

Normative synergy: the impact of ISO certifications on companies' financial performance

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Abstract

Purpose – This study examines the impact of adherence to ISO 9001, ISO 14001, and ISO 45001 on the financial performance of publicly traded Brazilian companies from 2014 to 2023.

Design/methodology/approach – Panel regressions were estimated using firm-year data and two IMS operationalizations: A binary measure of full integration and a continuous measure of partial integration. Financial performance was measured by operational ROA and net ROA. The models include financial, operational, and sector controls, use random effects supported by Hausman tests, and included one-period-lagged specifications.

Findings – Results show a positive and statistically significant association between ISO integration and financial performance, with stronger coefficients for partial integration and partial persistence in lagged models.

Practical implications – Publicly traded companies may improve financial performance by consistently integrating ISO certifications, promoting efficiency, coordination, better resource utilization, reduced redundant costs, and lower regulatory and operational risks. The degree of integration matters, as integrated arrangements may generate stronger gains than fragmented adoption.

Social implications – ISO integration is associated with organizational legitimacy, a socially and environmentally responsible image, safer and more sustainable work environments, and potential effects on employer branding, talent retention, and employee satisfaction.

Originality/value – This study shows that ISO certification–financial performance relationships vary by the degree of integration and remain consistent across alternative performance measures and lagged specifications.

Keywords Financial performance, ISO standards, Publicly traded companies, Operational efficiency

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1. Introduction

The implementation of ISO standards seeks to align companies' practices with the expectations of customers, suppliers, and other stakeholders (Jannah, Jatmiko, & Kusuma, 2020). The adoption of these standards may support insertion into value chains, improve process and product quality, and strengthen relationships with stakeholders (Naser, Karbhari, & Zulkifli Mokhtar, 2004). However, certification can be costly because it requires financial, human, and knowledge resources; when held simultaneously, these standards may increase resource demands and intensify the challenges of ensuring that adoption generates benefits rather than merely costs (Ritchie, Gallagher, Melnyk, & Shahzad, 2024).

Previous studies have explored the relationship between the adoption of ISO standards and organizational performance from various perspectives. Aragón-Correa and Rubio-López (2007) discuss proactive environmental management, emphasizing that compliance with ISO standards alone is insufficient to guarantee financial improvements. Gimenez and Ventura (2005) suggest that compliance with ISO standards can improve operational efficiency and, consequently, financial performance, while highlighting the importance of internal and

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external integration for logistics performance, especially in the fast-moving consumer goods sector. [Marhavilas, Koulouriotis, and Gemeni \(2011\)](#) reinforce that the implementation of ISO standards related to risk management can not only improve workplace safety but also positively affect companies' financial performance.

Adherence to ISO standards, in addition to improving corporate image and strengthening reputation among stakeholders, can increase operational efficiency by implementing quality and environmental management practices, often resulting in cost reductions and productivity gains ([Marhavilas et al., 2011](#)). Additionally, the quality of products and services, as promoted by compliance with ISO 9001, may increase customer satisfaction and loyalty, thereby positively affecting sales and financial performance ([Bernardino, Figueiredo, Jesus, & Soares Filho, 2022](#); [Gimenez & Ventura, 2005](#)).

Despite evidence of the benefits of ISO compliance, a gap remains in the literature regarding the combined impact of these certifications on financial performance. Pressures to adopt different ISO standards may lead to financial expenditures and competition for managerial attention, especially for the most common standards: ISO 9001, 14001, and 45001. In this scenario, there is an opportunity to investigate how adherence to these standards relates to the financial performance of Brazilian publicly traded companies over an extended period, from 2014 to 2023, for companies that were certified under the three standards in combination at least once. Thus, this study seeks to move beyond isolated or sector-specific analyses to explore this effect in a broader, longer-term context.

To investigate how combined adherence to ISO 9001, ISO 14001, and ISO 45001 relates to companies' financial performance, this study employs panel regressions using annual data from publicly traded Brazilian companies from 2014 to 2023. The analysis considers two operationalizations of the Integrated Management System (IMS): a dichotomous measure of full integration and a continuous measure of partial integration, and two complementary measures of financial performance: operational return-on-assets (ROA) and net ROA. The specifications include financial and operational controls, macro-industry dummies, comparisons between fixed and random effects using Hausman tests, and one-period-lagged models to qualify the temporal interpretation of the association being analyzed.

The results indicate that higher levels of integration among ISO certifications are associated with better financial performance among companies. This association is observed for both the full and partial integration measures, with stronger effects for the latter in the main models, and it remains partially stable in the one-period-lagged specifications. Taken together, these findings reinforce the relevance of examining the integration between ISO standards and financial performance, with greater attention to the degree of integration and the temporal dimension of the relationship.

This study contributes to understanding the relationship between ISO certifications and financial performance by analyzing the combined adoption of ISO 9001, ISO 14001, and ISO 45001 standards among Brazilian publicly traded companies. The contribution of the study also lies in showing that this relationship may vary with the degree of certification integration and remains consistent across specifications with different performance measures and a lagged temporal structure. In doing so, the study responds to calls in the literature for investigations that jointly consider normative integration, its potential benefits, and the organizational costs and requirements associated with its implementation ([Ritchie et al., 2024](#); [Jannah et al., 2020](#)).

2. Literature review and hypotheses

The implementation of ISO 9001, ISO 14001, and ISO 45001 standards has been widely discussed in the literature on quality management and corporate sustainability, especially regarding the impact of these certifications on organizational performance ([Jannah et al., 2020](#); [Bakator & Čočkaló, 2018](#); [Wang & Liu, 2023](#)). The adoption of these standards reflects companies' attempt to align internal processes with widely recognized practices, promoting operational and financial improvements and responding to stakeholder and regulatory-

environment demands (Sousa & Voss, 2002). At the normative level, ISO 9001 emphasizes the continuous improvement of the quality management system, ISO 14001 guides the monitoring and evaluation of environmental performance, and ISO 45001 establishes processes for monitoring and evaluating occupational health and safety performance (ABNT NBR ISO 9001:2015, 2015; ABNT NBR ISO 14001:2015, 2015; ABNT NBR ISO 45001:2018, 2018).

In empirical terms, the literature presents mixed evidence on the relationship between ISO certifications and performance. In the Brazilian context, Bernardino *et al.* (2022) present evidence supporting an association between ISO 9001 and profitability, whereas de Souza Campos, Grzebieluckas, and Selig (2009) do not find statistically significant differences. However, they observe superior performance among companies that hold ISO 14001 certification. In international evidence, Arocena, Orcos, and Zouaghi (2020) report positive effects of ISO 14001 on profitability, while Neves, Reis, Reis, and Dias (2024) present less conclusive results for ISO 9001 and ISO 14001. Taken together, these studies reinforce the relevance of examining the relationship between ISO certifications and financial performance in different contexts.

Moreover, the impact of these standards is not limited to internal efficiency and improved relationships with resources, the environment, employees, and the community; it also extends to the company's reputation and its ability to meet the expectations of external stakeholders (Sousa & Voss, 2002). Bakator and Čockalo (2018) emphasized that ISO standards, especially ISO 9001, play a significant role in improving organizational performance by aligning quality management practices with strategic objectives.

By aligning their operations with these standards, companies not only comply with regulations but also enhance their legitimacy with customers, investors and society at large (Freeman, 1984). Freeman and McVea (2001) broadened this concept, emphasizing that certified companies are perceived as more responsible and ethical, thereby increasing their attractiveness to investors and consumers. Naser *et al.* (2004) and Jannah *et al.* (2020) point out that a significant gap remains in the literature on the impact of the simultaneous application of standards on companies, particularly regarding how the adoption of these certifications directly affects their financial performance.

In addition to operational benefits, recent studies suggest that the combined adoption of ISO 9001, ISO 14001, and ISO 45001 can yield substantial financial gains (Wang & Liu, 2023). Jannah *et al.* (2020) showed that by combining these three standards, companies can improve their operational efficiency while promoting an image of social and environmental responsibility. The adoption of an integrated approach to ISO standards enables companies to reduce costs, improve product quality, and minimize regulatory risks, thereby increasing their market competitiveness and profitability.

Viswanathan, Johnson, and Toffel (2023) address the importance of ISO 45001 for promoting safe and sustainable work environments. Their research indicates that compliance with this standard not only improves worker safety but also reinforces the company's image as a responsible employer, potentially leading to greater talent retention and higher employee satisfaction. This focus on performance evaluation and communication is also compatible with the requirements of ABNT NBR ISO 45001:2018, which provides processes for monitoring, measuring, analyzing, and evaluating OHS performance, including communicating results, as appropriate (ABNT NBR ISO 45001:2018, 2018).

Recent studies, such as Ritchie *et al.* (2024), reinforce the view that implementing ISO standards must be embedded in the organizational culture to sustain long-term results, as superficial adoption tends to yield limited effects. Wang and Liu (2023) also pointed to performance differences between companies with and without integrated management systems (IMs) and described IMs as the adoption of multiple standards or management models, frequently associated with ISO 9001, 14001, and 45001. However, the authors indicate that the performance of companies with IMs is not always superior when the integration between quality and environmental management systems is observed (Wang & Liu, 2023).

Adherence to a standard, especially ISO 9001, helps reduce administrative costs and improve resource efficiency (Ritchie *et al.*, 2024; ABNT NBR ISO 9001:2015, 2015). ISO 45001 addresses internal needs and objectives, such as reducing occupational risks and accidents, thereby contributing to improved productivity (Jannah *et al.*, 2020; ABNT NBR ISO 45001:2018, 2018). ISO 14001 contributes to improved financial performance by enhancing organizational image, reducing business risks, increasing operational efficiency, and promoting more effective and sustainable environmental management, all of which strengthen companies' competitiveness (Noryani *et al.*, 2020; ABNT NBR ISO 14001:2015, 2015).

Studies indicate that each ISO standard contributes individually to operational improvements: ISO 9001 standardizes processes and reduces nonconformity costs (Sousa & Voss, 2002), ISO 14001 minimizes environmental risks and waste (Noryani *et al.*, 2020), and ISO 45001 reduces occupational accidents and associated costs (Jannah *et al.*, 2020). However, the absence of systemic integration limits normative synergy, which is essential for maximizing financial benefits.

Talapatra, Uddin, Doiro, and Santos (2023) highlight that integrated management systems (IMSs) enhance the complementarity among standards, optimize resources, and align organizational objectives holistically. Companies with partial adoption, although they gain sectoral legitimacy, fail to capitalize on synergies, such as enhanced corporate reputation and interdepartmental operational efficiency, which are critical for attracting investors and consumers in competitive markets (Kludacz-Alessandri & Cygańska, 2021). In addition, Ritchie *et al.* (2024) warn that fragmented implementations can lead to redundant administrative costs and strategic misalignment, thereby reducing net returns. Thus, while partial compliance mitigates specific risks and generates punctual efficiencies, the absence of normative integration restricts the internalization of synergistic mechanisms, resulting in positive but less expressive financial impacts (Wang & Liu, 2023).

According to Talapatra *et al.* (2023), Noryani *et al.* (2020), and Wang and Liu (2023), combined adherence to ISO 9001, 14001, and 45,001 yields operational benefits, including improved resource use and reduced environmental and safety risks. In addition, the adoption of these standards may strengthen corporate image and legitimacy among stakeholders, potentially attracting investors and consumers and increasing competitiveness, thereby contributing to financial performance (Jannah *et al.*, 2020; Kludacz-Alessandri & Cygańska, 2021).

Taken together, this evidence is consistent with the literature, which points to a lack of empirical evidence and controversial results regarding the economic and financial benefits associated with the adoption of ISO standards, reinforcing the relevance of examining the relationship between ISO certification and financial performance in different contexts. Thus, the central hypothesis of this study is that adherence to ISO 9001, 14001, and 45,001 standards is directly related to better financial performance.

3. Method

This research aims to investigate the impact of adherence to the ISO 9001, ISO 14001, and ISO 45001 standards on the financial performance of Brazilian publicly traded companies that were jointly certified under these standards at some point between 2014 and 2023. To this end, we chose to focus on companies that, at some point during the period analyzed, held all three certifications, thereby constituting an Integrated Management System (IMS). The data used were obtained from secondary databases, notably LSEG (Refinitiv), and from official certification records. In cases of doubt regarding the existence of certification in the primary databases, the data were complemented through manual collection.

Financial performance was measured using two ROA measures with complementary purposes. As the main measure, we used operational ROA, calculated as the ratio of EBIT (earnings before interest and taxes) to the firm's total assets for the period. This measure was

adopted because it more closely captures the business's operational efficiency, reducing the influence of financial and tax decisions that do not arise directly from the company's operations. As an additional robustness check, we also estimated net ROA, defined as the ratio of net income after minority interests to total assets. The inclusion of this second metric aimed to verify whether the results remained consistent when performance was measured more broadly, incorporating the final effect of operational, financial, and tax decisions. Thus, while operational ROA is more appropriate for capturing effects associated with productive and organizational efficiency, potentially related to the integration of ISO certifications, net ROA allows evaluation of whether this association also holds under a more traditional and widely used measure of corporate profitability.

The central variable of the study, referring to the Integrated Management System (IMS), was operationalized in two complementary ways. First, we used a dichotomous measure of full integration, coded as 1 when the company showed combined adherence to the three certifications analyzed - ISO 9001, ISO 14001, and ISO 45001 - in the respective year, and 0 in the remaining cases. This specification more restrictively captures the condition of complete integration among the standards, directly approximating the idea of joint adoption of an integrated system. Second, we used a continuous measure of partial integration, calculated as the simple average of the three certifications. This measure assigned equal weights to each certification by first capturing a dichotomous indicator for each certification and then dividing by 3, yielding a value from 0 to 1. In this operationalization, the value 0 indicates the absence of certifications, 0.33 indicates the adoption of one standard, 0.67 indicates the adoption of two standards, and 1.00 indicates the adoption of three standards. We assigned equal weights to the three certifications because we understand that each represents a formally relevant component of the integrated system. Taken together, the two measures enable us to capture both full integration and gradual levels of incorporation of the standards, allowing us to assess whether the potential effects on performance stem solely from the complete adoption of the IMS or also from incremental gains associated with partial implementation.

To control for factors that may influence financial performance independently of the integration of ISO certifications, we included a set of control variables related to financial structure, firm size, operational intensity, and sectoral heterogeneity in the model. Specifically, we used the ratio between long-term debt and total assets, which measures the intensity of long-term indebtedness. We used total assets in millions of dollars as a proxy for firm size, since larger companies tend to operate on different scales, with different cost structures and competitive conditions. We also used revenue, measured in dollars, as an indicator of economic activity volume and the company's operational intensity. We employed a proxy for operating leverage, calculated as the ratio of general and administrative expenses plus depreciation to revenue, to capture differences in the rigidity of firms' operating cost structures. Additionally, we included industry dummies to control for structural performance differences associated with the sectoral environment.

The econometric model adopted for the analysis consisted of panel regressions on annual firm-year data, combining cross-sectional variation across companies and temporal variation over the 2014–2023 period. Initially, we estimated specifications with two measures of financial performance - operational ROA and net ROA - and with two operationalizations of the central variable of interest: a dichotomous measure of full IMS integration and a continuous measure of partial integration. In all main specifications, we included, as controls, the ratio of long-term debt to total assets, total assets in millions of dollars, revenue, and the operating leverage proxy, in addition to macro-industry dummies. To make the coefficients comparable in magnitude, the main estimations were conducted with the continuous variables standardized as z-scores. We then compared the specifications with fixed and random effects using Hausman tests applied to the time-varying regressors. Since the null hypothesis was not rejected at the 5% level in the four central specifications, we adopted random-effects models as the main specification. The result of the Hausman test is shown in [Table 1](#). Additionally, to mitigate concerns about temporality and causal inference, we estimated one-period-lagged

Table 1. Hausman test

Dependent variable	Main variable	Chi-square	<i>p</i> -value	Decision
Operational ROA (standardized)	IMS	7.96	0.1582	RE preferable
Operational ROA (standardized)	Partial IMS	10.04	0.0742	RE preferable
Net ROA (standardized)	IMS	4.00	0.5495	RE preferable
Net ROA (standardized)	Partial IMS	5.06	0.4091	RE preferable
Source(s): Prepared by the authors based on research data				

versions by replacing the contemporaneous IMS variables with their values at $t-1$ to verify whether certification integration in one year was associated with financial performance in the subsequent year.

The sample comprises 400 firm-year observations distributed across the period analyzed. In terms of certification integration (Table 2), the dichotomous measure indicates that 37.25% of observations correspond to full IMS integration, whereas 62.75% do not exhibit combined adoption of the three standards. When the continuous measure is considered, relevant heterogeneity is observed in integration levels: 23.00% of observations have no certification, 7.50% have one certification, 32.00% have two certifications, and 37.50% have all three standards.

From a sectoral perspective (Table 3), the sample is relatively diversified, with a higher concentration in Materials (22.50%) and balanced participation of Consumption and Agribusiness, Industrial and Capital Goods, and Utilities and Infrastructure, each with 17.50% of the observations. This distribution suggests sufficient variation in both the degree of

Table 2. Sample distribution by IMS

IMS level/Certification	Frequency	%
<i>Binary IMS</i>		
0 = absence of full integration	250	62.50
1 = full integration	150	37.50
<i>Total</i>	<i>400</i>	<i>100.00</i>
<i>Partial IMS/Number of ISO certifications adopted</i>		
0,0000 = no certification	92	23.00
0,3333 = one certification	30	7.50
0,6667 = two certifications	128	32.00
1,0000 = three certifications	150	37.50
<i>Total</i>	<i>400</i>	<i>100.00</i>
<i>Individual ISO certifications</i>		
ISO 45001 not adopted	226	56.50
ISO 45001 adopted	174	43.50
<i>Total</i>	<i>400</i>	<i>100.00</i>
ISO 14001 not adopted	119	29.75
ISO 14001 adopted	281	70.25
<i>Total</i>	<i>400</i>	<i>100.00</i>
ISO 9000 not adopted	119	29.75
ISO 9000 adopted	281	70.25
<i>Total</i>	<i>400</i>	<i>100.00</i>

Note(s): Partial IMS represents the proportion of ISO certifications adopted by the company among ISO 45001, ISO 14001, and ISO 9000. Binary IMS indicates full integration, taking the value 1 when the company simultaneously adopts the three certifications

Source(s): Prepared by the authors based on research data

Table 3. Sample distribution by macro-industry

Macro-industry	Frequency	%
Consumption and Agribusiness	70	17.50
Energy	40	10.00
Industrial and Capital Goods	70	17.50
Materials	90	22.50
Services and Telecommunications	30	7.50
Transportation and Logistics	30	7.50
Utilities and Infrastructure	70	17.50
Total	400	100.00

Source(s): Prepared by the authors based on research data

certification integration and sectoral composition, which supports the analysis of the relationship between IMS and financial performance.

4. Results

Table 4 presents the descriptive statistics of the variables used in the analyses. Operational ROA has a mean of 0.0852 and a standard deviation of 0.0593. In contrast, net ROA has a lower mean of 0.0423 and a standard deviation of 0.0536, suggesting that this measure is more sensitive to the combined effects of operational, financial, and tax decisions. Regarding the central variable of the study, IMS has a mean of 0.3725, indicating that slightly more than one-third of the firm-year observations correspond to full integration of the three certifications. In contrast, partial IMS has a mean of 0.6133, showing relevant heterogeneity in the levels of joint adoption of ISO standards. Among the control variables, the ratio of long-term debt to assets has a mean of 0.3180, indicating a significant share of long-term debt in firms' financial structures.

The correlations among the covariates, obtained using Spearman's method, are shown in Table 5. The correlation matrix generally indicates low to moderate associations among the variables, with no immediate evidence of severe multicollinearity problems, except for the higher correlation between IMS and partial IMS ($r = 0.7708$; $p < 0.05$), which was expected given their conceptual proximity. Also noteworthy are the positive correlations between operational ROA, net ROA, and revenue, as well as the negative correlation between net ROA and long-term debt/assets, suggesting that greater indebtedness is associated with lower net performance.

Table 4. Descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum
Operational ROA	0.0852	0.0593	-0.0797	0.3501
Net ROA	0.0423	0.0536	-0.2353	0.2360
IMS	0.3725	0.4841	0.0000	1.0000
Partial IMS	0.6133	0.3870	0.0000	1.0000
Long-term debt/assets	0.3180	0.1655	0.0000	0.7456
Total assets (US\$ millions)	6,609	6,959	84	42,483
Operating leverage	0.1340	0.0791	0.0147	0.5453
Revenue (US\$ millions)	12.4710	13.5410	0.0130	90.4490

Source(s): Prepared by the authors based on research data

Table 5. Correlations

Variables	1	2	3	4	5	6	7	8
1. Operational ROA	1.00							
2. Net ROA	0.61*	1.00						
3. IMS	0.15*	0.15*	1.00					
4. Partial IMS	0.11*	0.12*	0.77*	1.00				
5. Long-term debt/assets	−0.06	−0.34*	0.02	0.18*	1.00			
6. Total assets (US\$ millions)	−0.01	−0.06	0.14*	0.28*	0.16*	1.00		
7. Operating leverage	−0.17*	−0.10	−0.08	−0.03	0.08	−0.18*	1.00	
8. Revenue (US\$ millions)	0.28*	0.24*	0.13*	0.15*	−0.06	0.24*	−0.24*	1.00

Source(s): Prepared by the authors based on research data

Table 6 presents the results of the main panel regressions with random effects for two measures of financial performance, operational ROA and net ROA, and two operationalizations of the study’s central construct, binary IMS and partial IMS. Overall, the results indicate a positive and statistically significant association between the integration of ISO certifications and firms’ financial performance, supporting the study’s central hypothesis. In the models with operational ROA, the standardized coefficient for binary IMS is positive and significant ($\beta = 0.1447$; $p < 0.01$), whereas partial IMS shows an even higher coefficient ($\beta = 0.1968$; $p < 0.01$). A similar pattern is observed when performance is measured by net ROA: binary IMS remains positive and significant ($\beta = 0.1132$; $p < 0.05$), and partial IMS again presents a stronger effect ($\beta = 0.1786$; $p < 0.01$). Taken together, these results suggest that full integration of the three certifications is associated with better performance and that incremental gains occur as the level of integration increases. All variables presented in these models showed VIF values below 5, ruling out multicollinearity problems.

Table 6. Main models

Variables	(1) Operational ROA	(2) Operational ROA	(3) Net ROA	(4) Net ROA
IMS	0.1447*** (0.0467)		0.1132** (0.0475)	
Partial IMS		0.1968*** (0.0568)		0.1786*** (0.0569)
Long-term debt/assets	−0.1203 (0.0736)	−0.1601** (0.0741)	−0.4057*** (0.0734)	−0.4451*** (0.0745)
Total assets (millions)	−0.3963*** (0.0963)	−0.4027*** (0.0956)	−0.1152 (0.0963)	−0.1331 (0.0961)
Operating leverage	−0.1214* (0.0637)	−0.1306** (0.0632)	−0.0807 (0.0634)	−0.0878 (0.0628)
Revenue	0.2768*** (0.0499)	0.2765*** (0.0497)	0.2164*** (0.0498)	0.2141*** (0.0495)
Macro-industry dummies	Sim	Sim	Sim	Sim
N	400	400	400	400
Firms	40	40	40	40
Wald χ^2	74.39	77.49	68.91	73.78
R ² overall	0.1891	0.1780	0.2053	0.2049

Note(s): Standard errors in parentheses. Standardized coefficients. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source(s): Prepared by the authors based on research data

These findings are consistent with the reviewed literature, which indicates that the adoption and integration of ISO certifications may be associated with better financial performance. However, this effect is not uniform across all contexts. In the Brazilian market, the results approximate [Bernardino et al. \(2022\)](#), who identify a positive impact of ISO 9001 on profitability measured by ROA, and complement the evidence of [de Souza Campos et al. \(2009\)](#), who, although they do not find statistically significant differences between groups, observe higher profitability among companies with ISO 14001. Internationally, the positive coefficients are also consistent with [Arocena et al. \(2020\)](#), who report increased profitability associated with ISO 14001, and with the arguments of [Wang and Liu \(2023\)](#) regarding incremental gains from the integration of management systems. At the same time, the fact that partial IMS presents higher coefficients than binary IMS suggests that benefits may accumulate gradually, which helps qualify the recent literature that reports non-homogeneous results, such as [Neves et al. \(2024\)](#), reinforcing that the relationship between ISO certifications and financial performance depends on the institutional context and the way performance is measured.

[Table 7](#) extends the analysis by introducing a one-year temporal lag in the central IMS variables, directly addressing the need to consider temporality and causal inference. The results show that the positive association between certification integration and performance remains, at least partially, stable when IMS is measured at $t-1$. In the models with operational ROA, the lagged coefficients for binary IMS ($\beta = 0.1005$; $p < 0.10$) and partial IMS ($\beta = 0.1277$; $p = 0.050$) remain positive, though at a lower magnitude than in the contemporaneous models. In the models with net ROA, the lagged effects are even more consistent: both binary IMS ($\beta = 0.1095$; $p < 0.05$) and partial IMS ($\beta = 0.1359$; $p < 0.05$) remain positive and significant. This pattern reinforces the interpretation that the integration of ISO certifications is not limited to the mechanical simultaneity of certification and performance in the same year. Still, it may also precede observable improvements in profitability, especially when profitability is measured in net terms. The variables had VIF values below 5 across all models, ruling out multicollinearity.

Table 7. Lagged models

Variables	(1) Operational ROA	(2) Operational ROA	(3) Net ROA	(4) Net ROA
IMS ($t-1$)	0.1005* (0.0545)		0.1095** (0.0558)	
Partial IMS ($t-1$)		0.1277* (0.0652)		0.1359** (0.0661)
Long-term debt/assets	-0.1131 (0.0773)	-0.1429* (0.0770)	-0.4186*** (0.0781)	-0.4529*** (0.0788)
Total assets (millions)	-0.3048*** (0.1036)	-0.3100*** (0.1036)	-0.1031 (0.1048)	-0.1131 (0.1057)
Operating leverage	-0.1256* (0.0672)	-0.1296* (0.0668)	-0.0978 (0.0675)	-0.1029 (0.0673)
Revenue	0.2850*** (0.0526)	0.2845*** (0.0525)	0.2284*** (0.0529)	0.2277*** (0.0529)
Macro-industry dummies	Sim	Sim	Sim	Sim
N	325	325	316	316
Firms	37	37	36	36
Wald χ^2	56.78	57.72	64.84	65.28
R ² overall	0.1815	0.1690	0.1994	0.1923

Note(s): Standard errors in parentheses. Standardized coefficients. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source(s): Prepared by the authors based on research data

The partial maintenance of effects in $t-1$ is consistent with the literature, arguing that the benefits of normative integration tend to emerge progressively as the practices associated with certifications are incorporated into organizational routines. This result approximates the argument of [Ritchie et al. \(2024\)](#), according to which the implementation of ISO standards must be internalized to produce more consistent long-term effects, as well as the mechanisms discussed by [Talapatra et al. \(2023\)](#), [Noryani et al. \(2020\)](#), [Jannah et al. \(2020\)](#), and [Wang and Liu \(2023\)](#), which associate the integration of standards with improved resource use, risk reduction, and reputational strengthening. Thus, the lagged models reinforce the view that the observed relationship does not merely reflect temporal coincidence between certification and performance, but is consistent with the interpretation that the integration of standards may precede gains in profitability.

5. Discussion

The results of this study indicate that the integration of the ISO 9001, ISO 14001, and ISO 45001 standards is associated with better company financial performance, both when measured by operational ROA and by net ROA. In the main models, this association appears positive and statistically significant for the two operationalizations of the central construct, with higher coefficients for partial IMS than for binary IMS, suggesting that gains related to integration may manifest gradually as the level of joint incorporation of the certifications increases. This pattern is consistent with the reviewed literature insofar as it approximates the evidence of [Bernardino et al. \(2022\)](#), in the Brazilian context, and [Arocena et al. \(2020\)](#), in the international context, while also helping to qualify less conclusive results, such as those reported by [de Souza Campos et al. \(2009\)](#) and [Neves et al. \(2024\)](#), reinforcing that the relationship between ISO certifications and financial performance depends on the institutional context, the measure adopted, and the degree of integration observed.

The lagged models also help qualify this interpretation. Although the coefficients in $t-1$ are more moderate than in the contemporaneous models, they remain positive and statistically significant, especially in the models with net ROA, suggesting that certification integration may precede observable improvements in profitability. This result is consistent with [Ritchie et al. \(2024\)](#), which indicates that the effects of normative integration tend to depend on the internalization of practices within organizational routines rather than solely on the formal possession of certifications. At the same time, the persistence of the results in specifications with additional controls, macro-industry dummies, a correlation matrix, VIF diagnostics, and random-effects models selected by the Hausman test reduces the plausibility that the observed association is attributable solely to omitted factors related to size, revenue, cost structure, or sectoral composition.

The results are consistent with the interpretation that integrating ISO standards may be associated with operational, reputational, and internal coordination gains, as suggested by [Jannah et al. \(2020\)](#), [Talapatra et al. \(2023\)](#), [Wang and Liu \(2023\)](#), and [Ritchie et al. \(2024\)](#). Even so, these benefits should not be treated as automatic, because the literature itself highlights that simultaneous implementation also requires financial, human, and managerial resources and may generate coordination costs, administrative redundancies, and internalization challenges. In this sense, the findings of the present study reinforce the relevance of normative synergy and indicate that its effects depend on the firm's ability to transform formal compliance into effective organizational integration. Thus, the study's contribution is not to claim a universal benefit of integrated certification, but to show that, in the context analyzed, higher levels of integration are associated with better financial performance, even when alternative performance measures, additional controls, and lagged specifications are considered.

5.1 Limitations and future research

This study has limitations that open space for future research. First, although the results remain consistent across different specifications, including models with two performance measures, two IMS measures, additional controls, and lagged versions, the study remains based on observational associations, so causal interpretation should be made with caution. Second, despite the attempt to incorporate Propensity Score Matching as an additional robustness check, satisfactory matching was not achieved due to common support and post-matching balance problems, which limit comparisons between treated and untreated firms with similar characteristics. Third, there is still a need to better understand the internal mechanisms by which certification integration translates into performance, which can be explored more deeply through qualitative research, case studies, or mixed designs. In addition, this study did not directly measure the initial and recurring costs associated with obtaining and maintaining ISO 9001, ISO 14001, and ISO 45001 certifications, nor the time required for their implementation and renewal. This limitation is relevant because the managerial evaluation of normative integration depends not only on the potential financial gains observed but also on the financial, human, and organizational expenditures required to implement, maintain, and audit these certifications over time. Thus, future research can advance by incorporating direct measures of certification costs and time, enabling a more precise assessment of the cost-benefit trade-off of the integrated adoption of ISO standards. Finally, the sample, although broad and sectorally diversified, comprises Brazilian publicly traded companies, mostly larger firms; future investigations may explore smaller firms, other institutional contexts, and possible moderators of the relationship between normative integration and financial performance.

6. Final considerations

This study presents evidence that higher levels of integration among ISO 9001, ISO 14001, and ISO 45001 standards are associated with better financial performance in Brazilian publicly traded companies that held the three certifications in combination at some point between 2014 and 2023. In particular, the results indicate that both full and partial integration are positively associated with performance, with stronger effects for the continuous IMS measure in the main models and partial maintenance of these effects in lagged specifications. These findings are consistent with the interpretation that normative integration may favor operational efficiency, internal coordination, corporate reputation, and risk management. Still, they do not authorize treating these benefits as automatic or universal, since the combined adoption of certifications entails significant costs and organizational requirements.

Generative AI

The authors declare the use of generative AI in this study. During the writing and revision of this manuscript, the authors used Google Gemini and Grammarly to support linguistic editing and improve text readability, focusing on grammar, syntax, clarity corrections, and the punctual rewriting of excerpts. The authors have fully reviewed all suggestions and remain entirely responsible for the final content.

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