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ORIGINAL ARTICLE

Relationships among strategically aligned performance indicators, controls, and performance

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ABSTRACT

This paper investigates if planning and cost controls and strategically aligned performance indicators (SAPI) are necessary and sufficient conditions to achieve a high level of organizational performance (OP). This article fills a gap in research by investigating elements of the management control system as necessary and sufficient conditions to achieve high levels of OP. Our findings show the reduced importance of planning controls and the great importance of aligning priorities and indicators to achieve high levels of performance. The paper is helpful for the practitioners that have to choose what kind of management controls are priorities to achieve high levels of performance. Management control frameworks are helpful for the literature and the practice. Still, the practitioners cannot implement the whole set of these components, considering the restriction of time and contingency aspects. The companies must choose what kind of management controls they have to implement, considering the goal of achieving performance. We used a quantitative methodology based on contingency theory in a survey of 89 Brazilian firms. The relationships were tested using partial least squares structural equations modeling (PLS-SEM), and necessary condition analysis (NCA) was applied to identify the management controls that are sufficient and necessary conditions for superior performance. The results of our study suggest that a high level of strategically aligned indicators is necessary to achieve a high level of performance. Results also suggest the importance of aligning strategic priorities with appropriated performance indicators, primarily defended in the normative (balanced scorecard) and empirical literature.

Keywords: strategically aligned performance indicators, necessary conditions analysis, planning controls, management controls, organizational performance.

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1. INTRODUCTION

Understanding what management controls affect organizational performance (OP) is an open question that remains important for both academics and practitioners. Building upon contingency theory (Chenhall, 2003; Otley, 2016), which focus on what kind of management controls are fitted with strategic and structural aspects, and resource-based theory (RBT) (Davila et al., 2009; Grafton et al., 2010; Henri, 2006a), which focus on how management controls affect capabilities and indirectly on performance, and also investigate when and how the use of management controls affects performance (Harlez & Malagueño, 2016; Henri, 2006a; Widener, 2007).

These studies have examined whether different management controls interact to influence OP and whether the effects of management controls on OP occur through the competencies enhanced by the controls.

Although these studies are essential, they contribute little to professional practice. Additionally, organizations rarely utilize all the management controls suggested in frameworks (Guerreiro et al., 2006), such as the management control package (Malmi & Brown, 2008), strategic management accounting (Cadez & Guilding, 2008), levers of control (Simons, 1995, 2000), among others. Bedford and Malmi (2015) also point out, through their research, how accounting blends with a wide variety of control arrangements and contexts. Furthermore, even if the results of these studies suggest that specific management controls do not influence performance (Beuren & Teixeira, 2014; Henri & Journeault, 2010; Kaveski & Beuren, 2020; Panosso et al., 2017), it is unreasonable to believe that organizations would eliminate them, as these controls may be deeply institutionalized in their routines. Moreover, they may also be a necessary condition (Dul, 2016, 2020a) for better performance.

The question of which management control mechanisms are necessary conditions for achieving performance remains unresolved in academia and for practitioners. Knowing how to determine which management control mechanisms are required can help practitioners in effort allocation decisions, mainly when there is an overload of information and tasks they have to manage (Merchant & Otley, 2020) routinely. According to Mertens et al. (2020), who reviewed the literature on management accounting studies that investigated necessary conditions, few studies addressed this issue, and this methodology has not yet been precisely addressed. In the same way as Shahjehan and Qureshi (2019), we posit that the central question of this paper has not yet been addressed because, until the dissemination of the necessary condition analysis (NCA) by Dul (2016), there were no appropriate analytical tools to assess the necessary condition hypotheses.

Previous studies in management accounting that used necessary conditions did not associate management controls with performance (Mertens et al., 2020); rather, they examined topics such as cognitive conflict, antecedents of strategy, financial distress, among others.

In this paper, we applied NCA proposed by Dul (2016) to identify the management controls that are necessary conditions for superior performance in terms of goal achievement.

We also combined NCA with partial least squares structural equation modeling (PLS-SEM) estimation. Understanding what aspects are necessary and what are sufficient conditions is an essential subject in the practice of organizations, particularly for those interested in solving problems using hypothesis-driven methods (Garrette et al., 2018). We used the combination of these techniques to examine the role of one capability called strategic alignment and two management controls – planning controls and cost controls – as necessary and sufficient conditions to achieve high levels of performance.

We argue that the strategic alignment of goals with performance indicators occurs in a strategic arena involving the company's top management, which is activated whenever the organization must choose the key performance indicators aligned with the strategic priorities. We posit that this process happens during the planning process or when these strategic priorities change. On the other hand, planning and cost controls work on a more routine basis and are used by operational managers, such as operations managers, product managers and process managers. These managers use these controls to run their operations, monitor the profitability of products, services, and segments and the operational expenses to adhere to the budgeted amounts, and meet the performance indicators' strategic priorities.

There are still open questions about whether performance indicators are derived from objectives and critical success factors (Ferreira & Otley, 2009; Perego & Hartmann, 2009). In practical terms, to guarantee that performance indicators are linked to a company's business strategy (Epstein & Manzoni, 1998; Micheli & Manzoni,

2010), it is essential to ensure that what is measured and reported relates to the relevant strategic goals (Melnyk et al., 2014) consisting in a standard process (Bourne et al., 2000).

Strategic alignment is an ability to align their actions in pursuit of their strategic goals (Endrikat et al., 2020), which is operationalized by choosing appropriated performance indicators to all strategic priorities that result from the planning controls like a strategic plan. In accordance with prior studies (Grafton et al., 2010), we focus on the alignment between strategies and performance indicators or strategically aligned performance indicators, hereafter SAPI. This construct is not a control artifact, but an ability (Endrikat et al., 2020). This subject is a research opportunity considering the high institutionalization of practical models like objective key results (OKR) adopted by many companies like Google (van Oijen, 2020), LinkedIn, and Twitter.

During their organizational routine, companies use different kinds of management controls. One of them is planning controls, which are important control mechanisms for strategy implementation. They are expected to influence employees' behavior and affect performance (Flamholtz et al., 1985; Merchant & Van der Stede, 2012). Another is cost controls, which are helpful to guarantee that operations are under control by monitoring expenses, raw material costs, product/service margins, activity costs, and customer profitability, and they are also expected to affect performance (James & Elmezughi, 2010; Maiga et al., 2014). Even though the high institutionalization of balanced scorecard (BSC) (Harris, 2014) that states the alignment between strategic priority and performance indicators (Decoene & Bruggeman, 2006; Hoque, 2014), this construct is not studied at the same study with management controls, and how they relate to performance. This paper intends to fill this gap by showing whether SAPIs, planning controls, and cost controls are necessary conditions to achieve high OP, that is, to increase the level of goal achievement, including both short-term monetary goals (e.g., profit) and long-term nonmonetary goals (e.g., innovation). We carried out a survey with finance professionals from 89 companies in Brazil and used the NCA software (Dul, 2020a) to analyze necessary conditions.

We believe that this study offers three relevant contributions to the management control literature and the practice. First, this paper contributes to the academic literature and practice by identifying the relationships among planning and cost controls, strategic alignment, and performance. Second, showing which management control mechanisms are necessary to achieve performance. Third, we show what level of management control use is needed to achieve a high level of OP. We expected that managers would be able to direct their efforts in controlling the operations that fall under their purview with this knowledge.

This paper is structured as follows: in section 2, we develop our hypotheses and introduce our theoretical model. Next, we describe the research methodology. In the subsequent section, we present and discuss the results. Section 5 discusses the main implications of the paper's findings and the limitations and opportunities for future research.

2. THEORETICAL BACKGROUND

Considering that NCA is a technique relatively new in management accounting studies, we begin this chapter describing this technique first.

2.1 NCA

A necessary determinant (above certain level) must be present to obtain (certain level of) the desired result. Nevertheless, its presence is not sufficient to achieve this result (it does not guarantee the expected result). Without its presence, failure is certain (the result will not be achieved) because its absence cannot be compensated neither by other result determinants nor by an increase in the intensity of the determinants already present (Dul, 2016).

After the paper's publication, some researchers began to use NCA to analyze the relationship between the constructs – for instance, intelligence and creativity (Karwowski et al., 2016), contract details and trust (van der Valk et al. 2016), gestation activities and firm emergence (Arenius et al., 2017), critical success factors for implementing lean practices in small and medium enterprises (SMEs) (Knol et al., 2018), the conditions for marketing capability (Tho, 2018).

Specifically in the field of management accounting, Mertens et al. (2020) illustrate NCA by applying it to a case of designing costing systems and complementary insights it generated in comparison to the results of a regression analysis. According to these authors, their research contributes to improving hypothesis development

by "giving logical and methodological guidance to identify sufficiency and necessity appropriately" (Mertens et al., 2020, p. 24). The authors further note that NCA enables researchers to identify critical levels that must be present to achieve a specific level of the desired outcome (e.g., a product cost accuracy of 5%).

2.2 Sufficiency Hypotheses and Necessity Hypotheses

A sufficiency hypothesis concerns the mean tendency (more X → more Y). A necessary hypothesis predicts when Y does not occur (absence X → absence Y) or which level of X is necessary to have a certain level of Y (Dul, 2020b). Richter et al. (2020) show how these kinds of hypotheses complement the sufficiency hypotheses tested by PLS-SEM.

2.2.1 SAPI and performance

One of the roles of performance indicators is to communicate the strategic priorities and performance drivers needed to achieve those priorities (Verbeeten & Boons, 2009). Performance measures used diagnostically can help set performance standards and, when aligned with strategic priorities, can facilitate discussion with top-level managers (Harlez & Malagueño, 2016). By using the BSC, companies translate their vision and mission into measurable goals and provide a visual map of the causal links between the performance indicators and strategic priorities (Nørreklit et al., 2017). Moreover, using BSC as a strategic alignment tool implies that organizations select and use performance indicators linked to business strategy (Epstein & Manzoni, 1998; Frezatti et al., 2015; Micheli & Manzoni, 2010; Oro & Lavarda, 2019; Valente, 2014). By doing so, organizations ensure that what is measured and reported are the relevant strategic goals (Melnyk et al., 2014).

Strategic alignment is considered a capacity (Franco-Santos et al., 2012) whose key benefit is to promote performance improvements (Ferreira & Otley, 2009; Schniederjans & Cao, 2009). Then, the broad-based SAPIs are expected to improve organizational outcomes (Grafton et al., 2010). Ferreira and Otley (2009, p. 271) stated that "key performance measures are the financial or non-financial measures (metrics) used at different levels in organizations to evaluate success in achieving their objectives".

Those authors supplemented the evidence that alignment between performance measures and strategy affects performance (Ferreira & Otley, 2009). The previous literature has confirmed the effect of strategic alignment on performance. For example, Van der Stede et al. (2006) found that the relationship between strategic alignment and performance was partially supported. The results were confirmed only for firms that followed quality-based strategies and used subjective nonfinancial measures extensively. Akhtar and Sushil (2018), in an empirical study of the Indian oil industry, found that strategic performance management system (SPMS) implementation issues have proved to be major driver of effectiveness. Ilmudeen et al. (2019), in research with senior information technology (IT) and business managers in China, found that the quality-oriented strategic alignment dimension has a significant relationship with all performance measures. Junqueira et al. (2016), in a study with large and medium-sized companies, found that strategic choices and the management control systems have a positive impact on performance. Baird (2017) tested with Australian firms whether an alignment between indicators and strategies produced greater effectiveness of performance measurement systems, but this hypothesis has not been validated. Harlez and Malagueño (2016) stated that top-level managers' professional/academic backgrounds contribute to the benefits of alignment between performance measurement systems and strategic priorities. Galas and Ponte (2006) manifest that the implementation of the BSC causes managerial changes that influence the factors of IT.

Following these previous studies, we state this hypothesis:

H_{1a}: the use of SAPIs is positively associated with OP.

H_{1b}: a high level of use of SAPIs is a necessary condition to achieve higher levels of OP.

2.2.2 Planning controls and OP

Successful organizations connect their planning controls to the intended strategies (Sponem & Lambert, 2016), and planning controls are used to define deliberate strategies through long-term strategic planning (Mintzberg et al., 2008; Simons, 1987) and budgeting, where strategic guidelines are validated in the form of operational planning directing managers' efforts (Hansen, 2011; Hansen & Van der Stede, 2004).

The use of planning controls (UPC) may also positively affect financial performance (Chenhall & Langfield-Smith, 1998; Dibrell et al., 2014; Oyadomari et al., 2018). Boyd (1991) developed a meta-analysis study by which he showed a positive association between strategic planning and a series of performance dimensions, including sales growth. Planning controls such as strategic planning and budgeting are useful for top-down, bottom-up, and lateral communication (Merchant & Van der Stede, 2012). Nevertheless, there have been many critiques about the importance of a budget in the presence of uncertainty, for example, Merchant and Otley (2020); but other studies have shown that this control is still essential (Libby & Lindsay, 2010).

Pollanen et al. (2017), in empirical research on Canadian public organizations, found that strategic performance measures (SPM) of efficiency and effectiveness are positively associated with performance. Suykens et al. (2021), in its turn, in a study about non-profit organizations, confirm that management tool use and performance measurement are central in explaining how performance-based accountability impacts subjective performance. In another study, already mentioned in this text, Grafton et al. (2010) found that decision-facilitating measures impact the organization's strategic capabilities and, subsequently, its performance.

We formally state our second hypothesis predicting the association between planning controls and OP as follows:

H_{2a}: the UPC is positively associated with OP.

H_{2b}: a high level of UPC is a necessary condition to achieve higher levels of OP.

2.2.3 Cost controls and OP

Cost controls usually include financial performance indicators that allow an organization to monitor cost efficiency and effectiveness (Bedford & Malmi, 2015). Thus, they contribute to improving organizational productivity and performance (Cadez & Guilding, 2008; Diefenbach et al., 2018; Mahama & Cheng, 2013). Cost controls are used in routine activities when managers have to monitor their operations, including activities, expenses, resources, product margins, and customer profitability and are useful tools to monitor the drivers of performance (Cadez & Guilding, 2008; Fish et al., 2017; Kasanen et al., 1993).

Prior studies have shown that cost controls are important mechanisms for implementing productivity and efficiency strategies. For instance, Chenhall and Langfield-Smith (1998) indicated that using cost controls such as activity-based costing is beneficial to organizations pursuing efficiency strategies to obtain high performance. Similarly, Allen and Helms (2006) showed that organizations pursuing efficiency strategies of cost leadership differentiate themselves by focusing on cost control practices, which minimize costs (e.g., distribution and overhead costs).

Prior empirical evidence has also indicated that cost controls can be useful for implementing growth strategies. For instance, Cadez and Guilding (2008) suggested that adopting growth strategies, such as prospectors, is positively associated with cost control mechanisms. Cost controls are used by managers to control routine activities, such as consumption and use of production materials, and to monitor the costs and expenses of developing a service, the costs of activities, customer profitability, and segment results. These controls form the pillars for a company to achieve high performance by routinely maintaining the operations control, diagnosing opportunities to make decisions about price strategies, and reducing costs.

Following these previous studies, we stated this hypothesis:

H_{3a}: the use of cost controls (UCC) is positively associated with OP.

H_{3b}: a high level of UCC is a necessary condition to achieve higher levels of OP.

2.2.4 Theoretical model

In summary, a high level of SAPI, UPC, and UCC use is necessary to achieve higher levels of OP. However, the lack of such use cannot be compensated by an increase (investment or use) in other independent variables. Therefore, it must be a priority in organizational decisions.

Figure 1 depicts the theoretical model and the relationship between our constructs.

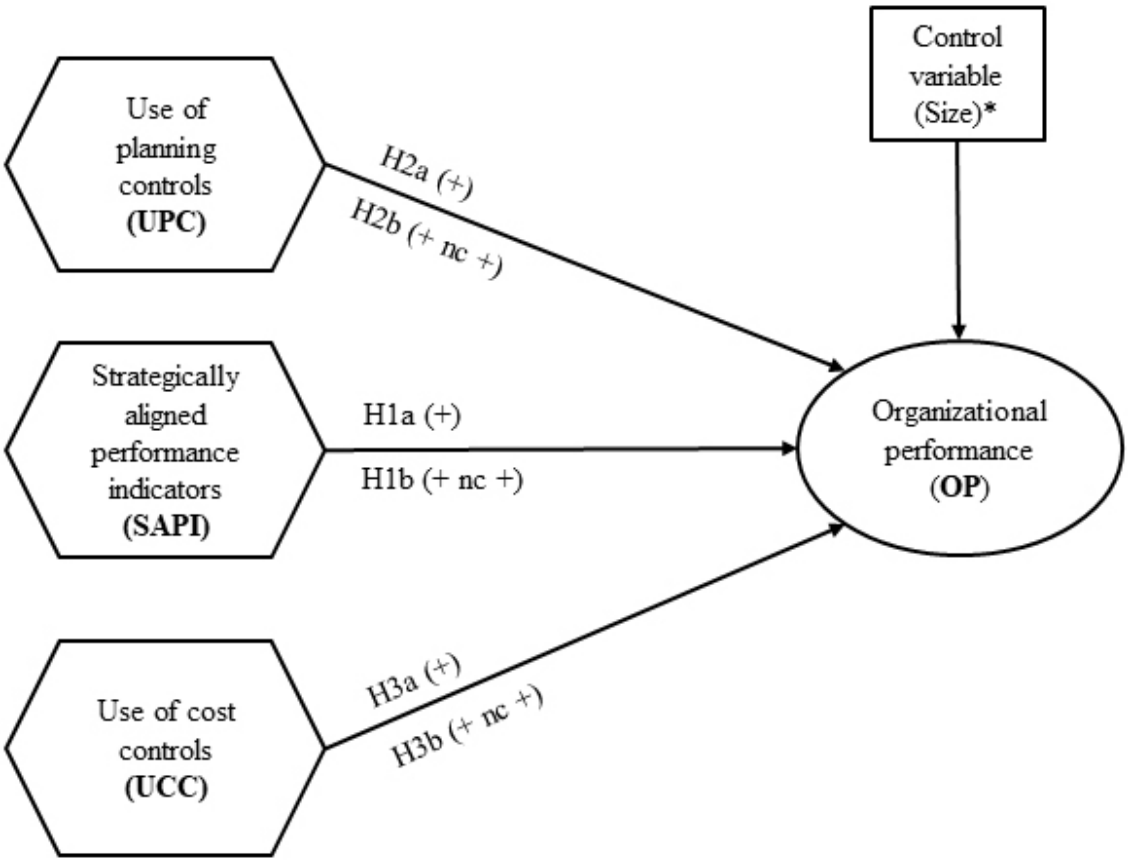

Figure 1 *Conceptual model*
(+nc+) = a high level of X is necessary for a high Y level of Y (Dul, 2020a, p. 32); OP = organizational performance; SAPI = strategically aligned performance indicators; UCC = use of cost controls; UPC = use of planning controls.
**Control variable was just used in partial least squares structural equations modeling (PLS-SEM) estimation.*
Source: *Elaborated by the authors.*

3. RESEARCH METHOD

3.1 Measurement of Constructs

We do not provide the scales used to measure the constructs due to the restriction of the number of words, but the first author can provide them. We operationalized OP as a reflective latent variable (Hair et al., 2014) and all other constructs as formative. We developed the SAPIs, cost control, and planning controls constructs scales and validated them through SmartPLS 3. We assessed items using a seven-point Likert scale adapted from the literature to measure the constructs in the study. Before collecting the data, we also performed a pretest with two experienced researchers in quantitative research and one accounting manager to validate the survey questionnaire. They suggested minor changes in the final questionnaire.

3.1.1 SAPIs (formative construct)

To operationalize this construct, we first asked the respondents what strategic priorities their managers make efforts to follow (Harlez & Malagueño, 2016). Second, we asked what performance indicators the managers considered important. Third, we compared which strategic priority with their best correspondent; for example, if the goal is sales growth, the indicator compared was market share. Fourth, we measured the construct by the difference, in the module, between the score assigned to the strategic priority and the performance indicators used, calculated on a reverse scale similar to other studies that estimated this type of alignment (Bontis & Crossan, 1999; Bontis et al., 2002). We obtained the performance indicators from the practitioner literature following Dekker et al. (2013).

3.1.2 UPC (formative construct)

To operationalize both management control constructs, we showed a list of controls and asked the respondents about the utilization level to manage the company. The scale varies from small use 1 to high use 7.

Planning controls such as strategic planning and budgeting are useful for top-down, bottom-up, and lateral communication (Merchant & Van der Stede, 2012). Zero-based budgeting is a managerial practice that many global companies are adopting (Mahler, 2016), and rolling forecasting (Hansen, 2011) is a tool that contributes to increasing the capacity to react to uncertainties.

3.1.3 UCC (formative construct)

We developed this construct from the premise that practitioners have developed several tools, as reported by Kasanen et al. (1993). These tools are often not captured by the academic literature or textbooks, such as expenses matrix management, products margin, business unit results, customer profitability, activity-based costing, and bridge analysis. We used some techniques that appeared in both academic and practitioner literature, following Cadez and Guilding (2008) and Chenhall and Langfield-Smith (1998).

3.1.4 OP (reflective construct)

We measured OP following previous studies and considered the argument that general performance is the most comprehensive (Endrikat et al., 2020). We used a mix of monetary [profit, earnings before interest, taxes, depreciation, and amortization (EBITDA), return on investment (ROI), sales] and nonmonetary (innovation, customer satisfaction, conquering new markets) performance indicators based on previous studies (Henri, 2006b; Van der Stede et al., 2006). The respondents answered questions about a set of performance indicators compared with the goals considered the classical concept of performance. We preferred this operationalization instead of performance compared with competitors (Grafton et al., 2010) because few companies disclose their financial numbers in Brazil.

3.2 Population and Data Collection

Our unit of analysis was the organization. In this survey, we collected data for the construct used in this paper and for other constructs not used due to not having relations with the focus of this article. In our quantitative analysis, we also maintain the confidentiality of the respondent and company names. The collected data was from the following two databases: the first was the ANEFAC database (Associação Nacional dos Executivos de Finanças, Administração e Contabilidade), with approximately 3,000 companies, and the second was based on social networking (LinkedIn, Facebook, and personal contacts) through an electronic survey questionnaire through the Formsite platform from August 1 to October 21, 2016. The ANEFAC sent an e-mail in three rounds (for every two weeks) inviting its affiliate companies to join the study, and we received 32 responses in total. However, two responses were discarded because the respondents' profiles were not adequate for the research. Therefore, the paper had only a 1.1% response rate in that period.

The second sample was obtained from the authors' social networks, which included approximately 4,200 contacts in diverse market segments and known processes (Noy, 2008). The survey questionnaire link was made available on the first author's personal LinkedIn and Facebook page and sent by e-mail to his contacts.

Although there is bias when researchers use the snowball sampling strategy due to the non-probabilistic samples and the individual relationships with a solid social network (Baltar & Brunet, 2012), it is feasible to use this research technique. However, the results cannot be generalized to the population (Clark-Carter, 2004, p. 158; Speklé & Widener, 2018). We have a low response rate, and it causes sample bias. One form to solve the signal and selection bias would be to collect the highest response rate (Hiebl & Richter, 2018; Speklé & Widener, 2018).

From this list, the paper received 210 responses, but only 115 complete responses. After eliminating nonvalid responses, we obtained 89 valid responses from the two databases and a 3.4% response rate.

3.3 Respondent and Firm Profiles

Regarding the respondents' profiles (Table 1), 36% were working for multinational companies, and 64% were working for Brazilian companies. About the industry, our sample is very diversified, without concentration. Most of the respondents were working from mid- to large-size companies, representing 85.4% of the sample. We also observe that 85.4% of the respondents worked in financial and accounting departments (tax, accounting, audit, controllership, and finance). Regarding their positions, approximately 64% of the respondents worked as coordinators or above (shareholder-director and owner-manager) and 52.8% had more than three years of experience.

Table 1
Respondent and firm profile (n = 89)

Firm profile	n	%	Respondent profile	n	%
Type of firm			***Position of the respondent***		
Brazilian company	57	64.0	Analyst and assistant	23	25.8
Multinational company	32	36.0	Coordinator and manager	41	46.1
			Consultant	7	7.9
Market segments			Shareholder-director/owner-manager	16	18.0
Agribusiness	3	3.4	Others	2	2.2
Food, drink, and tobacco	7	7.9			
Automotive and auto parts	5	5.6	***Work department***		
Retail business	4	4.5	Audit and tax department	11	12.4
Communications	4	4.5	Accounting, controllership, and finance	65	73.0
Construction industry	6	6.7	Administrative department	4	4.5
Electronics	6	6.7	Others	9	10.1
Hospital and health	2	2.2			
Mining, oil, and gas	4	4.5	***Respondent experience (years)***		
Paper and cellulose	2	2.2	Until 3	42	47.2
Chemistry and petrochemicals	3	3.4	3 to 5	8	9.0
Education services	4	4.5	5 to 10	13	14.6
Transportation services	4	4.5	10 to 15	10	11.2
Public services and concession	2	2.2	15 to 20	7	7.9
Steel and metallurgy	2	2.2	20 to 25	3	3.4
Technology and computing	2	2.2	25 to 30	1	1.1
Others	29	32.6	30 to 35	3	3.4
			Above 40	2	2.2
Number of employees					
1 to 50	13	14.6			
51 to 100	17	19.1			
101 to 1,000	27	30.3			
1,001 to 10,000	24	27.0			
Above 10,000	8	9.0	Total	89	100.0

Source: *Elaborated by the authors.*

3.4 Data Analysis

We used statistical procedures, which provide testability and increase the robustness of the results (Kaplan & Duchon, 1988), and a synergistic process (Eisenhardt, 1989). For instance, we used Harman's single factor for testing the common method variance (CMV) (Bagozzi et al., 1991; Podsakoff et al., 2003, 2012). The results showed that the first unrotated factor extracted 20.7% of the total variance. We obtained eight factors with an eigenvalue greater than 1; therefore, CMV is not a problem because the variance extracted was below 50%, and the model did not need any correction. By using the two samples collected from the two sites, i.e., the ANEFAC database and the social networking database, we performed one-way analysis of variance (ANOVA) to compare them. Our results indicate that most of the two samples' variables come from the same population, and there is no major issue with combining them. We also used structural equation modeling (SEM) through SmartPLS 3 to test the measurement model and the relationship between the constructs. Finally, we used NCA to analyze the necessary condition (Dul, 2016, 2020a, 2020b; Dul et al., 2020) for the OP.

We observe that we did not have problems regarding the missing values for the constructs used in this paper. We also analyzed the outliers following the recommendations of Hair et al. (2009), who suggested working with standardized values until ± 3 for a sample above 80, and we did not detect any potential outliers in the sample.

3.5 SEM (to Test the Sufficiency Hypotheses)

In evaluating the relationships between the BSC, SAPI, UCC, planning control use UPC, and OP, we used SEM with SmartPLS 3 software. SEM is suitable for smaller samples (Smith & Langfield-Smith, 2004) and models with formative indicators, that is, the present case (Chin & Newsted, 1999, p. 313). On the other hand, the technique of PLS-SEM does not have indicators of the model fit (Tenenhaus et al., 2005) as in LISREL and AMOS. However, it is appropriate to maximize the explained variance of the dependent variables (Chin & Newsted, 1999; Hair et al., 2011). Hair et al. (2011) also stated that PLS-SEM is suitable when one wants to contribute to developing a theory.

The relationships between the constructs were evaluated based on the suggestions of Fornell and Larcker (1981), Hair et al. (2011), Tenenhaus et al. (2005), and Wetzels et al. (2009). The PLS model figures and several tables are not presented here due to lack of space but can be obtained from the first author.

3.6 NCA (to Test the Necessary Hypotheses)

NCA is a method developed by Dul (2016, 2020a), Dul et al. (2020), and Vis and Dul (2018) to assess if a condition is necessary for an outcome. In our model, the conditions are the use of SAPIs, UPCs, and UCCs, and the outcome is OP.

We used the NCA package (Dul, 2020a) to test these hypotheses and estimate the effect size, inefficiencies, p-values, and bottleneck tables. The factor scores from the first analysis (PLS-SEM) were used as input into the NCA package.

4. RESULTS

The results were assessed in two steps: (i) in measurement and structural model from the PLS algorithm with the original indicators and (ii) with NCA parameters using the factorial scores from the first step.

4.1 Measurement Model Assessment

OP was the only reflective construct, and in this kind of construct, the indicators are manifestations of the construct (Bedford & Spekle, 2018). The variation of a latent variable causes a covariation in the measure indicators; that is, the direction of causality is from the construct to the indicators (Jarvis et al., 2003). Therefore, the indicators reflect the variation from the latent variable.

The convergent validity of OP was measured by the average variance extracted (AVE = 0.548), as this value was considered adequate due to being greater than 0.50 (Fornell & Larcker, 1981; Hair et al., 2009). Regarding the convergent validity through factor loadings, they were all significant ($p < 0.05$) and above 0.6 (Table 2).

The reliability of OP was evaluated based on composite reliability (CR = 0.894), as this value was greater than 0.7. Therefore, we considered it adequate (Hair et al., 2009, 2011; Henseler et al., 2009).

All other constructs were formative (SAPI, UCC, and UPC); in this kind of measurement, the formative indicators explain the construct (Jarvis et al., 2003). Therefore, the direction of causality is from the indicators to the latent variables (Jarvis et al., 2003), and changes in the indicators cause changes in the constructs (Bedford & Spekle, 2018).

The formative model's assessment is less developed in recent literature than the reflective model (Bedford & Spekle, 2018). In the formative model, each item contributes to the construct, which means that it is not recommended to remove items from the model (Malhotra, 2012, p. 555).

One problem that could cause instability in the weights or the formative items is multicollinearity (Bedford & Spekle, 2018; Malhotra, 2012). However, our results indicated that multicollinearity [variance inflation factor (*VIF*)] was equal to or lower than 1.419 (Table 2), which is below the cutoff point of 3.30 suggested by Diamantopoulos and Siguaw (2006). Hence, multicollinearity was not an issue in this measurement model.

In Table 2, we observe that each construct had three or more items with outer weights above 0.3 (relative importance) and two or more items with significant outer loadings (absolute importance), which means that the construct was appropriately measured. Therefore, we retain all items (even those with lower outer weights), considering the content validity and future uses of this scale.

Table 2
Measurement at the indicator level (n = 89)

Formative indicators	VIF	Outer weight	Outer loading	Reflective indicators	Outer loading
CC1 -> UCC	1.419	-0.161	0.368	OP -> EP1	0.835
CC2 -> UCC	1.097	0.071	0.320	OP -> EP2	0.788
CC4 -> UCC	1.072	0.519	0.685	OP -> EP3	0.737
CC5 -> UCC	1.240	0.537	0.728	OP -> GP1	0.764
CC6 -> UCC	1.374	0.439	0.661	OP -> GP2	0.697
				OP -> GP3	0.736
PC1 -> UPC	1.376	0.812	0.678	OP -> GP4	0.601
PC2 -> UPC	1.311	-0.360	0.057^{ns}		
PC3 -> UPC	1.155	0.721	0.708		
PC4 -> UPC	1.303	-0.319	0.126^{ns}		
SA1 -> SAPI	1.155	-0.165	0.010^{ns}		
SA3 -> SAPI	1.185	0.409	0.433		
SA4 -> SAPI	1.166	0.468	0.599		
SA5 -> SAPI	1.153	0.636	0.697		
SA6 -> SAPI	1.143	0.151	0.290		
SA7 -> SAPI	1.193	0.182	0.410		
SA8 -> SAPI	1.274	-0.056	0.327		

Note: *All outer weights and outer loadings are significant at 5% ($p < 0.05$), except where ^{ns} (not significant) appears ($p > 0.2$). CC = indicators of use of cost controls; EP = indicators of organizational performance – efficiency performance; GP = indicators of organizational performance (growth performance); OP = organizational performance; PC = indicators of use of planning controls; SA = indicators of strategically aligned performance indicators; SAPI = strategically aligned performance indicators; UCC = use of cost controls; UPC = use of planning controls; VIF = variance inflation factor.*
Source: *Elaborated by the authors.*

4.2 Structural Model Assessment

Based on Table 3, the path coefficients have the same function as the standardized beta in the regression analysis (Hair et al., 2011, p. 147). The model explained 25.7% of the variance in OP, and H_{1a} and H_{2a} were confirmed with small to medium effect sizes (Cohen's f^2 classification: 0.02 = small, 0.15 = medium, 0.35 = large) and significant path coefficients ($p < 0.01$) (Cohen, 1998). Additionally, H_{3a} was confirmed at only 10% significance; since the effect size was small. We interpreted this result as 0 (no practical importance); therefore, H_3 was not confirmed.

Table 3
Results of the structural model (n = 89)

Model	Structural relations	Hypothesis	f^2	Path coefficient	Standard deviation	p-value	R square adjusted (%)
1	LargeSize -> OP	control	0.004	-0.067	0.108	0.537	0.0
2	SAPI -> OP	H_{1a} (+)	0.111	0.302	0.101	0.003	25.7
	UPC -> OP	H_{2a} (+)	0.062	0.230	0.088	0.009	
	UCC -> OP	H_{3a} (+)	0.040	0.188	0.104	0.071	

Notes: *The company's size was included as a control variable in the first model, but it was not significant ($p > 0.2$); therefore, it was not maintained in the second model. P-values obtained by bootstrapping with 5,000 repetitions.*
LargeSize = company's size dummy coded (0 = small-middle size; 1 = large size); OP = organizational performance; SAPI = strategically-aligned performance indicator; UCC = use of cost controls; UPC = use of planning controls.
Source: *Elaborated by the authors.*

4.3 NCA

The NCA package (Dul, 2020a) computes all the NCA results from the scatter plot (Figure 2). The ceiling line separates the space into two regions: the region with points and the ceiling zone (almost without points). The ceiling zone (upper left corner) is the region where condition (X) constrains outcome (Y).

Figure 2 depicts the relationship between our constructs.

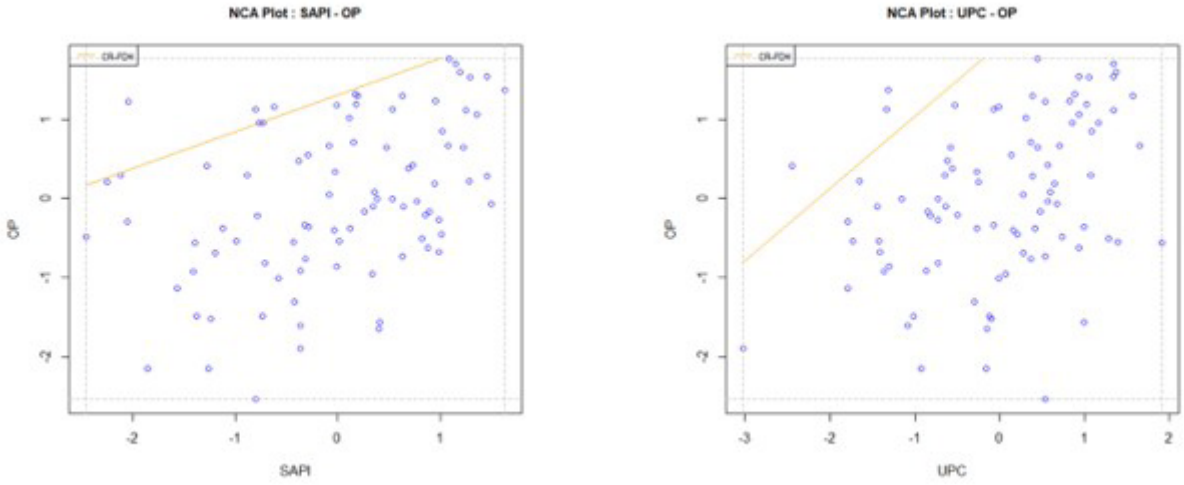

Figure 2 *Scatter plots with ceiling lines (regression type) – ceiling regression-free disposal hull (CR-FDH)*

Notes: *The empty space in the upper left corner is used to compute the effect size in the necessary condition analysis (NCA) (Dul, 2020b), as a percentage of the total space (ceiling zone/scope).The effect size classification is: 0 < d < 0.1 = small; 0.1 ≤ d < 0.3 medium; 0.3 ≤ d < 0.5 = large; 0.5 ≤ d ≤ 1.0 = very large (Dul, 2020b). The third scatter plot is available with the first author (It is similar to these two). The ceiling line is used to compute the bottleneck tables (Table 4); in this case, to achieve the outcome [organizational performance (OP)] equals 40% performance range (-0.819 in standardized scale), none of the three independent variables are necessary conditions.*

OP = organizational performance; SAPI = strategically aligned performance indicators; UPC = use of planning controls.

Source: *Elaborated by the authors.*

However, to achieve higher OP results, the three independent variables become necessary conditions, as in the following examples:

- SAPI is a necessary condition [(*CR-FDH*) d = 0.156, p = 0.034] to achieve high OP (90% of the range), and SAPI must be greater than 61.4% of the range. If SAPI is below this value, OP will certainly not reach 90% of the range. A lack of use of SAPIs cannot be compensated for by an increase (investment) in other independent variables (conditions); therefore, the use of SAPIs must be a priority in organizational decisions.
- UPC has a medium effect size (CR-FDH d = 0.170, p = 0.060) on OP, which is significant at only 10%, and as we can see in the bottleneck table (Table 4), it is a necessary condition to achieve higher values of OP. If UPC is below 47.5% of the range, OP will certainly not achieve 90% of the range. However, even if UPC > 47.5 of the range, success is not guaranteed; it is a necessary but not sufficient condition.
- Although UCC does not contribute to the increase in OP (Table 3: β = 0.188, p = 0.071), UCC is a necessary condition (or constraint or bottleneck) to achieve high OP (CR-FDH d = 0.220, p < 0.001). For example, to achieve a high OP (90% of the range), UCC must be greater than 73.9% of the range. If UCC is lower than this value, OP will certainly not reach 90% of the range. A lack of UCC cannot be compensated for by an increase (investment) in other independent variables; therefore, it must be a priority in organizational decisions.

Regarding SAPIs and OP, the results confirmed hypothesis H_{1a}, that is, the use of SAPIs is positively associated with OP, following previous studies. This result confirms that aligning strategic priorities with performance indicators positively affects OP.

The findings are important to advance our knowledge about what influences this process, which could be considered a capability according to the RBT or a performance dimension of the strategy development process (Endrikat et al., 2020, p. 10). The findings suggest that SAPIs enhance employees' perception of strategy implementation and, therefore, to one of the BSC results (Ho et al., 2014). Even though there were previous results, this result is significant because we used a practical way to measure this construct.

The more important result is that the use of SAPIs is a necessary condition to achieve a high level of OP (H_{1b} confirmed). This finding suggests that the top management team should put the best of its efforts into this part of the strategic process because, without SAPIs, OP may suffer and not be achieved.

Regarding the UPC, the effects of this use on performance were marginally significant, only at the level of 10%, so the results suggest that these controls do not influence performance and do not confirm hypothesis H_{2a}. However, these controls are conditions necessary to achieve high performance, confirming hypothesis H_{2b}. The results suggest that although they do not influence performance, these controls need to be used but at low intensity. This result follows the finding that budgets are less relevant in contexts of uncertainty (Merchant & Otley, 2020).

Although the cost controls do not influence performance and do not confirm the H_{3a} hypothesis, they are necessary conditions to obtain high-performance levels (H_{3b} confirmed). The intensive UCC is required for companies that want to achieve high performance. Our results confirm that cost controls are no longer a rare resource from RBT. However, they are still essential to keep operations under control, creating the conditions for organizations to obtain superior performance. These controls create the conditions that activate other management controls and competencies.

In Table 4, the results show that to achieve a high level of OP, for instance, 90, a SAPI should have a value of 61.4, planning control use should have a value of 47,5, and cost control use should have the highest value at 73.9. By increasing the OP to 80-90% range, the SAPI index has to increase by approximately 50%, and cost control use has to increase by 20 points. With these results in mind, managers can measure the level of effort that should be necessary to guarantee a targeted level of OP. The results suggest that managers should use these controls intensively and routinely use management reports such as product and service margin, cost of activities, and customer and segment profitability reports.

Table 4
Bottleneck table from necessary condition analysis (NCA)

Percentage.range				Actual values			
OP	**SAPI**	**UPC**	**UCC**	**OP**	**SAPI**	**UPC**	**UCC**
0	NN	NN	NN	-2.538	NN	NN	NN
10	NN	NN	NN	-2.108	NN	NN	NN
20	NN	NN	NN	-1.678	NN	NN	NN
30	NN	NN	NN	-1.249	NN	NN	NN
40	NN	NN	NN	-0.819	NN	NN	NN
50	NN	9.3	NN	-0.389	NN	-2.565	NN
60	NN	18.8	13.8	0.041	NN	-2.094	-1.913
70	16.0	28.4	33.8	0.471	-1.802	-1.623	-1.067
80	38.7	37.9	53.8	0.900	-0.874	-1.152	-0.221
90	61.4	47.5	73.9	1.330	0.055	-0.681	0.625
100	84.1	57.0	93.9	1.760	0.983	-0.210	1.471

Note: *Actual values – We use the standardized factorial scores from SmartPLS (mean = 0, standard deviation = 1). This scale is the same used in the scatter plots (Figure 2). Percentage.range – The scores are transformed to 0-100, in which 0 is the minimum observed and 100 is the maximum. This scale could be easier to interpret than the actual values.*
NN = not necessary; OP = organizational performance; SAPI = strategically aligned performance indicators; UCC = use of cost controls; UPC = use of planning controls.
Source: *Elaborated by the authors.*

5. DISCUSSION AND CONCLUSION

We examined the relationship between strategic priorities and indicators (SAPI), planning controls, cost controls, and OP. We tested which of these constructs are necessary and which are sufficient conditions. We based our research question on RBT applied to management accounting research (Endrikat et al., 2020; Henri, 2006a) and, partially, on contingency theory concepts.

The results can confirm our argument that SAPIs are part of the strategic process (Endrikat et al., 2020; Kolehmainen, 2010) when top managers establish organizational strategic priorities. This process is a constant organizational theme since strategic priorities derive from key success factors and corporate vision and mission (Ferreira & Otley, 2009). During this process, managers connect strategic priorities to the performance indicators chosen (Ferreira & Otley, 2009). This process occurs when strategic priorities change following the dynamic environment in which companies compete. If a new strategic priority emerges, managers need to choose key performance indicators, combining leading indicators that show if the necessary initiatives are being implemented and lagging indicators that show if the strategic priority is being achieved.

There is evidence that supports the idea that the inclusion of performance indicators increases managers' attention to the long-term consequences of their actions and future firm performance (Abernethy et al., 2013; Farrell et al., 2008). The monitoring of performance indicators linked to strategic priorities is done in weekly meetings when directors and managers monitor whether the organization's strategic priorities are being achieved. Additionally, the results show that this process is a necessary condition for achieving a high level of OP. This is a sufficient condition that positively influences OP.

With strategic priorities and performance indicators in mind, managers focus on making decisions routinely (Hall, 2010). For this, they use a bundle of management controls (Grabner & Moers, 2013; Malmi & Brown, 2008) to orient their decisions and influence their team's behavior.

Cost controls used routinely are essential to monitoring operations in detail, controlling the use of resources spent in activities such as delivery, marketing, sales, and administrative, and controlling the cost of products and services by monitoring product and service margins. In addition, customer profitability analysis can identify which customers (Cadez & Guilding, 2008; Cardinaels, 2008) are crucial to operational efficiency. Even though cost control use does not positively influence OP, it is not a distinguished artifact, considering its broad dissemination among companies. However, according to our results, cost control use is a necessary condition to achieve high OP (if the cost control use level is low, OP will not certainly be high). In other words, it is mandatory for companies that are trying to achieve a high level of OP, suggesting that operations may be managed with the use of cost control.

Our findings show that planning control use influences OP, but marginally, which confirms the minimal importance of planning control use (Merchant & Otley, 2020) to achieve organizational goals. However, more importantly, this construct is a necessary condition. The implementation of SAPIs probably occurs more quickly and likely produces results in a shorter time interval than strategic planning and budgeting. The results suggest that with strong strategic alignment, the UPC can be reduced, probably because SAPIs work as essential drivers to influence behavior and decisions to achieve high performance. Companies can use a strategic map, like Kaplan and Norton (2000) suggested, or some beyond budgeting principles (Berg & Madsen, 2020; Østergren & Stensaker, 2011; Sandalgaard & Bukh, 2014). Additionally, they use some practitioners' techniques like OKR to emphasize goals and key performance indicators.

Our study contributes to the literature by joining management control techniques, usually analyzed by the literature in management control. By contrast, strategic alignment is studied in the literature on the SPMS. Combining two fields of study reflects what happens in practice, where SPMS is part of the strategic process. In this arena, top managers choose the company's objectives and connect them with performance indicators. On the other hand, management controls are part of managers' operational routines, where managers make decisions at the department and business unit levels. These two processes coexist timely once the strategic process updates strategic priorities and goals, providing feedback and information to managers to achieve organizational goals by using management control tools such as budgeting, planning, and cost controls.

The results are relevant for practitioners, particularly those in organizations existing under information overload, which increases the cost of follow-up and can impair cognitive decision-making (Helfat & Martin, 2014). A strategic performance management system goal should provide more organized information and avoid

information overload (Gimbert et al., 2010). The results suggest that understanding which management control mechanisms are mandatory could help managers allocate their efforts to achieve higher OP.

One limitation of our research is that we did not investigate most management controls, as Gschwantner and Hiebl (2016) recommended. Therefore, the results should be reviewed carefully since reward, administrative and cultural controls, and other management control packages (Malmi & Brown, 2008) were not included in our model.

Another limitation is related to the sample size (89 respondents and cross-sectional). Due to the small sample size, we could not explore more contingency factors to explain these relationships, such as strategic uncertainty or strategic complexity, among others. Furthermore, researchers could investigate what contingency factors, such as strategic uncertainty or other organizational characteristics, such as autonomy and flexibility, could favor these relationships. Further studies could also explore the influences of other controls, such as dynamic and cultural controls.

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