (Asif *et al.*, 2013; Windolph *et al.*, 2014). Both of these – production and employee well-being – are becoming essential activities for companies wanting to achieve the goal of the "TBL of sustainability" (Zeng *et al.*, 2007), and both can contribute to SD (Siva *et al.*, 2016). It is also suggested by the ISO (2015) the MSs can help organizations to improve its overall performance and provide a sound basis for SD initiatives.

The relation between IMS and organizational performance has been explored but has produced contradictory results. Some studies suggest that IMS is an opportunity to improve the "competitiveness, development, and sustainable success of organizations" (Rebelo *et al.*, 2015); to achieve "better quality, higher productivity, greater customer satisfaction, and greater profit" (Tsai and Chou, 2009); and to increase competitive advantage and contribute to SD (Jørgensen *et al.*, 2006; Zeng *et al.*, 2010). However, there is a lack of empirical research providing evidence to support this perception (Nunhes *et al.*, 2016), and "one way to verify if the integration of MSs contributes to sustainability is to analyze the relationship between integration and performance of social-environmental-economic issues" (Poltronieri *et al.*, 2018, p. 374).

Scholars have devoted more attention to the relationship between EM systems and organizational performance. Some studies have shown positive correlations between EM systems and financial performance (Feng *et al.*, 2016) and between EM systems and environmental footprints (Qi *et al.*, 2013); EM has been said to lead "to better environmental performance, greater eco-efficiency, greener products, and more transparency for and acceptance by external environmentally concerned stakeholders" (Tsai and Chou, 2009). Moreover, EM helps to improve sales, customer satisfaction, corporate image, and market share; it also has a positive impact on environmental performance (de Vries *et al.*, 2012) and financial performance by reducing waste and promoting reuse (Wagner and Blom, 2011; Wu *et al.*, 2015). For Gotschol *et al.* (2014), EM is considered an economically sustainable business, will economically benefit firms and reduces the negative impact of environment practices on marketing and financial performance (Yang *et al.*, 2011).

There is a significant gap in studies that relationship management systems focused on the social dimensions of TBL with organizational performance. Studies suggest that the Occupational Health and Safety Assessment Series 18001 (OHSAS 18001) creates and

maintains a safe working environment and the health of workers. This series is said to target the social dimension of sustainability (Qi *et al.*, 2013) and to contribute to more efficient work processes, improved employee perceptions of the working environment and greater recruitment attractiveness (Tsai and Chou, 2009). Some studies also suggest a positive relationship between CSR and financial performance (Van Beurden and Gössling, 2008); however, contradictory empirical evidence demonstrates the significant adverse effect of CSP on CFP, depending on the industry sector (Baird *et al.*, 2012).

In this study, we focus on economic performance indicators to provide quantitative insights. According to Chatzoglou *et al.* (2015), "positive financial benefits will be obtained if studies use a holistic overview to include all the components that have a relationship with how economic performance is achieved." Moumen and El Aoufir (2017) corroborates and concluded that the IMS is an approach to cost reduction, operational improvements, efficient management and utilization of resources, employee motivation and a means to better compliance to social obligations and requirements of different stakeholders.

However, regarding IMS and economic performance, we found contradictory results. Some authors have examined certifications and their relevant impact on economic performance. For example, Psomas *et al.* (2013) showed that the degree of certification effectiveness (based on the level of achievement of the standard's objectives) determines the impact of its success.

Additionally, Dick *et al.* (2008) and Lo *et al.* (2011) suggested studying the integration of standards and lists of certifications and their impact on the financial performance of companies. Others authors suggested to study the relationship between ISO certification, environmental and financial performance (Melnyk *et al.*, 2003b); measures on financial performance (Jacobs *et al.*, 2010); and the financial ratios and subjective criteria (Zailani *et al.*, 2012). These authors propose the use of accounting and financial indicators, such as sales, return on assets (ROA), return on investment (ROI), total assets, number of employees and asset turnover.

Other authors state that there is evidence for the existence of a substantial mechanism whereby better-performing firms self-select to adopt certifications and, therefore, this link cannot be proved (Mežinska *et al.*, 2015). Also, standards – in and of themselves – will not automatically help companies achieve better performance (Dick *et al.*, 2008; Lo *et al.*, 2011); and the financial performance of an organization should not be centered on the certification itself (Karim and Bingi, 2015).

Some authors have found no conclusive evidence that sales or profitability improve after certification (Lima *et al.*, 2000; Simmons and White, 1999). Häversjö (2000) concludes that in terms of sales, certifications open new doors and generally improves the image of the company; Naveh and Marcus (2005) suggested that the certifications did not necessarily or automatically yield better business performance; Terziovski *et al.* (1997) concludes that the certification has a little or no explanatory power of organizational performance; Wayhan *et al.* (2010) suggested that their results ended that the certification has a minimal impact on financial performance. These authors find no effect of IMS on companies' TBL sustainability performance. Although most reports indicate that certification is a significant investment (Casadesús and Karapetrovic, 2005), findings show that the money spent on certification does not adversely affect the profitability of firms.

Based on this discussion of the lack of consensus and empirical evidence, our conceptual model aims to analyze the effect of IMS on economic performance (suggested by Melnyk *et al.*, 2003a; Corbett *et al.*, 2005; Corbett and Kirsch, 2001) that indicated that there is a little evidence about it. Also, Jacobs *et al.* (2010) suggested estimating the impact on financial performance. Dick *et al.* (2008) and Lo *et al.* (2011) did not find a significant relationship between the number of business certifications and the financial performance

in their studies, and they suggested that more studies could try to understand the performance, thereby leading to our research hypothesis:

H1. IMS has a positive effect on the economic performance of companies.

Figure 1 shows the conceptual model. To simplify the model, some arrows have been hidden, and only the general *H1* position is presented (Figure 1).

3. Research methods

According to the research objectives, a confirmatory quantitative approach was selected to analyze the research hypothesis. We use archival data that "are unbiased because the providers of it have no awareness of being observed" (Flynn *et al.*, 1990).

An empirical and analytical method is applied. According to Martins (2002, p. 34), these "are approaches that have in common the use of collection techniques, treatment, and markedly quantitative data analysis." In this type of study, there are serious concerns about the causal relationships between variables. The validation of the scientific evidence is sought through testing instruments, degrees of significance and systematization of operational definitions.

3.1 Sampling process

The sampling process was structured in two groups of firms inspired in previous research as Corbett *et al.* (2005) for analyzing the effect of ISO 9000 certification financial performance, and Hendricks (2001) and Hendricks and Singhal (2001) investigating the impact of total quality management (TQM) on stock price and financial performance.

The first step in collecting data on economic performance is to search archival sources for public information on firms. The sampling process included two groups: the core group and the control group. The core group is composed of companies with integrated certifications (ISO 9001 and ISO 14001 and OHSAS 18001). The control group is composed

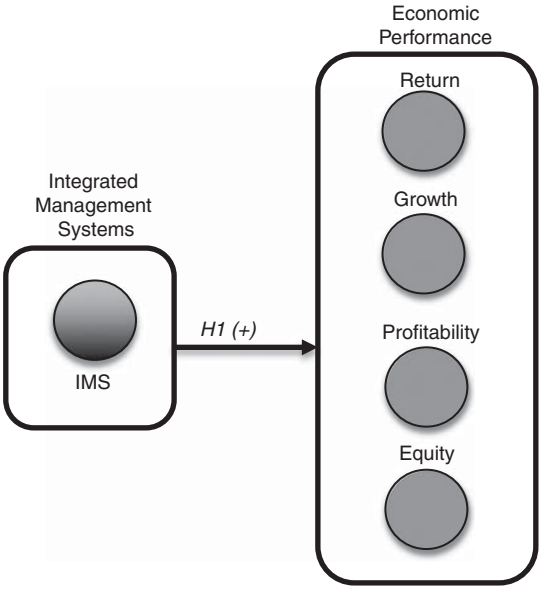

Figure 1.
Conceptual model and hypothesis

of industry size-matched companies (mirror companies), but without IMS certifications related to social and environmental dimensions.

The sampling process in these two groups is based on public data and documents and, thus, robust and traceable. Our sample comes from the publication "Maiores e Melhores," which shows the better and major companies published in *Exame* magazine in the year 2016. This publication presents economic and financial information on 1,247 Brazilian companies, which are classified into the following sectors: wholesale, automotive industry, capital goods, consumer goods, communication, diversified, electric-electronic, energy, pharmaceutical, construction industry, digital industry, mining, pulp and paper, agricultural production, chemicals and petrochemicals, services, steel and metallurgy, telecommunications, textiles, transportation and retail (Lahóz and Caetano, 2016).

Using stored data from 1,247 companies, we sought to identify which companies had implemented IMS and developed TBL actions. For this, company websites and reports were analyzed, and, in some cases, e-mails were sent to check information in the databases on certifications for group classification, looking for further documentation. Following this analysis, it was observed that many companies, sectors and indicators were missing data, so some companies and indicators were excluded, as presented in Figure 2.

After identifying which companies had implemented IMS and TBL actions, two groups were created to compare performance on IMS and TBL actions. We compared companies with and without IMS and TBL actions. The sample was divided into two groups:

(1) IMS core group: Companies with integrated certifications (ISO 9001 and ISO 14001 and OHSAS 18001), totalizing 124 companies.

(2) Control group: companies with the same characteristics, size, and sectorial classification, but without IMS in TBL dimensions. This means companies without MS certifications on standards related to social and environmental dimensions, totalizing 129 companies.

3.2 Operationalization of the variables

The key constructs analyzed are IMS in TBL dimensions and economic performance.

IMS in TBL dimensions is a difficult construct to operationalize. We chose as a proxy for IMS in TBL dimensions firms that have obtained certifications on all TBL dimension, as discussed previously for the IMS core group. This research design was inspired in previous research that applied ISO 9000 Certification as a proxy of implementation t (Corbett *et al.*, 2005). Similarly, the studies of Hendricks (2001) Hendricks and Singhal (2001) on the influence of TQM also adopt this kind of proxy (i.e. winning of awards as a proxy for more mature TQM implementation). Thus, the IMS construct was operationalized as a nominal variable, designed as a dummy

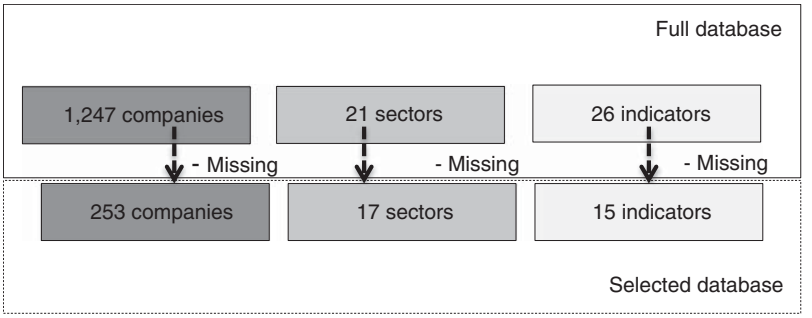

Figure 2.
Selected database

variable, i.e. a value equal to 1 was attributed to the firms that belonged to the same group and 0 to all the other categories, consistent with Falk and Miller (1992). The control variable sector was also designed as a dummy variable. Table I shows the operationalization of these variables.

For operationalize economic performance, we adopted a large range of indicators extracted from the literature that were designed in the SEM as formative indicators. To analyze economic performance, we focus on the following indicators: earnings growth (Heras-Saizarbitoria, Molina-Azorín and Dick, 2011); earnings after taxes/net profit (Hřebíček *et al.*, 2012); earnings before interest and taxes (Hřebíček *et al.*, 2012); earnings before interest, taxes, depreciation and amortization (Hřebíček *et al.*, 2012); earnings per share, P/E = price earnings ratio (Hřebíček *et al.*, 2012); economic value added (Hřebíček *et al.*, 2012); free cash flow (Hřebíček *et al.*, 2012); gross profit margin (Heras-Saizarbitoria, Molina-Azorín and Dick, 2011); number of employees (Lo *et al.*, 2011; Lannelongue *et al.*, 2015); operating income (Karim and Bingi, 2015); operation cash flow (Hřebíček *et al.*, 2012); perceived performance (Ittner and Larcker, 1997); profit margin (Heras-Saizarbitoria, Molina-Azorín and Dick, 2011; Hřebíček *et al.*, 2012); profit ratios (Lannelongue *et al.*, 2015); profits (Lannelongue *et al.*, 2015); ROI (Hřebíček *et al.*, 2012); ROA (Casadesús *et al.*, 2008; Corbett *et al.*, 2005; Heras-Saizarbitoria, Molina-Azorín and Dick, 2011; Hřebíček *et al.*, 2012; Ittner and Larcker, 1997; Karim and Bingi, 2015; Lannelongue *et al.*, 2015; Lo *et al.*, 2011, 2012; Lannelongue *et al.*, 2015); return on capital employed (Hřebíček *et al.*, 2012); ROE (Casadesús *et al.*, 2008; Corbett *et al.*, 2005; Heras-Saizarbitoria, Molina-Azorín and Dick, 2011; Hřebíček *et al.*, 2012; Ittner and Larcker, 1997; Karim and Bingi, 2015; Lannelongue *et al.*, 2015; Lo *et al.*, 2011, 2012; Lannelongue *et al.*, 2015); return on sales (Heras-Saizarbitoria, Molina-Azorín and Dick, 2011; Hřebíček *et al.*, 2012; Ittner and Larcker, 1997; Karim and Bingi, 2015; Lo *et al.*, 2011, 2012); sales growth (Casadesús *et al.*, 2008; Corbett *et al.*, 2005; Heras-Saizarbitoria, Molina-Azorín and Dick, 2011; Ittner and Larcker, 1997; Lo *et al.*, 2011, 2012); stock market returns (Heras-Saizarbitoria, Molina-Azorín and Dick, 2011); stock market valuation (Karim and Bingi, 2015); total assets (Lo *et al.*, 2011);

IMS	D1	D2	*n*	%
IMS core group	1	0	124	49
Control group	0	1	129	51
			253	

Sectors	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	n	%
Wholesale	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	3.2
Automotive industry	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	4.3
Capital goods	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	3.6
Consumer goods	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	11	4.3
Diversified	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4
Eletric–eletronic	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	8	3.2
Energy	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	59	23.3
Construction industry	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	28	11.1
Digital industry	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	7	2.8
Mining	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	7	2.8
Pulp and paper	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6	2.4
Agricultural production	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	10	4.0
Chemicals and petrochemicals	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	30	11.9
Services	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		19	7.5
Steel and mettalurgy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	17	6.7
Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	17	6.7
Retail	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	2.0
Total																		253	100.0

Note: Any category might be used as a reference
Source: Falk and Miller (1992)

Table I.
IMS and sectors-coded as dummy

total asset turnover (Lannelongue *et al.*, 2015); total return (Heras-Saizarbitoria, Molina-Azorín and Dick, 2011); and total revenues (Hřebíček *et al.*, 2012).

We searched for these economic performance indicators in the database and, after removing the missing data indicator, a set of 15 indicators was selected, as shown in Table II. For all these indicators, the descriptive statistical analysis was performed.

The economic performance construct was deployed, and four variables were considered: profitability, equity, growth and return. Thus, in the structural model, the economic performance variables were designed only as lagging indicators, excluding depth, liquidity and other related indicators. All four latent variables were also designed as formative based on the manifest variables described in Table II.

Code	Indicator	Unit	Description
V1	Net sales	USD million	Obtained by subtracting the total sales, returns, discounts, rebates, etc. This index measures the net margin of the company
V2	Sales margin	USD million	Indicator that compares net income with the turnover of the company
V3	Adjusted profit income	USD million	Is the net profit or positive results shown in the Statement of Income, after recognition of the effects of the loss of purchasing power of the currency used for the measurement of the items of assets and liabilities in the financial statements
V4	Net profit legal	USD million	Is the nominal result for the year calculated in accordance with the legal rules (without considering the effects of inflation), after deducting the provision for income tax and social contribution and adjusted the interest on capital, considered as financial expenses
V5	Adjusted net worth	USD million	It is the legal net worth updated by the effects of inflation
V6	Net worth legal	USD million	It is the sum of capital, reserves and equity valuation adjustments, less the sum of the capital to be paid up, treasury shares and accumulated losses, without considering the effects of inflation. It measures the company's wealth, although distorted by the absence of monetary correction
V7	Return on equity (ROE)	USD million	Return on equity – measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested
V8	Net working capital	USD million	It is represented by short-term funds available to finance the company's activities. It is measured as the difference between assets and liabilities
V9	Total assets	USD million	Comprises the assets and rights of the entity, expressed in local currency
V10	Return on asset (ROA)	USD million	Return on assets – measures the amount of profit made by a company per dollar of its assets
V11	Financial turnover	Index no.	It is gross sales and services in dollars divided by total assets adjusted dollars. Measures the company's operational efficiency and should be compared with the profit margin on sales
V12	General liquidity	Index no.	As the company has not invested resources in fixed assets for each dollar of debt
V13	Current liquidity	Index no.	Is current assets divided by current liabilities
V14	General debt	%	Is the sum of liabilities, including duplicates discounted, with long-term liabilities divided by total assets adjusted
V15	Long-term debt	%	Is the long-term liabilities divided by total adjusted assets. It is an important indicator because the long-term debt are usually expensive, which does not occur with most of the liabilities included in current liabilities

Note: The ROE and ROA indicators are not part of the *Exame* magazine indicators but were calculated by the author based on information from this database

Table II. Economic performance indicators

3.3 Data analysis

The sample was analyzed to compare the economic and financial performance of the companies in the two selected groups (core and control groups). The first method used is statistical analysis, and the second is SEM.

The data were analyzed according to their frequency distribution, descriptive statistics and bivariate analyses (cross-tables and correlations). The first step was a descriptive statistical analysis of both the IMS core group and the control group, considering the 15 selected economic performance indicators. The second step was to analyze both groups by sector; for this, we selected only those sectors with more than 15 companies: energy, construction industry, chemicals and petrochemicals, services, steel and metallurgy and transportation (see Table III). These sectors represent approximately 67 percent of the sample of 253 companies. The third step is to analyze the data normality. MINITAB 17® software was used for descriptive database analysis. The Anderson–Darling normality test (Anderson–Darling test), which tests the homogeneity of samples, was used according to (Scholz and Stephens, 1987). The statistical test is based primarily on a doubly weighted sum of the squared differences between the integrated empirical distribution functions of the individual samples and the composite sample. One weight is adjusted for the possibly

Code	*n*	Mean	Median	SD	Minimum	Q1	Q3	Maximum
IMS core group								
V1	124	1,171.00	516.00	2,133.00	49.00	263.00	1,289.00	18,692.00
V2	124	3.79	3.65	22.32	−193.90	−0.62	8.80	58.80
V3	124	30.60	17.00	217.60	−1,877.70	−3.30	62.20	716.20
V4	124	46.00	20.10	156.90	−1,012.50	3.10	70.20	697.80
V5	124	1,138.00	210.00	4,876.00	−1,020.00	94.00	677.00	50,256.00
V6	124	1,105.00	201.00	4,758.00	−1,042.00	88.00	643.00	48,909.00
V7	124	0.11	0.10	0.55	−3.89	0.01	0.24	2.09
V8	124	205.10	42.30	869.10	−700.90	−3.30	176.80	8,818.50
V9	124	2,487.00	626.00	9,187.00	46.00	250.00	1,818.00	96,098.00
V10	124	0.05	0.04	0.10	−0.20	0.00	0.09	0.51
V11	124	1.17	0.90	1.10	0.10	0.60	1.50	8.20
V12	124	2.30	1.00	9.29	0.10	0.70	1.38	88.70
V13	124	1.76	1.35	1.77	0.10	1.00	2.00	17.00
V14	124	58.74	61.10	21.68	6.60	43.35	74.65	120.90
V15	124	29.17	23.10	24.90	0.60	12.93	41.55	209.50
Control group								
V1	129	808.00	883.00	1,174.00	7.00	225.00	423.00	7,795.00
V2	129	4.47	9.75	16.25	−80.20	0.30	4.30	58.80
V3	129	32.70	45.50	144.50	−533.00	−0.30	18.20	864.10
V4	129	33.80	47.50	135.80	−503.00	1.40	19.90	884.60
V5	129	532.00	436.00	1,137.00	−97.00	57.00	139.00	7,321.00
V6	129	512.70	434.80	1,102.00	−97.70	55.00	132.80	7,220.50
V7	129	0.00	0.27	30.96	−264.50	0.03	0.13	229.00
V8	129	72.70	434.80	1,102.00	−97.70	55.00	132.80	7,220.50
V9	129	1,316.00	1,264.00	2,467.00	10.00	190.00	420.00	17,627.00
V10	129	0.06	0.08	0.16	−0.48	0.01	0.05	1.19
V11	129	1.44	1.50	2.05	0.10	0.50	1.10	19.20
V12	129	1.28	1.50	1.51	0.10	0.65	1.00	15.90
V13	129	1.68	2.10	1.25	0.20	1.00	1.30	7.00
V14	129	60.76	75.15	25.96	0.10	46.95	59.40	219.20
V15	129	27.87	43.65	19.68	0.10	11.30	23.40	76.00

Source: Data from Minitab 17® software

Table III.
Descriptive statistical analysis: IMS and control group

different sample sizes, and the other is integrated, putting more weight on the differences of the distributions compared to the tail (Scholz and Stephens, 1987). If the sample did not present a normal distribution of data, a non-parametric test, such as the mood median test, was applied. The mood median test is used to determine whether the median of two or more different groups (Minitab Inc. USA, 2016).

Following the statistical analysis, the full model was evaluated using partial least squares path modeling (PLS-PM). PLS SEM (as opposed to covariance-based techniques) was considered the adequate method for various reasons, according to the checklist suggested by Hair *et al.* (2013). First, it was possible to incorporate nominal variables into the structural model, as was the case for the IMS core and control groups and the industry sectors control variable. Second, this method did not depend on the regularity of the variables or the normality of the residuals because the significance probabilities were estimated by bootstrapping (Henseler *et al.*, 2009; Tenenhaus *et al.*, 2005).

To analyze the research hypothesis (*H1*), the structural model was estimated by applying to bootstrap, performed in Smart PLS 3 (Ringle *et al.*, 2015) for 3,000 resamplings. According to Hair *et al.* (2013, p. 54), the bootstrapping procedure performs robustly when data are non-normal. The nomological validity was based on the effect size, which can range from 0.02 to 0.15, to 0.35 for weak, moderate and strong effects, respectively (Cohen, 1977; Hair *et al.*, 2013).

The significance probabilities were estimated by bootstrapping directly in Smart PLS 3 with resampling's as recommended by Tenenhaus *et al.* (2005).

4. Results

4.1 Descriptive statistics analysis

In the sample analysis groups, the difference in the amount of business between the IMS core group and the control group is only 5. The averages of the two groups for indicators such as net sales (V1), net profit legal (V4), adjusted net worth (V5), net worth legal (V6), ROE (V7), net working capital (V8), Total Assets (V9), general liquidity (V12), current liquidity (V13) and long-term debt (V15) are presented above. While for other indicators, such as Sales Margin (V2), adjusted profit income (V3), ROA (V10), financial turnover (V11) and general debt (V14), the averages are higher for the control group, as shown in Table III.

The normal test applied by MINITAB 17® software is the Anderson–Darling test, and the samples were not normal for any group. Thus, the hypotheses to be tested at significance levels of 95 and 90 percent using the mood median test are the following:

$$H_0 = \mu_{\text{IMS Core Group}} = \mu_{\text{Control Group}},$$

$$H_1 = \mu_{\text{IMS Core Group}} \neq \mu_{\text{Control Group}}.$$

The mood median test is used to determine whether the medians of both groups are different (Table IV).

The mood median test applied to the sample was statistically significant at the 95 percent significance level for the following indicators: Adjusted Net Worth (V5), net worth legal (V6) and financial turnover (V11).

The test results for adjusted net worth (V5) were as follows: $\chi^2 = 5.41$, GL = 1, $p = 0.020$. For net worth legal (V6), $\chi^2 = 5.41$, GL 1, $p = 0.020$; and for financial turnover (V11), $\chi^2 = 4.87$, GL 1, $p = 0.027$. Given the results of this test, we reject H_0 at the significance level for indicators V5, V6 and V11 because there are significant differences.

Adjusted net worth and net worth legal indicators represent the company's assets and the sum of its capital, among other factors; these indicators measure the wealth of companies. Financial turnover measures the operating efficiency of the company, and based on the statistical analysis, it can be concluded that companies in the IMS core group have

	p-value	Median	Average$_{\text{IMS group}}$	Average$_{\text{Control group}}$
V1	0.29	454.00	1,171.40	808.24
V2	0.41	4.00	3.79	4.47
V3	0.85	17.10	30.58	32.70
V4	0.95	19.90	45.99	33.83
V5	0.020*	181.00	1,137.60	531.90
V6	0.020*	175.00	1,104.60	512.70
V7	0.49	0.12	0.11	0.00
V8	0.57	38.60	205.11	72.65
V9	0.12	491.00	2,486.60	1,316.50
V10	0.49	0.04	0.05	0.06
V11	0.027*	0.90	1.17	1.44
V12	0.92	1.00	2.30	1.28
V13	0.67	1.30	1.76	1.68
V14	0.49	60.20	58.74	60.76
V15	0.95	23.40	29.17	27.87

Table IV. Mood median test

Notes: $n = 253$. *,**Significant at 95 and 90 percent, respectively
Source: Data from Minitab 17® software

statistically higher averages for equity indicators; and companies in the control group have statistically higher financial turnover indicators. However, the difference between the averages of the two groups is 0.27.

Thus, after analyzing the indicators of adjusted net worth and net worth legal, we can conclude that companies that use IMS have statistically higher performance compared to companies that do not use IMS. However, when we analyze the financial turnover indicator and compare the IMS core group to the control group, despite the small difference between the means, the control group has a statistically higher average than the IMS core group.

For the others indicators at 95 and 90 percent significance levels, we decide not to reject H_0, so there are no differences between the averages of both groups.

4.2 Sectors-mood median test

For the mood median test (by sector), the hypotheses to be tested at the significance levels of 95 and 90 percent are:

$$H_0 = \mu_{\text{IMS Core Group}} = \mu_{\text{Control Group}}.$$

$$H_1 = \mu_{\text{IMS Core Group}} \neq \mu_{\text{Control Group}}.$$

The mood median test (Table V) for the construction industry and steel and metallurgy sectors did not produce results that contributed to the rejection of H_0. Thus, for all indicators in these sectors, we accept H_0 at 90 and 95 percent levels of significance.

The net sales indicator (V1) is statistically significant at 95 percent for the energy sector ($\chi^2 = 7.50$, GL = 1, $p = 0.006$) and at 90 percent for the chemical and petrochemical industries ($\chi^2 = 6.53$, GL = 1, $p = 0.011$) and services ($\chi^2 = 6.74$, GL = 1, $p = 0.009$); these values help to reject H_0, and the indicator is the cash flow that the company receives with the sales made. Analyzing the energy sector in both the IMS core group ($\mu = 1{,}330.9$) and the control group ($\mu = 567.65$), the average of the difference is approximately 134 percent. In the chemical and petrochemical IMS core group ($\mu = 1{,}269\ 80$) and the control group ($\mu = 190.78$), the average of the difference is approximately 565 percent. Thus, it is noted that companies using IMS have higher profits on product sales and services when compared to companies that do not use IMS.

Table V.
Mood median test for sectors

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	
Energy																
p-value	0.006*	0.91	0.091**	0.091**	0.091**	0.027*	0.52	0.52	0.091**	0.24	0.061**	0.35	0.73	0.52	0.91	$n = 59$
Median	519	6.60	25	30.3	204	194	0.15	4.20	1125	0.05	0.7	0.80	1.10	62.80	40.80	
$\text{Average}_{\text{IMS Group}}$	1330.9	1.95	25.6	52.65	1209.64	1181.58	0.33	129.6	3092.44	0.08	1.11	4.2	1.26	64.98	39.15	
$\text{Average}_{\text{Control Group}}$	567.65	4.99	−3.35	2.87	745.88	718.47	0.29	31.75	1562.15	0.1	1.62	1.44	1.63	59.07	38.24	
Construction industry																
p-value	0.13	1.00	1.00	1.00	0.13	0.13	1.00	0.45	0.45	0.45	0.45	0.91	0.45	0.45	0.13	$n = 28$
Median	367.00	1.90	5.50	12.10	190.00	189.00	0.08	91.00	388.00	0.05	0.85	1.40	2.05	48.30	22.30	
$\text{Average}_{\text{IMS group}}$	645.39	4.50	10.46	17.89	354.45	346.86	0.09	159.46	764.01	0.05	1.13	1.47	2.39	47.50	24.34	
$\text{Average}_{\text{Control Group}}$	462.93	0.02	−25.22	−19.23	178.42	175.33	18.93	115.90	452.19	−0.01	1.41	1.58	2.08	56.53	29.25	
Chemical and petrochemicals																
p-value	0.011**	0.72	0.27	0.27	0.011**	0.011**	0.72	0.27	0.011**	0.27	0.27	0.065**	0.27	0.068**	0.068**	$n = 30$
Median	229	4.45	9.60	11.20	71	71	0.19	31.00	236	0.07	1.15	1.4	1.55	57	9.8	
$\text{Average}_{\text{IMS Group}}$	1269.80	4.01	57.41	54.81	447.87	425.63	0.10	68.51	1620.20	0.05	1.16	1.43	1.69	60.8	19.82	
$\text{Average}_{\text{Control Group}}$	190.78	4.78	11.72	13.60	84.91	82.27	0.19	38.99	167.36	0.09	1.51	1.55	2.03	53.35	11.66	
Services																
p-value	0.009**	0.85	0.46	0.46	0.009**	0.009**	0.26	0.009**	0.46	0.85	0.46	0.46	0.061*	0.040*	0.85	$n = 19$
Median	416	13.70	50.00	32.00	182	154	0.19	−1	491.00	0.07	0.70	0.50	1	66.7	35.60	
$\text{Average}_{\text{IMS Group}}$	288.57	13.58	41.14	33.08	120.39	107.28	0.45	−62,112	428.71	0.10	1.13	0.58	0.68	72.15	38.16	
$\text{Average}_{\text{Control Group}}$	751.78	15.07	159.09	148.9	887.84	842.57	0.19	139.12	2592.60	0.10	1.35	1.00	1.37	67.52	33.11	
Steel and metallurgy																
p-value	0.86	0.86	0.86	0.86	0.40	0.40	0.86	0.40	0.40	0.86	0.23	0.59	0.63	0.86	0.86	$n = 17$
Median	329.00	3.60	5.00	16.00	375.00	368.00	0.02	97.00	471.00	0.01	0.70	1.00	1.30	41.80	15.00	
$\text{Average}_{\text{IMS Group}}$	1060.40	−0.74	64.31	83.35	1187.10	1156.10	−0.04	225.59	2022.60	0.01	0.77	1.69	3.08	44.37	15.28	
$\text{Average}_{\text{Control Group}}$	919.25	2.45	16.28	30.75	1200.90	1164.80	0.07	58.32	2010.20	0.05	0.95	1.12	1.62	48.23	15.80	
Transportation																
p-value	0.20	0.77	0.20	0.20	0.024*	0.024*	0.77	0.77	0.20	0.77	0.092**	0.49	0.38	0.49	0.77	$n = 17$
Median	347.00	4.70	20.00	17.00	237	201	0.07	−5.00	910.00	0.03	0.4	0.60	0.90	66.00	34.50	
$\text{Average}_{\text{IMS Group}}$	326.90	5.26	25.36	18.09	1285.60	1234.10	−0.16	−42.01	1611.70	0.01	11,571	8.43	0.90	59.54	59.73	
$\text{Average}_{\text{Control Group}}$	724.08	−0.70	239.95	39.32	687.55	623.93	0.86	−111.49	2235.20	−0.01	0.7	0.74	1.05	66.81	37.06	

Notes: *,**Significant at 95 and 90 percent, respectively

When we analyze the services sector, the opposite occurs with the indicator V1 in the IMS core group ($\mu = 288.57$) and the control group ($\mu = 751.78$); the difference between the means is approximately 62 percent. Adjusted net worth (V5) was statistically significant for the energy sector ($\chi^2 = 2.85$, GL = 1, $p = 0.091$), chemical and petrochemical sector ($\chi^2 = 6.53$, GL = 1, $p = 0.011$), services sector ($\chi^2 = 6.74$, GL = 1, $p = 0.009$) and transportation sector ($\chi^2 = 5.13$, GL = 1, $p = 0.024$). We thus reject H_0 at a significance level of 90 percent for the energy, chemical and petrochemical industry, and services sectors, and we reject it at 95 percent for the transport sector. Rejecting H_0, it is assumed that the averages of the groups are different, and the control group is demonstrated to be statistically superior to the IMS core group for the energy, chemical and petrochemical, and transportation sectors, while the opposite occurs in the services sector ($\mu = 120.39$ IMS core group, and control group $\mu = 887.84$).

The same sectors show that net worth legal (V6) is statistically significant at the 95 percent significance level for the energy and transportation sectors and the level of 90 percent for the chemical and petrochemical and services sectors. Thus, H_0 is rejected at those levels of significance. So, regarding the adjusted net worth (V5) indicator for net worth legal (V6), the average group of the energy sector ($\chi^2 = 4.90$, GL = 1, $p = 0.027$), the chemical and petrochemical sector ($\chi^2 = 6.53$, GL = 1, $p = 0.011$), and the transport sector ($\chi^2 = 5.13$, GL = 1, $p = 0.024$) are shown to be significantly higher for the IMS core group, while the services sector ($\chi^2 = 6\ 74$, df = 1, $p = 0.009$) behaves inversely to the companies of the control group: $\mu = 842.57$, while in the IMS core group $\mu = 107.28$, corresponding to approximately 13 percent of the average control group.

Regarding equity indicators (V5 and V6), the sum of the capital of companies with all certifications IMS core group is higher compared to the control group for the energy, chemical and petrochemical and transportation sectors.

Also, in the energy sector, adjusted profit income (V3) ($\chi^2 = 2.85$, GL = 1, $p = 0.091$) and net profit legal (V4) ($\chi^2 = 2.85$, GL = 1, $p = 0.091$) were statistically significant at the 90 percent level, so H_0 is accepted for this level of significance, and the averages of the two indicators are far superior to those of the IMS core group.

For the energy sector, two other indicators stood out. The index that measures the operational efficiency of the company, financial turnover (V11) ($\chi^2 = 3.50$, GL = 1, $p = 0.061$), was slightly higher for the control group at the 90 percent significance level. So, we decide to reject H_0 and total assets (V9) for the energy sector ($\chi^2 = 2.85$, GL = 1, $p = 0.091$), based on the averages of the two groups (IMS core group $\mu = 3{,}092.44$ and control group $\mu = 1{,}562.15$), and also for the chemical and petrochemical sector ($\chi^2 = 6.53$, GL = 1, $p = 0.011$), based on the averages for the groups (IMS core group $\mu = 1{,}620.20$ and control group $\mu = 167.39$). Thus, H_0 is accepted at the 90 percent significance level, and we note that companies with certifications add more active companies than non-certified companies.

Regarding general liquidity (V12), we reject H_0 at the 90 percent significance level and analyze the means of the groups. These means were slightly higher for the control group in the chemical and petrochemical sector ($\chi^2 = 3.39$, GL = 1, $p = 0.065$).

General debt (V14) at the 90 percent level of significance rejects H_0 for the chemical and petrochemical sector ($\chi^2 = 3.33$, GL = 1, $p = 0.068$), and at the 95 percent significance level, H_0 is rejected for the services sector ($\chi^2 = 4.23$, GL = 1, $p = 0.040$). Companies that use IMS finance 60.8 (chemicals and petrochemicals) and 72.15 percent (services) of their assets using third-party capital. It may be advantageous for companies to work with third-party capital, and this indicator may show that companies with certification have more credibility in the market when raising resources (Bernardo *et al.*, 2015; Corbett *et al.*, 2005; Lo and Chang, 2007; Lo *et al.*, 2011).

At the 90 percent significance level, we reject H_0 for long-term debt (V15), $\chi^2 = 3.33$, GL = 1, $p = 0.068$ for the chemical and petrochemical sector, indicating that among

companies with IMS, 19.82 percent of their debt will mature in the long term compared with companies in the control group, for which this figure is 11.66 percent.

For the service sector, analyzing the net working capital (V8) and current liquidity (V13) indicators at the 90 percent significance level, we reject H_0 for V8 ($\chi^2 = 6.74$, GL = 1, $p = 0.009$), and the 95 percent significance level rejects H_0 for V13 ($\chi^2 = 3.52$, GL = 1, $p = 0.061$). For both, the average of the control group (V8 $\mu = 139.12$ and V13 $\mu = 1.37$) must be superior compared to the IMS core group (V8 $\mu = -62.11$ and V13 $\mu = 0.68$). The results indicate that companies in the control group, for the sector in question, have more resources available to finance their activities while still having capital available for settling their other obligations.

Unlike the IMS core group, when we analyze V13, $\mu = 0.68$, which may indicate that certified companies in the services sector may not have enough capital available to repay their obligations, as the value is less than 1.

Thus, at the significance levels of 95 and 90 percent for all sectors, the indicators that are not highlighted in Table V contributed to the acceptance of H_0. It is concluded that the means are not significantly different.

4.3 Structural equation model (SEM)

The PLS/SEM measurement and structural models were tested for the sample using Smart PLS 3.0 software (Ringle *et al.*, 2015).

The latent variable "IMS" was encoded as a dummy variable, as discussed above, and modeled as a formative in this model. All economic performance variables were designed as formative as well. In these cases, the evaluation of validity and reliability is not applicable because correlation among the formative indicators was neither necessary nor desired.

The structural model was evaluated through bootstrapping with 3,000 resamplings, and the results confirm the research hypothesis, i.e. the positive effect of IMS on economic performance (see Table VI and Figure 3).

Figure 3 shows the results of the path algorithm and bootstrapping performed in Smart PLS 3.0 software.

Table VI summarizes the results obtained from the Smart PLS 3.0 software, which analyzed the structural model. According to the results, companies that use IMS have better economic performance than companies in the control group. Among the four economic performance variables investigated, the results show that three are significant at 99 percent of confidence (p-value = 0.000). Only the return variable was not significant. The IMS core group shows a positive and significant effect of 27 percent on profitability in comparison with the control group. Additionally, the IMS core group shows 13.9 percent more growth and 9.3 percent more equity than the control group.

5. Discussion

The objective of this study was to analyze the effect of IMS in a TBL perspective on the economic performance of companies.

	Original sample (*O*)	Sample mean (*M*)	SD (STDEV)	*t*-statistics (|*O*/STDEV|)	*p*-values	R^2	R^2 adjusted
IMS → Equity	0.311	0.357	0.066	4.726	0.000	0.097	0.093
IMS → Growth	0.377	0.387	0.038	10.000	0.000	0.142	0.139
IMS → Profitability	−0.522	−0.536	0.040	13.101	0.000	0.272	0.270
IMS → Return	−0.049	−0.063	0.074	0.666	0.506	0.002	−0.002

Note: *Significant at 95 percent level
Source: Exported from Smart PLS 3.0

Table VI. Structural model results

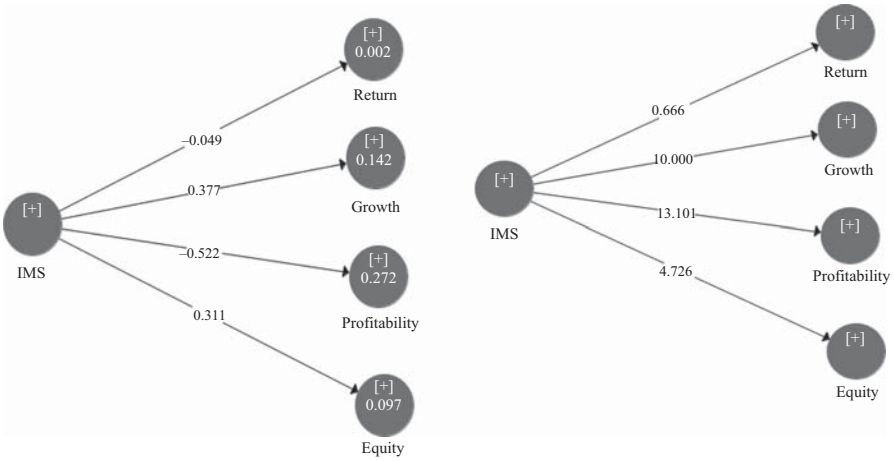

Figure 3.
Structural model – PLS algorithm and bootstrapping results

Source: Exported from SmartPLS 3.0

The research results corroborate the hypothesis that IMS has a significant and positive impact on economic performance in comparison with the control group. This study contributes to discussions of whether and how certifications on TBL perspectives help to improve the economic performance of companies in selected sectors. We can confirm that companies' economic performance is improved in all sectors. This result sheds light on the controversy in the literature between the positive (Porter and Kramer, 2011; Corbett and Kirsch, 2004; Jacobs *et al.*, 2010; Lo *et al.*, 2011; Melnyk *et al.*, 2003b; Psomas *et al.*, 2013; Zailani *et al.*, 2012) and negative (Casadesús and Karapetrovic, 2005; Dick *et al.*, 2008; Karim and Bingi, 2015; Lo *et al.*, 2011) impacts on economic performance. We present empirical evidence of the positive impact of IMS in TBL in a large sample of companies, using secondary databases that are less biased than stakeholders' perceptions.

Furthermore, we determined that the industry sector influence the relation between IMS and economic performance. Four sectors show significant differences in the economic indicators: energy, chemical and petrochemicals, services and transportation. The economic performance indicators that presented significant differences between the IMS core and control groups were the following: the net sales indicator (V1), adjusted profit income (V3), net profit legal (V4), equity indicators (V5 and V6), general liquidity (V12) and the general debt indicator (V14). It may be advantageous for companies to work with the third-party capital, and this indicator can show that companies with certification have more credibility in the market, which may help them raise funds (Bernardo *et al.*, 2015; Corbett *et al.*, 2005; Lo and Chang, 2007; Lo *et al.*, 2011).

This study has implications for practice because the results of the descriptive analysis, the median mood test and the structural equation model, which indicate that IMS with environmental and social standards can improve the economic performance of companies. This suggests that instead of the prevalent mindset in companies that sustainability leads to raise costs and reduce those profits (Porter and Kramer, 2011), the results show that the investments on IMS in TBL perspective influence economic performance. Thus, investing in IMS can increase the economic performance of companies, resulting in profitability, increased equity and sales growth. These findings are significant since more and more companies are interested in becoming sustainable.

Our research design, which uses secondary databases, helps to mitigate the bias that has affected other controversial results. However, our research methods have some limitations,

considering the indicators available in the database. Furthermore, despite its large size, the sample is composed only of Brazilian companies, and the country context must be considered when analyzing the results. Moreover, other variables can affect the relationship between IMS in TBL, and economic performance and their effect can be hidden in the research model. However, the control group helps to show the impact of sectors and firm size variables. As all research design, this research has limitations, and we agree on that. We enhanced the discussion on the limitations of the conclusions.

6. Conclusion

This research sheds light on the controversy in the literature between the win-win stream and trade-off stream concerning the influence of sustainability on economic performance. Our results findings suggest the positive influence of IMS with social and environmental sustainability standards vs negative effects on economic performance. The results show that economic performance is improved in the studied companies using IMS in TBL perspectives. Moreover, the study shows that the industry sector influences this relation, particularly in the energy, chemical and petrochemicals, services and transportation sectors.

As practical implications for executives and managers, the results help to justify the amount invested in IMS in TBL perspective because it shows that this investment increases the economic performance of companies, resulting in profitability, increased equity and sales growth. By using a control group, these results can be extended for a broad spectrum of different firms' sizes and sectors. It was questioning the predominant mindset in companies that sustainability increase costs while reinforcing the win-win narrative that investments on IMS in TBL perspective influence economic performance.

In future research, a cross-country analysis can be performed by applying a similar research approach. Moreover, other studies could investigate the trade-offs among indicators in both IMS core and control groups. Finally, other variables that can influence the relation between IMS in TBL and economic performance can be explored in the research model, and these effects investigated.

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