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Research Article

Structure of Planning and Control Artifacts and their Accuracy in Brazilian Family Businesses

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ABSTRACT

Objective: the accuracy of planning and control artifacts is fundamental for bringing assertiveness to the organizational management process. The utility of the artifacts is questioned when the desired accuracy is missing. This research aims to identify the relationship between the artifact structure, the market assumptions, and the accuracy of the performance variables with a view to adapting the artifact profile to the desired impact over performance accuracy. **Methods:** this is a quantitative study based on convenience sampling and the data analysis methods used were structural equation modeling and necessary condition analysis. **Results:** within a sufficiency logic, the results support adherence between the planning and control artifacts, but not their relationship with performance accuracy. However, when analyzing the necessity logic, the artifacts become a necessary condition for a high level of performance accuracy. **Conclusions:** we show that the planning and control structure is consistent for achieving accuracy, but defining the desired level of deviation tolerance is a fundamental condition for the efficiency level of the management process. The more demanding the organization is in terms of deviation tolerance, the greater the need for artifacts.

Keywords: forecast; rolling forecast; accuracy; planning and control; artifacts

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INTRODUCTION

The logic of the management and control chain is discussed from the theoretical viewpoint in papers in the area of management control (Malmi & Brown, 2008; Merchant & Van der Stede, 2007) and covers the existence of various artifacts such as strategic planning, budget, forecast, budgetary control, and performance indicators. However, there is little empirical evidence regarding the relationship between the artifacts within the logic of interdependence and specifically of complementarity (e.g., Grabner & Moers, 2013).

These mechanisms are normally treated as planning and cybernetic controls (that is, comparisons between predictions and results are provided), consisting of two of the five groups of control artifacts discussed by Malmi and Brown (2008) based on the management control systems (MCS) terminology. MCS consists of a collection or set of controls and control systems used by organizations interdependently (Bedford, 2020; Grabner & Moers, 2013; Malmi & Brown, 2008; Merchant & Otley, 2020). Chenhall and Moers (2015) discuss the difference between packages and the management control system per se, with the need to understand the set (Kapiyangoda & Gooneratne, 2021). Assertive information for managers on what they should do in the future to maximize their contributions in order to meet the organizational objectives is essential for the organization and the accuracy conveyed feeds future assertiveness through the credibility of the process.

Planning forms part of the results control logic by deciding directions in advance and the cycle ends and renews when the calculated results stimulate and encourage the managers to develop their talents and improve future performance (Degenhart, Lunardi, & Zonatto, 2019; Merchant & Van der Stede, 2007). As a set, the various elements contribute to executives increasing their ability to achieve results through the following factors: (1) knowledge of the expected results, which provides both the guidance on what is expected of someone and the opportunity for commitment as they understand whether it is possible or not to achieve the goal; (2) the ability to influence results, through knowing the performance profile expected of them and being able to develop strategies and tactics for that; and (3) the ability to effectively control the results, since they know the goals and plan how to achieve them (Merchant & Van der Stede, 2007).

This vision concerns the *ex-ante* control (Flamholtz, Das, & Angeles, 1985), an active option of this study's approach. The establishment of performance goals can favor different perspectives, such as the relationship with the historical results or what was negotiated, the existence of fixed or flexible targets, and the focus on the parameter of internal or external comparison, enabling the performance evaluation to occur and recognition to become technically viable (Frow, Marginson, & Ogden, 2010; Henttu-Aho, 2018; Merchant & Van der Stede, 2007).

In particular, planning and cybernetic controls provide various benefits for organizations, such as advance decisions, the coordination of activities, identification and advance delegation of responsibilities, motivation to achieve goals, and conditions for measuring and evaluating area and manager performance (Hansen & Van der Stede, 2004; Sivabalan, Booth, Malmi, & Brown, 2009). Within that perspective, one of the managers' expectations is for the planning and control process to enable the organization to be assertive in the establishment and achievement of goals,

considering that, in doing so, it can more effectively coordinate its resources, align objectives with managers, and incentivize them, as well as establishing alignment between the implemented strategies and the company's strategic priorities (Hansen & Van der Stede, 2004; Sivabalan et al., 2009; Sponem & Lambert, 2016).

One of the main attributes that can be used to evaluate the effectiveness of the planning and control process is its accuracy. Accuracy, in general, represents the level of precision with which a proposed estimate is aligned with the actual result and can be supported by various artifacts such as a budget and forecast (Brüggen, Grabner, & Sedatole, 2021; Cassar & Gibson, 2008; Henttu-Aho, 2018).

Therefore, it should be noted that the understanding and perception of accuracy directly affect the benefits mentioned by Merchant and Van der Stede (2007), giving value to them or even, in an extreme case, destroying them in terms of credibility. High accuracy in terms of what was planned tends to provide conviction that the planning and control process adds value to the management model. Low accuracy tends to create a perception that the investment in time, people, and mechanisms may be something that is meaningless (Becker, Mahlendorf, Schäffer, & Thaten, 2016) for the company objectives, due to the mismatch between the plan and reality, which is seen as a relevant criticism regarding the company budget (Libby & Lindsay, 2010).

A gap that derives from this perception is that the transformation of tolerance for deviations is not empirically discussed and the topic fails to receive advancements. In other words, how much accuracy does an organization need and how much can it have? How can the discussion of the decided accuracy be transformed into something useful for the organization? Consequently, research that critically analyzes both accuracy and the structure that enables its achievement is needed to improve the management models to address this relevant gap (Abernethy & Brownell, 1999) and, when this occurs, the mechanisms improve the process and are perceived as guides for responses to crises (Becker et al., 2016).

Within that perspective, the utility of the planning and control process gains a relevant dimension (Abernethy & Brownell, 1999), and its accuracy, which in terms of performance to be achieved becomes a decisive factor for the validation of its set (Frow et al., 2010; Libby & Lindsay, 2010). This attribute can also interfere in the performance evaluation of an individual, an area, and the organization as a whole, depending on the structure of its performance evaluation model (Luz & Lavarda, 2020). It is associated both with the mechanisms and with what senior management believes and expects from the set of mechanisms available.

In the structuring of this study, the following gaps were identified: (1) addressing accuracy considering the perspective of 'actual' accuracy (obtained result), proposing ranges of variation; (2) discussing the interdependence and integration of the structure of artifacts and its impact over accuracy, using the diagnostic control approach discussed by Simons (1995); (3) analyzing accuracy considering elements that are exogenous and therefore have less predictive controllability, namely the 'market assumptions,' such as inflation, exchange rate variations, wages, and supplier prices; and (4) addressing variables that present some level of relative controllability, the so-called 'accuracy of financial performance variables,' such as revenue, profit,

margin, and return, which are elements that are commonly used for organizational management. An additional gap that has implications over management models concerns understanding accuracy as liable to a conscious decision with elements with different levels of objectivity to be addressed. The five gaps were covered in different levels of depth.

Consequently, the guiding question of the research is the following: '*How* are *the planning and control artifacts associated with the desired level of performance accuracy?*' Thus, the research aims to identify the relationship between the structure of planning and control artifacts and the accuracy of the performance variables with a view to adapting the profile of artifacts to the desired impact over performance accuracy.

The study proposes to contribute to the management control literature in various ways: first, by presenting the set of planning and control artifacts in terms of complementarity, integration, and impact on accuracy; and second, by highlighting the accuracy topic in a quantitative and ordinal way, as an element to be decided by the organization in terms of level, considering that an organization's managers apply resources as a result of the observed degree of tolerance. This involves a proposal in which the managers, by understanding accuracy as something measurable (Ritchie & Lewis, 2003), can decide their level of tolerance according to their utility, prioritize the uses of artifacts, and allocate resources so that the combination works (Chapman, 1997; Chenhall, 2003). Finally, by exploring the necessary condition analysis (NCA) approach, we complement the structural equation analysis and shed light on the conditions needed for a high level of performance accuracy. With this, the impact of the research can be translated through the understanding of the behavior, adaptation, and use by companies in a comparative way so that the goals are realistic and, at the same time, challenging (Ferreira & Otley, 2009), resulting from the managers' contextual perception in the search for efficiency (Welsch, 1996).

LITERATURE REVIEW, CONSTRUCTS, HYPOTHESES, AND THEORETICAL MODEL

In the literature review, we will cover accuracy in the planning and control process, the artifacts of the planning and control system (basic and forecasts), and their hypotheses.

Accuracy in the planning and control process

Accuracy represents the level of precision with which an estimate of a market assumption or of a performance goal becomes reality (Brüggen et al., 2021; Cassar & Gibson, 2008; Henttu-Aho, 2018). To measure it, it is necessary to capture the percentage deviation between what was projected in the budget or in the forecast and what occurred (Henttu-Aho, 2018; Jordan & Messner, 2020).

In a parallel with the military area, the accuracy that a missile has is of fundamental importance for its own *raison d'être* (Morley, 2011). High accuracy indicates that what occurred is close to what was planned, that is, the target. The opposite is valid; that is, distance between what occurred

compared to what was predicted indicates low accuracy. Despite organizations defining a target, they often consider a tolerance level for variation around that target and, therefore, accuracy could also be perceived as the precision within that expected margin.

In the case of its use in organizations, it is important to define accuracy according to the planning horizon (Kim & Cross, 2005), as well as defining different levels of acceptable accuracy. Some studies address the accuracy of the planning process in various ways, being more or less specific, such as those of Castanheira (2011), Cassar and Gibson (2008), and Brüggen, Grabner, and Sedatole (2021), who specifically relate the term with an organization's sales volume, taking into account the actual/occurred accuracy. With regard to this research, the data collection involved both 'acceptable accuracy' and 'occurred accuracy.' The analysis takes into account the variation between these two dimensions.

Given the impact over the set of the elements of the planning and control process, the present study separates two groups of accuracy: the accuracy of the market assumptions and the accuracy of the performance measures.

Accuracy of the market assumptions

Companies have less power of influence, if they can have it, over the accuracy of the market assumptions, such as inflation, exchange rate variations, inputs prices, and wages (Jordan & Messner, 2020).

Accuracy of the performance measures

The accuracy of the performance measures refers to the result variables, such as revenue, margin, profit, and return on equity, which, despite being impacted by exogenous factors, are also consequences of decisions taken by the organization itself, such as the allocation of resources to different areas of responsibility (Jordan & Messner, 2020; Lu, 2011).

Hypothesis H1

The elements of the market assumptions are relatively less controlled by the organization (Adler & Chen 2011; Merchant & Van der Stede, 2007) and have an impact on all the lines of performance accuracy.

Macroeconomic stability provides projections of market assumptions with a greater chance of a high level of accuracy (Shelley & Omer, 1996). However, in situations in which this does not occur, the impact of the accuracy of the market assumptions over performance accuracy can be more relevant (Becker et al., 2016). In light of the above, we have hypothesis H1: 'The greater the market assumptions accuracy is, the greater the performance accuracy.'

Basic planning and control artifacts

The planning cycle involves various artifacts, whether strategy planning, the capital budget, the budget, and budgetary control (Frezatti, 2015; Granlund & Taipaleenmäki, 2005; Hansen & Van der Stede, 2004; Merchant & Van der Stede, 2007). The set of artifacts has been mentioned in the studies as relevant (Moores & Yuen, 2001) and their integration and complementary approach provide conditions for efficiency and improvement of the organizational planning and control process.

The approach of Hansen and Van der Stede (2004) enables this combination to be specified and the planning cycle is expected to start with a long-term strategic revision in which decisions are formalized that will affect both the organization's external and internal environment (Ferreira & Otley, 2009; Malmi & Brown, 2008).

Strategic planning

The strategic planning involves elements of organizational identity, such as the mission, vision, beliefs, and values that provide bases for the business strategies to be formalized and approved (Ferreira & Otley, 2009; Frezatti, Aguiar, Guerreiro, & Gouvea, 2011; Merchant & Van der Stede, 2007). These bases provide the conditions for operational plans to implement the strategies that will be operationalized in the budgets, including with the presence of forecasted financial statements (Frezatti et al., 2011; O'Regan & Ghobadian, 2002). The strategic planning is expected to be something that is dynamic and regularly revised.

CAPEX

The CAPEX (capital expenditure or capital budget) contains the long-term investment projects and is normally developed simultaneously with the strategic planning (Frezatti et al., 2011; Frezatti, Bido, Cruz, & Machado, 2015). It normally covers more than one year and, besides the strategic perspective, its process of choosing relevant projects takes into account analyses supported by indicators of financial return (Granlund & Taipaleenmäki, 2005).

Budget

The budget, in turn, operationalizes the strategic planning decisions over the horizon covered, requiring relatively greater involvement from various management levels of the entity (Frezatti et al., 2011; Hansen & Van der Stede, 2004).

Budgetary control

In various references, the term budgetary control refers to the planning and control process as a whole (Hansen, Otley, & Van der Stede, 2003; Scapens, 2006) and, in this study, it was used as the part of the process that compares what was predicted with what occurred, also treated as the analysis of budgetary variations (Sponem & Lambert, 2016).

Budgetary control becomes part of the process in which the monitoring of the degree to which the budget is achieved is periodically analyzed, and relevant variations are examined, understood, attributed, and explained, both in the performance dimension of the various levels of organizational analysis and of the individuals themselves in their roles (Merchant & Van der Stede, 2007).

Hypothesis H2

It warrants mentioning that the greater the adherence between the long-term plan (strategic planning and CAPEX) and medium- and short-term plans (such as the budget), the greater the adherence will be of the budgetary control, as this consists of a diagnostic control that enables the follow-up and monitoring of the implementation of strategies and of the achievement of objectives in line with the organization's value proposal (Frezatti et al., 2011).

Thus, the company will probably use budgetary control more intensely when it has a structured and consistent planning process behind it, considering that the planning process itself consumes the organization's resources and time and, therefore, should not be merely perceived as a meaningless ritual for influencing behaviors and enabling decisions (e.g., Libby & Lindsay, 2010). In light of the above, we have hypothesis H2: 'The greater the adherence is of the planning mechanisms (strategic planning, CAPEX, and budget), the greater the adherence will be of the budgetary control.'

Hypothesis H3

On one hand, differences between what was predicted and what occurred can motivate managers in valuing the control and, on the other, greater involvement and discussion can provide a long-term view, improving the implementation of strategies (Abernethy & Brownell, 1999).

The search for alternatives to redirect actions and pursue the qualitative goals defined in the strategic planning and reported in the budget form part of that process and the more the perception of accuracy is confirmed, the more the strategies are strengthened (Abernethy & Brownell, 1999). In other words, the degree of realism of the market assumptions expressed in the plan tends to legitimize the budgetary control process as a whole. In light of the above, we have hypothesis H3: 'The greater the accuracy is of the market assumptions, the greater the adherence of the budgetary control.'

Hypothesis H4

When opportunities are sought based on the context lived, a number of conditions are needed (Bisbe, Batista-foguet, & Chenhall, 2006) and replanning is fundamental to preserve what was decided, from the strategic perspective. In a stable environment, accuracy can require follow-up actions to ensure that 'things happen'; in a volatile environment, besides that concern, instruments and actions are required to 'maintain and make reality' the strategic planning questions (Flamholtz et al., 1985). Based on the budgetary control process, managers can balance

tactical questions linked to financial results with strategic questions that impact the business scenario over a long-term horizon.

Within that context, accuracy is more than 'getting right' what will occur, but rather 'making what was decided happen.' In fact, that is the role of the planning and control mechanism (Merchant & Van der Stede, 2007), and the budgetary planning process identifies actions when the actual results deviate from the defined and approved planning. Through developing the process there is learning whose benefits extrapolate the short-term actions (Abernethy & Brownell, 1999) that should be reflected in the artifacts.

Supported by the reflections proposed by Cassar and Gibson (2008), by promoting the sharing of follow-up reports and managers' involvement, it is hoped that the budgetary control can, through providing the conditions to structure the forecast, influence not only the accuracy of the planning process for the following period (regarding the elaboration of the new plan), but also stimulate actions by the managers that lead to the achievement of the financial performance goals defined in the budget and, therefore, stimulate a lower level of deviations between the budgeted and achieved goals.

In other words, budgetary control enables the monitoring of the level of accuracy of the performance goals established in the budgetary cycle and, primarily when these goals are associated with the manager's performance evaluation and rewards, they tend to influence behaviors and incentives that prioritize the achievement of the planned results (accuracy). In light of the above, we have hypothesis H4: 'The greater the adherence is of the budgetary control, the greater the performance accuracy will be.'

Additional planning and control artifacts — base forecast and rolling forecast

As a result of various models and demands, the forecast feature is installed in the planning and control process, both to review the budget and begin the planning process for the following period; it can technically exist if basic artifacts are made available, improving the process.

The word 'forecast' has been used in various ways and with different understandings, and in this study it was used in two concepts (Simons, 1990; Sponem & Lambert, 2016): base forecast as a review of the annual budget in the sense of obtaining the most likely results and rolling forecast as an extension of projection.

Base forecast

The base forecast is also known as the base demand forecast, called this by Hansen (2011), as a review of the budget, which is used to update the information featured in the annual budget (Sivabalan et al., 2009), in the remaining period covered by it. In any case, for it to exist, the budgetary control process is needed as it provides the starting point for analyzing the variations, their causes, evaluating the future scenario, and making new projections. In this sense, the greater the uncertainty is, the greater the demand for the forecast due to demands both inside and

outside the organizations (Bhimani, Sivabalan, & Soonawalla, 2018; Brüggen et al., 2021; Henttu-Aho, 2018).

For example, an organization where the actual month of January has been calculated can structure the base forecast by revising the projections for the period from February to December. Potential for recovery or for maintaining results is discussed and adjustments may be included in the artifacts.

Hypothesis H5

The researchers believe that the base forecast is something that can coexist with the budget and can also substitute it (Ekholm & Wallin, 2011; Sivabalan et al., 2009) and, for the base forecast to exist, in the budgetary control process the actual result needs to be calculated. The base forecast is 'actioned' primarily when the budget deviates from the actual context by not contemplating the effect of changes in the organization's environment, something that is observed within the budgetary follow-up process, as noted by Henttu-Aho (2018) and Bhimani, Sivabalan, and Soonawalla (2018). In addition, the budgetary control enables us to identify the existence and extent of deviations between the obtained results and the plan, which are important attributes that stimulate the use of the base forecast and the rolling forecast. In light of the above, we have hypothesis H5: 'The greater the adherence is of the budgetary control, the greater the adherence of the base forecast.'

Hypothesis H6

The structure of the base forecast provides the new estimates of the financial statements for the months still to occur in the year and the economic-financial assumptions can be updated when necessary. Therefore, updated information is expected to provide conditions for decisions and implementations that generate improved results, and thus lead to greater performance accuracy (Kalchschmidt, Nieto, & Reiner, 2010; Sivabalan et al., 2009).

Based on the existence of the base forecast, the actual results are compared not only with the budget, but also with the available base forecast with the expectation of improving performance accuracy. Shapiro and Spence (1997) attribute to adequate forecast performance, especially in complex environments, the combination of intuition and analytical elements based on the artifacts. Brüggen et al. (2021) provide evidence regarding the role of the forecast as a mechanism for coordination between sales managers and production managers, and the resulting impact that the forecast exerts over the accuracy of certain performance measures such as the level of stock and estimated sales volumes.

The great utility of this type of base forecast is to provide a more likely view of the expected result, in a more flexible way than the annual budget (Lukka & Granlund, 2003), and the flexibility in being able to adjust standardized objectives in the budget will affect its potential benefit in terms of accuracy (Berg & Karlsson, 2014). In light of the above, we have hypothesis H6: 'The greater the adherence is of the base forecast, the greater the performance accuracy will be.'

Rolling forecast

The rolling forecast, also called rolling budget (Bhimani et al., 2018), is presented as a mechanism that extends the planning horizon in the organization (Hansen, 2011). It can contain information for 12, 18, 24, and 36 months; in short, the horizon that provides the generation of useful information. The projections are added to the periods occurred. A company whose month of January has been calculated, for example, includes in its mechanism the projection for January of the following year. With relation to the utility of the artifact, it can be the starting point for the budget for the following year and/or it can contribute to analyses and investment decisions, for example. The versions tend to become more favorable as revisions are made (Su, Baird, & Schoch, 2017).

The use of the rolling forecast is believed to impact increased accuracy (Jordan & Messner, 2020) in the planning process as a whole (Hansen & Van der Stede, 2004), as well as the management of that process due to both the question of providing information and agglutinating managers being nurtured with provocations based on projections.

In any case, with this updated information senior management can bring forward decisions guided by the long-term vision (Berg & Karlsson, 2014) regarding investments, for example. It can be used to obtain the first targets for a budget for the following year (Berg & Karlsson, 2014), based on the organization's strategic positioning. This perspective of understanding values the actions and guidance in the sense that the results can be calculated in different time dimensions, not only encapsulated in pre-established Gregorian annual periods.

Hypothesis H7

Given that this set of artifacts characterizes the planning and control structure, well-defined results treated in a structured way within the organizational environment provide the managers with a perception of what is expected of them and encourage them to produce and influence the expected results (Merchant & Van der Stede, 2007), reflected in the budgetary control process. Without the set of artifacts, in which the budgetary control is the follow-up point, we have no way of discussing the accuracy, as we need references. However, the combination with integration and complementarity can provide conditions for improving the controls as a whole (Jordan & Messner, 2020; Merchant & Van der Stede, 2007). In light of the above, hypothesis H7 was defined: 'The greater the adherence is of the budgetary control, the greater the adherence of the rolling forecast.'

Hypothesis H8

The versions of the planning tend to become more favorable as revisions are made (Su et al., 2017) and can be seen as mechanisms that increase the accuracy in the planning process as a whole (Hansen & Van der Stede, 2004), due to both the question of providing information and by agglutinating managers being fed with provocations based on projections.
The existence of a planning environment in which the artifacts exist can stimulate the existence of specific mechanisms to meet the demands of the organizations. Thus, the existence of basic

artifacts and of the base forecast enables the existence of the rolling forecast to meet specific demands with improved accuracy (Jordan & Messner, 2020). One mechanism is expected to have an impact over the other, including changing importance and demands met in the various areas of the organization (Hansen, 2011). The rolling forecast can be a starting point for the budget for the following year to be able to contribute to analyses and investment decisions, for example. In light of the above, hypothesis H8 was defined: 'The greater the adherence is of the base forecast, the greater the adherence of the rolling forecast.'

Hypothesis H9

The rolling forecast provides the opportunity for including periods to provide projections that can guide new budgets or even support the decision-making process, for example, in terms of investments. It can be used for monitoring and even comparing with the base forecast in terms of improving the accuracy for longer periods. It is likely that the set of artifacts, including the forecast, will provide the reduction of 'organizational games' (Merchant & Van der Stede, 2007).

Besides the projection mechanism, its use provides a planning environment that creates synergies and the improvement of its set. In light of the above, we have hypothesis H9: 'The greater the adherence is of the rolling forecast, the greater the performance accuracy.'

The theoretical model of this research is presented in Figure 1.

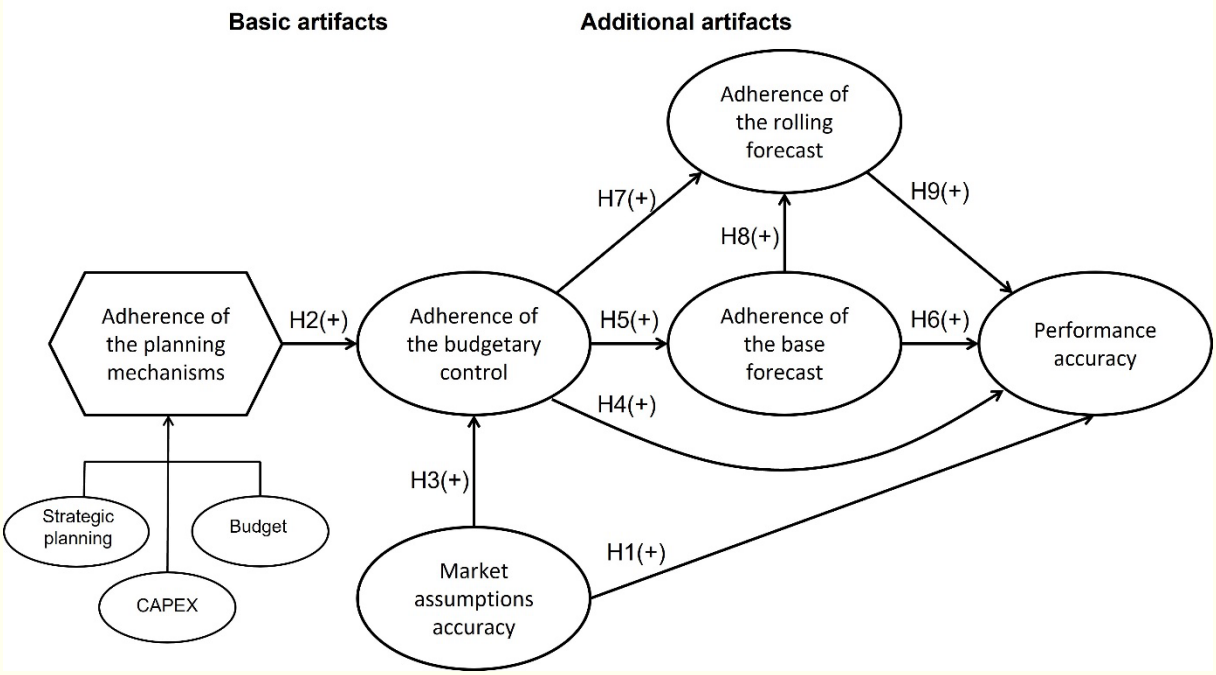

Figure 1. Theoretical research model.

Note. Ellipses represent latent (reflective) variables, hexagons represent emergent (formative) variables, and the measurement of these variables is detailed in section 'Data collection instrument'.

METHODOLOGICAL PROCEDURES

Data collection instrument

The variables used in the model were identified and operationalized based on the literature (Appendix A) and each indicator was measured using a Likert scale with five points, a neutral point, and semantic opposites.

The 'adherence of the planning mechanisms' was measured as a type-II second-order construct (Hair Jr., Sarstedt, Ringle, & Gudergan, 2018); that is, it is a construct formed of three dimensions that complement each other and were measured reflexively, considering the first-order latent variables strategic planning, capital budget (CAPEX), and budget.

Both the 'acceptable accuracy and what occurred' were measured as the percentage deviation between what was projected in the budget and what occurred (Henttu-Aho, 2018; Jordan & Messner, 2020), with the indicators and references being presented in Appendix B. Subsequent to the data collection, these answers were transformed into an ordinal scale comparing the actual/observed accuracy and the acceptable accuracy. For example, a company that has an acceptable accuracy > 5% (p.p.) and ≤ 10% (p.p.) that at the end of the period observed an actual deviation below 5% (p.p.) obtained an accuracy deviation value equal to +1, that is, more precise than the acceptable accuracy. In turn, a company that has an acceptable accuracy below 5% (p.p.) that at the end of the period observed a deviation above 20% (p.p.) obtained an accuracy value of -3, that is, three levels below the acceptable accuracy.

In summary, both latent variables (accuracy of the market assumptions and accuracy of the performance measures) were measured considering the difference between the occurred accuracy and the acceptable accuracy, for each one of the indicators in Table 2.

Sample and direction

The data were collected from family businesses for three main reasons: (1) to have a specific context to enable the discussion of the results; (2) because we understood that the variability in the answers in relation to accuracy would be greater in this specific context, that is, there would be a greater likelihood of us observing the phenomenon being studied, since in publicly-traded companies the isomorphism in relation to the use of controls tends to generate homogenous results; and (3) the very relevance of this type of company in the Brazilian context, numerically (representing more than 90% of companies) and economically.

The data were collected through a questionnaire, using the SurveyMonkey software, and the approach was innovative in the area since, as the data collection was developed, it provided immediate individual retribution through the sending of a specific report. This path was chosen in order to: (1) improve the credibility of the data, with the opportunity to correct them when necessary; (2) improve the image of the 'research' topic in the eyes of the companies, making new research viable; and (3) create a long-term relationship with the organizations, providing benefits

to the respondent through the returning of knowledge. The population of family businesses was defined primarily based on databases of participants in previous research originally derived from databases such as the *Revista Maiores e Melhores* (*Biggest and Best Magazine*), EMIS (Emerging Markets), and ORBIS.

The managers were identified and invitations were sent to the potential respondents (senior managers) via LinkedIn by the researchers themselves. The data collection was carried out before the COVID-19 pandemic period, which began in 2020, with a final valid sample of 48 Brazilian family businesses.

To evaluate the impact of the sample size on the results obtained (possible type-II error), two sensitivity analyses were conducted using the G*Power 3 software (Faul, Erdfelder, Buchner, & Lang, 2009); as the PLS algorithm is based on the multiple linear regression, this was the option chosen in G*Power 3:

- Full model (linear multiple regression – R^2 deviation from zero): significance level = 0.05; statistical power = 0.80; n = 48; 4 predictors (most complex part of the model) → resulted in an effect size (f^2) equal to 0.277, which equates to R^2 = 0.217, that is, values below this limit would not be detected as significant, but in Table 5 it is observed that three of the four results exceeded this value.

- One coefficient at a time (linear multiple regression – single regression coefficient): defining the same values → resulted in f^2 = 0.133, which is considered a medium effect in the Cohen (1988) classification. Thus, from the statistical viewpoint, effect sizes smaller than 0.133 would not be detected as significant, but from the practical viewpoint they would also not be important, that is, the sample is sufficient to detect important effects ($f^2 \geq 0.15$) as being significant.

The segmentation by size took into account the European definition of size per number of employees (Comissão Europeia, 2020): (1) up to 49 employees (small size); (2) from 50 to 249 (medium size); (3) from 250 to 999 (large size I); equal to or above 1,000 (large size II). In effect, the European Commission treats large-sized companies as those with more than 250 employees and in this study we separated two large-sized groups to be able to better understand this question, which would not be captured without the separation.

In Table 1, we present the characteristics of the companies and of the survey respondents, considering a final sample of 48 respondents. In terms of size it can be perceived, as was intended, that there is heterogeneity in the number of employees, covering small-, medium-, and large-sized companies, which can also be perceived by their annual turnover, following the stratification of the sample.

In relation to the control structure, it is perceived that in 66.7% of the sample the controlling family holds 100% of the shares and in 33.3% there is the presence of other minority shareholders. In addition, the companies in the sample are 24.7 years old on average.

Finally, it can be perceived that 89.58% of the survey respondents are level 1, that is, they report to shareholders or to the board; 8.3% are level 2, reporting to senior management; and only one respondent reports to middle-level managers (managers and superintendents, for example). This

profile of respondents provides comfort both from the viewpoint of a comprehensive overview and due to their experience of the company and depth of necessary knowledge.

Table 1

Descriptive analysis of the sample

	N	%		N	%
Panel A. Number of employees			*Panel C. Shareholder control*		
Up to 49	10	20.83%	Under 50% family control	10	20.83%
From 50 to 249	9	18.75%	Between 50 and 100% family control	6	12.50%
From 250 to 999	16	33.33%	100% family control	32	66.67%
Equal to or above 1000	13	27.09%			
Panel B. Annual turnover in millions (2017 baseline)			*Panel D. Hierarchical level of the respondent*		
Up to 50	18	37.50%	Level 1	43	89.58%
Between 51 and 100	5	10.42%	Level 2	4	8.33%
Between 101 and 300	9	18.75%	Level 3 and below	1	2.08%
Between 301 and 500	3	6.25%			
Between 501 and 1000	6	12.50%			
Above 1000	7	14.58%			

Note. Survey results.

Data analysis methods

The structural equation modeling multivariate technique (PLS-SEM) was used to analyze the relationships between the variables that were the object of study. This technique has been used extensively in the area of management control (Nitzl, 2016) as it has a number of advantages over other techniques, such as linear regression, because it enables the estimation of the model with latent variables and multiple dependence relationships, it does not impose assumptions regarding the data distribution, and it requires a smaller sample than structural equation modeling based on covariances (Hair Jr., Hult, Ringle, & Sarstedt, 2021; Nitzl, 2016).

Besides PLS-SEM, necessary condition analysis (NCA) (Dul, 2016; Van der Valk, Sumo, Dul, & Schroeder, 2016) was used with the aim of identifying the minimum levels of the antecedents needed to achieve high levels of performance accuracy. NCA has been discussed as an important approach for complementing PLS-SEM results, that is, to evaluate whether an antecedent is necessary and sufficient for high outcome values (Richter, Schubring, Hauff, Ringle, & Sarstedt, 2020).

ANALYSIS AND DISCUSSION

Accuracy analysis

One contribution of the research concerns the understanding of what is considered as accuracy, within the two dimensions of market assumptions and performance metrics. For that, the data collection was segmented to capture the tolerance of deviations of accuracy, both acceptable and occurred accuracy. Without that, it would not be possible to operationalize the concept and make it practical in the life of organizations. Table 2 presents the frequency of the answers considering the levels of tolerance of deviations of acceptable and occurred accuracy and indicates the approximation regarding predominance of their numerical representativeness of tolerance of deviations in the 5% and 10% layers.

Table 2

Distribution of the frequencies of the accuracy indicators

Measured in percentage or percentage points	Tolerance/acceptable deviation				Actual occurred deviation			
	≤5	5 < X ≤ 10	10 < X ≤ 20	>20	≤5	5 < X ≤ 10	10 < X ≤ 20	>20
Accuracy of the market assumptions								
Inflation	79.17%	16.67%	4.17%	0.00%	70.83%	25.00%	4.17%	0.00%
Exchange rate variation	52.08%	37.50%	10.42%	0.00%	47.92%	37.50%	12.50%	2.08%
Supplier price variation	68.75%	29.17%	2.08%	0.00%	54.17%	37.50%	6.25%	2.08%
Wage variation	81.25%	18.75%	0.00%	0.00%	79.17%	20.83%	0.00%	0.00%
Accuracy of performance metrics								
Revenues	41.67%	39.58%	16.67%	2.08%	45.83%	29.17%	22.92%	2.08%
Gross margin	52.08%	31.25%	14.58%	2.08%	47.92%	33.33%	16.67%	2.08%
Net earnings	45.83%	41.67%	8.33%	4.17%	43.75%	37.50%	14.58%	4.17%
Return on equity	56.25%	35.42%	6.25%	2.08%	45.83%	41.67%	8.33%	4.17%

The absence of a reference regarding the accuracy topic related to the planning and control process of organizations is an important challenge. In addition, the topic has been considered as something internal and confidential in organizations, which makes its collection difficult. Therefore, in the data collection a heuristic approach was considered in the sense of using parameters found in the organizations, without the previous support of structured research. The data on accuracy were captured through four dimensions, one being the least tolerant, namely the one that accepts a 5% variation (100 – 5 = 95% accuracy), a second with a 10% variation (100 – 10 = 90% accuracy), a third with a 20% variation (100 – 20 = 80% accuracy), as well as a fourth with more than 20% tolerance. Table 2 shows the answers for the three alternatives, which total 100%.

With regard to market assumptions, we found a predominance of the least tolerant accuracy (5% variation = 95% accuracy), with emphasis on the assumptions about inflation (70.83% of the

respondents) and wage readjustments (79.1% of the respondents). The expectations are formed according to the macro environment and are captured by the companies in different ways, such as through common media, consultancies, and discussion groups, for example. The indicators affect organizations differently. A company that does not import or export will nonetheless see an impact from exchange rate variations, although differently from one that has the two transaction perspectives. The second range of accuracy (which covers 10% tolerance, 100 – 10 = 90%) provides the cumulative expectations (when added to the first range), in most of the assumptions close to 100%. This indication serves to perceive that, in the planning and control process, the accuracy of the market assumptions, for the sample considered, is something that is relevant for building the process as a whole, at a low tolerance threshold, affecting the accuracy of the performance goals.

Even though the performance goals are particular to each organization, they derive from strategic definitions and are affected by incentives and development plans, according to the reading of opportunity and risk scenarios perceived by the managers. Revenue, margin, net earnings, and return on equity will somehow appear as performance variables, normally added to other indicators. In the sample considered we found proximity of expectations of accuracy between the variables covered, fluctuating between 43.75% (net earnings) and 47.92% (gross margin) in the least tolerance of variations alternative (5% = 100 – 5 = 95%). In the second accuracy alternative (10% = 100 – 10 = 90%), the sample distribution offsets in the resulting variables (net earnings and return on equity), fluctuating between 29.1% (revenues) and 41.6% (return on equity). Finally, in the most tolerant layer (100 – 20 = 80%), the respondents' indication fluctuates between 12.5% (return on equity) and 25% (revenues).

Hypotheses of the PLS-SEM research — sufficient condition perspective

The structural equation modeling analysis was segregated into two stages, the measurement model analysis and the structural model analysis. The measurement model was validated, considering convergent validity, discriminant validity, and reliability, as indicated by Hair Jr., Hult, Ringle, and Sarstedt (2021).

As a criterion for convergent validity, the average variance extracted (AVE) presented values above 0.5. In addition, from the cross loadings matrix it is possible to perceive high factor loadings for the respective latent variables (values above 0.7).

From the Fornell-Lacker correlation matrix analysis (Table 3) it is possible to perceive the discriminant validity, considering the evidence that the values on the diagonal (square root of AVE) are higher than the correlations between the latent variables (Hair Jr. et al., 2021). It is also observed from Table 3 that the latent variables referring to the strategic planning, CAPEX, budgetary planning and control, forecast, and rolling forecast artifacts are positively related. It is also possible to perceive a low correlation between the artifacts and the accuracy variables (market assumptions and performance metrics).

Table 3

Descriptive statistics and matrix of correlations between the latent variables

	1	2	3	4	5	6	7	8
1. Strategic planning	**0.898**							
2. CAPEX	0.643	**0.821**						
3. Budget	0.658	0.753	**0.852**					
4. Budgetary control	0.573	0.588	0.619	**0.862**				
5. Base forecast	0.516	0.55	0.518	0.737	**0.894**			
6. Rolling forecast	0.553	0.527	0.482	0.316	0.517	**0.918**		
7. Market assumptions accuracy	0.095	0.055	0.022	0.077	-0.064	-0.092	**0.665**	
8. Performance accuracy	0.009	-0.059	-0.089	-0.113	-0.041	0.065	0.285	**0.816**
Average variance extracted (AVE)	0.807	0.673	0.727	0.742	0.799	0.843	0.442	0.666
Composite reliability	0.926	0.892	0.914	0.896	0.923	0.941	0.741	0.889
Mean	3.90	3.65	3.99	4.18	4.08	3.40	-	-
Standard deviation	1.19	1.29	1.16	1.12	1.07	1.27	-	-

Note. The values on the diagonal are the square roots of the average variances extracted; as these values are higher than the correlations between the latent variables (values outside the diagonal), there is discriminant validity (Hair Jr. et al., 2021). Based on the sample of 48 companies, the correlations above |0.285| are statistically significant at the 5% significance level. The mean and standard deviation values were calculated based on all the variables corresponding to the construct. They were not presented for the accuracy variables due to the way they were measured, based on the difference in acceptable/tolerated level of deviation versus the actual occurred deviation.

The high correlations (higher than 0.6) between strategic planning, CAPEX, and budget confirm the modeling of the adherence of the planning mechanisms as a second-order latent variable measured by the three mechanisms. A medium-high correlation is also observed between the budgetary control, base forecast, and rolling forecast mechanisms.

As part of the stage of evaluating the measurement model, in Table 4 we present the results of the relative and absolute importance of the variance inflation factors (VIFs), which are validity criteria for a formative second-order construct. The results suggest that the second-order latent variable (planning mechanisms) and the first-order variables (market assumptions accuracy and performance accuracy) meet the criteria defined by Hair Jr. et al. (2021) regarding the statistical significance (p-value) of the factor weight and loading, and of the relatively low value of the VIF.

Table 4

Relative and absolute importance of the formative 2nd-order variable (planning mechanisms)

	Relative importance		Absolute importance		VIF
	Factor weight	p-value	Factor loading	p-value	
Strategic planning -> Planning mechanisms	0.322	0.000	0.843	0.000	1.935
CAPEX -> Planning mechanisms	0.378	0.000	0.903	0.000	2.533
Budget -> Planning mechanisms	0.421	0.000	0.918	0.000	2.623

The structural model was analyzed considering a number of stages, following the recommendations proposed by Hair Jr. et al. (2021). The first is the analysis of multicollinearity between the constructs based on the VIF parameter. The second is the analysis of the structural coefficients (β) and of the effect size (f^2), taking into consideration the size and statistical significance (Hair Jr. et al., 2021). Finally, the coefficient of determination (adjusted R^2) was determined. For that analysis, the bootstrapping procedure was used with 5,000 repetitions and a two-tailed test (Hair Jr. et al., 2021).

With relation to the hypotheses of the structural model, 1, 2, 5, and 8 were validated at a 5% significance level (Table 5). Next, the results referring to each hypothesis are discussed in light of the literature. Among the statistically significant relationships, it warrants mentioning that the effect size is considered to be large, with the exception of hypothesis 1 (Market assumptions accuracy -> Performance accuracy), which is considered to be medium.

Table 5

Results of the structural equation modeling — direct effects

Structural relationships	Hypoth.	f^2	β	p-value	Adjust. R^2
Market assumptions accuracy -> Performance accuracy	**H1(+)**	**0.114**	**0.322**	**0.011**	
Budgetary control -> Performance accuracy	H4(+)	0.031	-0.250	0.398	**0.124**
Base forecast -> Performance accuracy	H6(+)	0.004	0.100	0.753	
Rolling forecast -> Performance accuracy	H9(+)	0.012	0.122	0.490	
Budgetary control -> Rolling forecast	H7(+)	0.013	-0.142	0.444	**0.277**
Base forecast -> Rolling forecast	**H8(+)**	**0.244**	**0.622**	**0.000**	
Budgetary control -> Base forecast	**H5(+)**	**1.190**	**0.737**	**0.000**	**0.543**
Planning mechanisms -> Budgetary control	**H2(+)**	**0.811**	**0.668**	**0.000**	**0.451**
Market assumptions accuracy -> Budgetary control	H3(+)	0.002	0.037	0.838	

Note. f^2 is the Cohen (1988) effect size and can be interpreted as follows: f^2 = 0.02 = small effect; f^2 = 0.15 = medium effect; f^2 = 0.35 = large effect.

Hypothesis H1 was validated (β = 0.322, p-value = 0.011, f^2 = 0.114): 'The greater the market assumptions accuracy is, the greater the performance accuracy.' As a result of the impact that the market assumptions have over the projections, the performance accuracy result is affected. The accuracy of these variables indicates a relationship with risk and the greater the expected market assumptions accuracy is, the lower the risk for the business (Shelley & Omer, 1996). In moments of stability and high predictability of accuracy, this effect would be modest (Shelley & Omer, 1996), but it can have a great impact in moments of volatility, including having implications in scenario adjustments and, consequently, in goal achievement (Becker et al., 2016), requiring revisions and possible adjustments based on established triggers (Becker et al., 2016).

Hypothesis H2 was validated (β = 0.668, p-value = 0.000, f^2 = 0.811): 'The greater the adherence is of the planning mechanisms (strategic planning, CAPEX, and budget), the greater the adherence will be of the budgetary control.' The set of artifacts (Frezatti, 2015; Merchant & Van der Stede, 2007) constitutes a basic structure for enabling the planning and control process (Hansen & Van der Stede, 2004) and constitutes a topic mentioned as relevant in the research

(Moores & Yuen, 2001). The research has validated its integration and complementation, which provide conditions for the development and improvement of the process, including conditions for influencing managers' behavior over short-, medium-, and long-term temporal horizons (Libby & Lindsay, 2010). The separation of budgetary control, treating it as derived from the other artifacts, involves what is expected from this stage of the process in terms of integration and feedback of the planning.

Hypothesis H5 was validated (β = 0.737, p-value = 0.000, f^2 = 1.190): 'The greater the adherence is of the budgetary control, the greater the adherence of the base forecast.' According to the dynamism perceived based on the conclusions of hypothesis 4, having an artifact that includes already realized information and adjusting future projections is of great value, providing a 'more likely vision of the expected result,' in a more flexible and contemporary way than the annual budget (Lukka & Granlund, 2003), which is treated as the commitment to the shareholders and is usually shown to be more rigid in relation to needs for changes.

The conceptual aspects identified in the sample enable us to understand that there are new estimations of the income statement for the months still to occur in the year underway, of the economic-financial assumptions throughout the year, and monitoring of the actual result with the base forecast (Berg & Karlsson, 2014; Bhimani et al., 2018; Brüggen et al., 2021; Hansen, 2011; Henttu-Aho, 2018; Lukka & Granlund, 2003; Merchant & Van der Stede, 2007; Sivabalan et al., 2009). Consequently, they impact the performance accuracy.

Davila and Foster (2005) address this topic by indicating the ability of managers to provide accuracy both in terms of timing and magnitude, which reveals the concern not only about having artifacts, but also elements that affect performance. The possibility of having flexibility in being able to adjust objectives prioritized in the budget influences the accuracy (Berg & Karlsson, 2014). Although foreseen in the literature, in the sample it was not possible to highlight a forecast that substitutes the budget per se, and the base forecast is something that can coexist with the budget (Ekholm & Wallin, 2011).

Hypothesis H8 was validated (β = 0.622, p-value = 0.000, f^2 = 0.244): 'The greater the adherence is of the base forecast, the greater the adherence of the rolling forecast.' The existence of planning and control artifacts and of the base forecast provides conditions for the availability of the rolling forecast to meet specific demands, as the literature corroborates (Hansen, 2011). Among the possible uses, it can be the starting point for the budget for the following year (Bhimani et al., 2018; Hansen, 2011; Hansen & Van der Stede, 2004; Jordan & Messner, 2020; Su et al., 2017). In the analysis of the sample, the comparison and integration between the base forecast and the rolling forecast were identified.

The following hypotheses were not confirmed: H3, H4, H6, H7, and H9. Some possibilities for more general explanations for the absence of significance of these hypotheses would be: (1) the size of the sample obtained, which generated non-capture bias and (2) different uses of the planning and control mechanisms, not fully reported in the literature and whose explanation cannot be captured by the questionnaire applied. Other possibilities are more specific, such as: (1) the budgetary control process behaves as a formal ritual that occurs independently of there

being deviations in relation to the market assumptions that formed the basis for the budgetary plan, that is, it forms part of the organization's management process; (2) the rolling forecast consists of a tool that is normally developed from the base forecast and, therefore, the relationship between the budgetary control and rolling forecast does not occur directly, but indirectly through the base forecast, an interpretation that is sustained by the indirect effect observed and that is statistically significant (β = 0.458, p-value = 0.005); and (3) the rolling forecast has a greater focus on the extension of the estimates beyond the fiscal year and, in this case, it may not be related with the performance accuracy of one period in particular.

Results of the necessary condition analysis (NCA)

The NCA was executed taking into account exactly the same set of constructs as the structural model and their factor scores obtained in the PLS-SEM. Table 6 indicates the results of the bottleneck table that is one of the results of the NCA. Along general lines, Table 6 indicates for what level of the dependent variable (performance accuracy) the independent variables (market assumptions accuracy and artifacts) become a bottleneck (they prevent high values of the dependent variable from being obtained).

Table 6

Bottleneck table (ceiling envelopment — FDH)

Y = Performance accuracy	Market assumptions accuracy	SP	CAPEX	Budget	Budgetary control	Base forecast	Rolling forecast
5	NN	NN	NN	NN	NN	NN	NN
10	NN	NN	NN	NN	NN	NN	NN
15	NN	NN	NN	NN	NN	NN	NN
20	NN	NN	NN	NN	NN	NN	NN
25	NN	NN	NN	NN	NN	NN	NN
30	**NN**	**NN**	**NN**	**NN**	**NN**	**NN**	**NN**
35	NN	NN	NN	NN	NN	8,5	NN
40	NN	NN	NN	NN	NN	8,5	NN
45	NN	NN	NN	NN	NN	8,5	NN
50	NN	NN	NN	NN	NN	8,5	NN
55	NN	NN	NN	NN	NN	8,5	NN
60	**NN**	**NN**	**NN**	**NN**	**NN**	**8,5**	**NN**
65	NN	19.5	NN	35.5	59.7	57.9	NN
70	NN	87.5	55.8	77.0	59.7	57.9	NN
75	NN	87.5	55.8	77.0	59.7	57.9	NN
80	**NN**	**87.5**	**55.8**	**77.0**	**59.7**	**57.9**	**NN**
85	NN	87.5	55.8	77.0	59.7	57.9	NN
90	**100**	**87.5**	**55.8**	**79.3**	**59.7**	**57.9**	**NN**
95	100	87.5	55.8	79.3	59.7	57.9	NN
100	100	87.5	55.8	79.3	59.7	57.9	NN

Note. These values are in percentages, so 0% = minimum value and 100% = maximum value.

The following should be highlighted in Table 6:

1. NN means 'not necessary,' that is, it indicates that that condition (independent variable) is not necessary to achieve 'that level' of performance accuracy. In this case, for example, an organization that accepts performance accuracy at a 30% level (70% deviation tolerance) does not need to worry about the existence of the artifacts (strategic planning, CAPEX, budget, budgetary control, base forecast and rolling forecast, and market assumptions). Consequently, the level of efficiency obtained will be low and the corresponding competitiveness will also be low. This discussion about the desired level is not present in the literature, but it does exist in the business empirical environment, in a heuristic way and not supported by references.

2. For a performance accuracy level between 35% and 60%, the base forecast appears to be necessary, but in a scarcely relevant way (8.5%). Even with such a low base forecast level, it is already possible to achieve those levels of performance accuracy. It is to be expected that the concept, components, and use of that base forecast have differences in relation to what we covered, since it depends on the basic artifacts to exist.

From the structural equation analysis (Table 5) we have:

H4 (Budgetary control → Performance accuracy): it is not a sufficient condition ($p > 0.2$), therefore, on average, investments in budgetary control will not result in increases in performance accuracy; however, if its value is not higher than 59.7%, the performance accuracy will certainly not exceed the value of 65%.

H6 (Base forecast → Performance accuracy): it is not a sufficient condition ($p > 0.2$), therefore, on average, investments in the base forecast will not result in increases in the performance accuracy; however, if its value is not higher than 57.9%, the performance accuracy will certainly not exceed the value of 65%.

3. To achieve a level of performance accuracy at the 80% threshold, the most relevant element is strategic planning, but other artifacts are also necessary (at lower levels), such as CAPEX, budget, budgetary control, and base forecast and rolling forecast. The necessity is clear and, consequently, the performance expectation derives from investment to have the artifacts.

4. For the performance accuracy to achieve a 90% level, the most relevant element is market assumptions accuracy, but the other elements are also necessary at lower levels, with the exception of the rolling forecast, which is not necessary.

From the structural equation analysis we have:

H1 (Market assumptions accuracy → Performance accuracy): it is a sufficient condition ($\beta = 0.322$, $p = 0.011$), in the sense that increases in the former will result (on average) in increases in the latter; and it is a necessary condition for achieving high levels of performance accuracy (≥ 90%).

5. If the organization increases the expectation of accuracy to 100%, reducing the deviation tolerance, the influence of the elements will be the same as 90%, indicating the existence of degrees of evolution. This perception of different relevances for the elements is significant for management to be able to decide what to do in terms of expectations and even resource allocation when it thinks

> that the improvement in accuracy is worthwhile and understands that each step has space for improvement before demanding a new investment.

Taking the references into account, we can highlight a number of aspects. First, the findings indicate paths for managers to increase the capacity to achieve results through knowledge of the expected results, which provides both the guidance for what is expected of the individuals, and the opportunity for commitment by understanding whether it is possible or not to achieve the goal, through the capacity to influence results, through knowing the performance profile expected of them, and being able to develop strategies and tactics for that (Frow, et al., 2010; Henttu-Aho, 2018; Merchant & Van der Stede, 2007). Therefore, the conditions are provided to extend the capacity to effectively control the results, through knowing the goals and planning how to achieve them (Merchant & Van der Stede, 2007). In this sense, the increase in assertiveness through the necessary accuracy, with different degrees of deviation tolerance, is a benefit that can be provided through the analysis. This eliminates the rigidity of thinking that accuracy is a binary variable, which is achieved or not achieved, and can influence activities such as executive pay and even investments in the management process.

As a result of the impact of accuracy, taking Cassar and Gibson (2008) into account, it is expected that, through promoting the sharing of follow-up reports and manager involvement, budgetary control can influence not only accuracy, but also the planning process for the following period (involving the elaboration of a new plan). This can occur through the stimulation of actions by managers that take into account the achievement of the financial performance goals defined (Hansen & Van der Stede, 2004; Sivabalan et al., 2009) in the long-term planning and, therefore, stimulate a lower level of deviations between budgeted and achieved goals.

Another way of understanding the impact of the degree of accuracy over people's behavior is by taking into account the fact that realized results stimulate and encourage managers to develop their talents and improve future performance (Merchant & Van der Stede, 2007). This concerns developing the learning process, whose benefits extrapolate the short-term actions (Abernethy & Brownell, 1999) that are affected by the assertiveness provided by the level of accuracy achieved.

This factor is relevant for future performance to continue being challenging and relates with the dimensions of performance, performance measurement, targets, and recognition and incentives (Jordan & Messner, 2020; Merchant & Van der Stede, 2007), which are fundamental elements for the competitiveness of organizations and can be incentivized when the professionals believe that their results can be planned and achieved.

CONCLUDING REMARKS AND IMPLICATIONS

We highlighted that monitoring accuracy implies having a planning and control structure as a condition for the process, but defining the degree of deviation tolerance desired by the organization is a condition for there to be some efficiency level for the management process. The more demanding the organization is in terms of low deviation tolerance, the greater the need to have artifacts available, the greater their importance will be in the process, and, consequently, the

investments required in people, knowledge, and methodology will also be greater. Thus, monitoring the evolution of the relevant variables, particularly those external to the organization, in an uncertain environment, constitutes a continuous and careful action, as the impacts change as a result of the variation in the degrees of tolerance.

The topic of accuracy, which is highly relevant for the organizational environment, demands an understanding of the conditions for which the planning and control artifacts are directed, within the planning environment in which the organization operates (Merchant & Van der Stede, 2007). After all, accuracy will strengthen the perception of utility of a given set of artifacts used in planning and control.

If that is true, what would the appropriate level of accuracy be? The level that the managers understand as appropriate provides a certain level of objectification of the discussion through different degrees of deviation tolerance. This objectification enables different expectations to be compared and, consequently, different artifact profile demands by organizations.

The connection between the accuracy of the market variables (hypothesis 1) and the accuracy of performance goals was also presented, indicating the connection between the organization's results and its external environment. Sharp and/or relevant movements in the market assumptions will cause an impact on the need to revise the planning through the artifacts and to meet the established goals. As a result, permanently monitoring these variables would be a vital implication for organizations.

As a result of the analysis of hypotheses 2, 5, and 8, we have the indication of the need for the set of planning and control artifacts, that is, strategic planning, the CAPEX, the budget, base forecast, and rolling forecast, and they highlight the integration and complementarity, based on which the accuracy can be discussed (Grabner & Moers, 2013; Malmi & Brown, 2008). It was revealed through the structural equation technique that it was not possible to achieve the differentiation of the degrees of deviation tolerance, which was possible through the NCA, respectively addressing the logic of sufficiency and necessity.

Regarding the theoretical implications, the need for a comprehensive overview was shown for the planning and control artifacts (Merchant & Van der Stede, 2007), through which the complementarity and integration should be perceived so that the management needs are met in terms of accuracy (Grabner & Moers, 2013; Malmi & Brown, 2008). The discussion of the accuracy per se of the set of performance variables is relevant for the assessment of the planning and control mechanisms and they affect the quality of management in terms of assertiveness of decisions (Frow et al., 2010; Henttu-Aho, 2018; Merchant & Van der Stede, 2007). Finally, in terms of practical implications, managers can understand the set of elements and where they can allocate resources and define improvements in the set of artifacts, taking into account the expectation of different degrees of accuracy.

The main limitations for the research were: (1) the quantity of valid respondents, which did not enable additional analyses; (2) the moment lived in economic terms, in which the difficulty of attracting the respondents was particularly challenging; and (3) the nature of necessary data that

could not be obtained through another methodological format with proxies given the type of problems emphasized.

As suggestions for future research we would like to list: (1) an in-depth study using multiple cases regarding accuracy; (2) a comparison of accuracy in moments of the COVID-19 pandemic with other moments, before and after; and (3) an investigation based on different empirical approaches, with cluster analysis, to identify different groups of companies that characterize the use of mechanisms and accuracy.

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Appendix A

Table A1

Structure of the system of the diagnostic control artifacts

Construct	Variables	Statement	Elaborated based on:
Strategic planning	SP_1	1. Identity items (mission, vision, beliefs, and values) Explores elements of identity such as mission, values, beliefs, and values	(Ferreira & Otley, 2009; Frezatti et al., 2011; Merchant & Van der Stede, 2007)
	SP_2	2. Strategies approved and formalized for the business Approves and formalizes strategies for the business	(Ferreira & Otley, 2009; Frezatti et al., 2011; Merchant & Van der Stede, 2007)
	SP_3	3. Operational plans for implementing the strategies Develops operational plans to implement the strategies	(Ferreira & Otley, 2009; Frezatti et al., 2011; Merchant & Van der Stede, 2007)
	SP_4	4. Long-term financial statements (income statement, balance sheet, and cash flow statement) Considers/evaluates the long-term financial statements in the development of the strategic plan	(Ferreira & Otley, 2009; Frezatti et al., 2011; Merchant & Van der Stede, 2007)
	SP_5	5. The strategic planning exists and is revised Regularly revises the strategic planning	(Ferreira & Otley, 2009; Frezatti et al., 2011; Merchant & Van der Stede, 2007)
Budget	Bud_1	1. Assumptions for the elaboration of the budget (inflation, interest, wage and input variations) Considers assumptions such as inflation, interest, wage and input variations	(Frezatti et al., 2011; Frow et al., 2010; Haka & Krishnan, 2005; Hansen & Van der Stede, 2004; Henttu-Aho, 2018)
	Bud_2	2. Components of the operational plans The operational plans contain MKT, operations, HR, and investments.	(Frezatti et al., 2011; Frow et al., 2010; Haka & Krishnan, 2005; Hansen & Van der Stede, 2004; Henttu-Aho, 2018)
	Bud_3	3. Operational plans for implementing the strategies Develops operational plans to implement the strategies	(Frezatti et al., 2011; Frow et al., 2010; Hansen & Van der Stede, 2004; Henttu-Aho, 2018)
	Bud_4	4. Financial plan Estimation of the statements: income statement, balance sheet, cash flow statement	(Frezatti et al., 2011; Frow et al., 2010; Haka & Krishnan, 2005; Hansen & Van der Stede, 2004; Henttu-Aho, 2018)
	Bud_5	5. The budget is aligned with the strategic planning	(Frezatti et al., 2011; Frow et al., 2010; Hansen & Van der Stede, 2004; Henttu-Aho, 2018)
Capital budget	CAPEX_1	1. Contains all the relevant long-term investment projects	(Frezatti, Aguiar, Guerreiro, & Gouvea, 2011)
	CAPEX_2	2. They cover periods longer than a year	(Frezatti, Aguiar, Guerreiro, & Gouvea, 2011)
	CAPEX_3	3. The major projects are supported by analyses such as net present value (NPV), payback, and internal rate of return (IRR)	(Frezatti, Aguiar, Guerreiro, & Gouvea, 2011)
	CAPEX_4	4. There is monitoring of the financial execution of the projects	(Frezatti, Aguiar, Guerreiro, & Gouvea, 2011)

Continues

Table A1 (continued)

Construct	Variables	Statement	Elaborated based on:
Base forecast — year	Forec_1	1. Re-estimates the income statement for the months still to occur in the year	(Berg & Karlsson, 2014; Bhimani, Sivabalan, & Soonawalla, 2018; Brüggen et al., 2021; Hansen, 2011; Henttu-Aho, 2018; Lukka & Granlund, 2003; Merchant e Van der Stede, 2007; Sivabalan et al., 2009)
	Forec_2	2. Re-estimates the economic-financial assumptions throughout the year	(Berg & Karlsson, 2014; Bhimani, Sivabalan, & Soonawalla, 2018; Brüggen et al., 2021; Hansen, 2011; Henttu-Aho, 2018; Lukka & Granlund, 2003; Merchant e Van der Stede, 2007; Sivabalan et al., 2009)
	Forec_3	3. Monitoring of the actual result compared with the base forecast	(Berg & Karlsson, 2014; Bhimani, Sivabalan, & Soonawalla, 2018; Brüggen et al., 2021; Hansen, 2011; Henttu-Aho, 2018; Lukka & Granlund, 2003; Merchant e Van der Stede, 2007; Sivabalan et al., 2009)
Rolling forecast	RolForec_1	1. Re-estimates the financial statements, adding the months already occurred within the new year so that it always has 12 or 24 months forecasted	(Bhimani et al., 2018; Hansen, 2011; Hansen & Stede, 2004; Jordan & Messner, 2020; Su, Baird, & Schoch, 2017)
	RolForec_2	2. The rolling forecast is considered at the time of establishing the forecast for the new year	(Bhimani et al., 2018; Hansen, 2011; Hansen & Stede, 2004; Jordan & Messner, 2020; Su, Baird, & Schoch, 2017)
	RolForec_3	3. Monitors the actual result and includes a comparison with the forecast	(Bhimani et al., 2018; Hansen, 2011; Hansen & Stede, 2004; Jordan & Messner, 2020; Su, Baird, & Schoch, 2017)
Budgetary control	BudCont_1	1. The budget is monitored monthly	(Merchant & Van der Stede, 2007; Scapens, 2006; Sponem & Lambert, 2016)
	BudCont _2	2. The variations identified are analyzed and explained	(Abernethy & Brownell, 1999)
	BudCont _3	3. The variations affect the executives' performance evaluation	(Merchant & Van der Stede, 2007; Scapens, 2006; Sponem & Lambert, 2016)
	BudCont _4	4. The planning and control mechanism is seen as something useful even if the accuracy (variation in the numbers) is not as desired	(Abernethy & Brownell, 1999)

Note. Scale: 5 points.

Appendix B

Table B1

Accuracy (variation in actual vs. budgeted for 2016)

Description/variables	Occurred accuracy	Acceptable accuracy	Elaborated based on:
	What is the level of occurred accuracy in the year in terms of percentage variation?	What would the acceptable percentage variation have been at the time of the forecast?	
[P] Variation in revenue — %	Up to 5%	Up to 5%	
[P] Variation in gross margin - %	> 5 < = 10%	> 5 < = 10%	(Becker et al., 2016; Jordan & Messner, 2020; Shelley & Omer, 1996)
[P] Variation in net earnings — %			
[P] Variation in return on equity — %	> 10% < = 20% and	> 10% < = 20% and	
[M] Variation in the inflation assumption — %	> 20%	> 20%	(Adler & Chen 2011; Becker et al., 2016; Jordan & Messner, 2020; Merchant & Van der Stede, 2007; Shelley & Omer, 1996)
[M] Variation in supplier prices — %			
[M] Variation in the exchange rate — %			(Adler & Chen 2011; Merchant & Van der Stede, 2007)
[M] Variation in wages — %			

Note. Scale: ordinal. Legend: [M] = Market assumptions accuracy. [P] Performance metrics accuracy.

Appendix C

Table C1

Descriptive analysis of the items related to the control mechanisms

Construct	Variable	Mean	Median	Min.	Max.	Standard deviation
Strategic planning	SP_1	4.04	5	2	5	1.22
	SP_2	3.92	4	2	5	1.17
	SP_3	3.96	4	2	5	1.09
	SP_4	3.88	4	2	5	1.15
	SP_5	3.69	4	2	5	1.26
Budget	Bud_1	4.27	5	2	5	1.08
	Bud_2	3.81	4	2	5	1.20
	Bud_3	3.83	4	2	5	1.11
	Bud_4	4.21	5	2	5	1.10
	Bud_5	3.83	4	2	5	1.20
Capital budget	CAPEX_1	3.56	4	2	5	1.22
	CAPEX_2	3.56	4	2	5	1.34
	CAPEX_3	3.65	4	2	5	1.33
	CAPEX_4	3.83	4	2	5	1.25
Base forecast	Forec_1	4.17	5	2	5	1.05
	Forec_2	3.83	4	2	5	1.14
	Forec_3	4.25	5	2	5	0.95
Rolling forecast	RolForec_1	3.25	3	2	5	1.30
	RolForec_2	3.42	4	2	5	1.27
	RolForec_3	3.52	4	2	5	1.23
Budgetary control	BudCont_1	4.33	5	2	5	1.12
	BudCont_2	4.30	5	2	5	1.01
	BudCont_3	3.79	4	2	5	1.24
	BudCont_4	4.29	5	2	5	1.00

Appendix D

Table D1

Cross loadings matrix

	SP	CAPEX	Budget	Budgetary control	Base forecast	Rolling forecast	Market assumptions accuracy	Performance accuracy
SP_2	**0.944**	0.533	0.608	0.499	0.382	0.490	0.090	-0.028
SP_3	**0.920**	0.573	0.646	0.598	0.502	0.513	-0.010	0.017
SP_5	**0.827**	0.630	0.514	0.440	0.507	0.488	0.184	0.036
CAPEX_1	0.625	**0.829**	0.671	0.485	0.409	0.390	0.068	-0.003
CAPEX_2	0.513	**0.799**	0.715	0.450	0.479	0.553	-0.032	-0.091
CAPEX_3	0.497	**0.829**	0.502	0.513	0.390	0.413	0.082	-0.093
CAPEX_4	0.462	**0.826**	0.565	0.483	0.529	0.368	0.067	-0.007
Bud_1	0.486	0.678	**0.911**	0.547	0.469	0.388	0.080	-0.031
Bud_2	0.448	0.548	**0.751**	0.386	0.277	0.284	-0.041	-0.178
Bud_4	0.562	0.602	**0.869**	0.647	0.510	0.370	-0.033	-0.140
Bud_5	0.722	0.723	**0.870**	0.517	0.485	0.568	0.056	0.017
BudCont_1	0.377	0.469	0.552	**0.857**	0.578	0.194	0.186	-0.003
BudCont_2	0.560	0.577	0.544	**0.907**	0.769	0.381	-0.055	-0.179
BudCont_4	0.530	0.458	0.509	**0.819**	0.523	0.211	0.109	-0.084
Forec_1	0.469	0.444	0.438	0.648	**0.927**	0.415	0.013	0.041
Forec_2	0.378	0.444	0.366	0.587	**0.888**	0.486	-0.200	-0.203
Forec_3	0.526	0.573	0.569	0.729	**0.867**	0.481	0.008	0.042
RolForec_1	0.383	0.432	0.331	0.173	0.411	**0.865**	-0.156	0.060
RolForec_2	0.590	0.556	0.491	0.352	0.516	**0.940**	-0.043	-0.001
RolForec_3	0.537	0.459	0.492	0.334	0.491	**0.947**	-0.064	0.123
Delta_AccInflation%	0.080	0.053	0.039	0.090	-0.082	-0.118	**0.965**	0.301
Delta_AccExchange%	0.066	-0.007	-0.074	0.058	0.065	-0.032	**0.590**	0.073
Delta_AccInputPrices%	0.035	0.040	-0.024	0.016	-0.069	0.105	**0.569**	0.041
Delta_AccWages%	-0.091	-0.092	-0.128	0.200	0.009	-0.047	**0.404**	-0.082
Delta_AccRevenue$	-0.108	-0.117	-0.211	-0.201	-0.130	-0.036	0.271	**0.821**
Delta_AccMargin$	0.033	-0.180	-0.053	-0.094	-0.075	0.062	0.170	**0.844**
Delta_AccNetEarnings$	0.112	-0.026	-0.058	-0.041	0.083	0.094	0.095	**0.795**
Delta_AccROE%	0.053	0.100	0.048	-0.005	0.032	0.118	0.307	**0.804**

Note. The latent variables are: Strategic planning (SP), Capital budget (CAPEX), Company budget (Bud), Budgetary control (BudCont), Base forecast, Rolling forecast (RolForec). The indicators SE1, SE4, Bud3, and BudCont3 were excluded as they presented an absence of convergent and/or discriminate validity.