



The use of management accounting information by boards of directors to oversee strategy implementation

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ABSTRACT

Past research has overlooked the specific informational needs and uses of management accounting information by boards of directors, which constitute a distinctive unit of analysis, focusing mainly on organizational actors within the boundaries of the firm. The aim of this study is to examine the use of management accounting information to oversee strategy implementation in the context of governance. Specifically, we intend to establish theoretical properties and propose a measurement model that captures the use of budget, financial and non-financial performance indicators by boards of directors to oversee the strategic plan. To develop the measurement instrument, conceptual specifications of constructs have been established based on a matrix approach that combines (i) the information conveyed by the three management accounting practices, along with (ii) two theoretical properties reflecting board activities, namely monitoring implementation of the strategic plan, and questioning of the strategic plan. The validity and reliability of the instrument have been evaluated and discussed using a rigorous multi-method integrated approach that includes a literature review, exploratory interviews, consultation of experts in management accounting and governance, and survey data collected from three samples of boards of directors.

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1. Introduction

Over the years, research at the interface between management accounting information (MAI) and strategy has evolved into a productive area of research (Langfield-Smith, 2007, 2008). Interestingly, the unit of analysis examined in this stream of research has been mainly restricted within the boundaries of the organization, focusing on top management teams or upper echelon managers. Virtually no studies have examined the use of MAI in the context of a board of directors, which differs from that of the organization overall. The boards are made up of executive and independent members whose knowledge of the organization's activities and whose distance from everyday operations vary considerably (Roberts et al., 2005; Rutherford & Buchholtz, 2007). In addition, the role of the board of directors is fundamentally distinguished from that of top management: the board governs the company whereas the executives manage it (Daily et al., 2003). Consequently, the board of directors

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forms a particular group with distinct informational needs and a use of MAI that reflects their strategic-based advisory role, notably to oversee the implementation of strategy (Parker, 2008; Roy, 2011).

The aim of this study is to isolate and specifically examine the use of MAI by boards of directors (hereafter MAI-BD) to oversee strategy implementation. Formally stated, we define MAI-BD as the formalized financial and non-financial information provided on a regular basis to boards of directors, whilst we refer to strategy implementation as the oversight of the strategic plan of the organization. We examine specifically the information emanating from three management accounting practices, namely budget, financial and non-financial performance indicators,¹ which contain a large amount of management information transmitted regularly to boards of directors (Davies, 1991; Parker, 2008). We will focus on the use of information provided by those management accounting practices in order to oversee the implementation of the strategic plan.

Specifically, the objectives of this study are twofold: (i) to establish strong conceptual bases for the use of MAI-BD to oversee strategy implementation by determining theoretical properties, and (ii) to develop a measurement instrument by proposing diverse items that empirically capture those theoretical properties. This instrument could be used by other researchers in the future to expand knowledge of the overlooked interface between management accounting and governance. To achieve these two objectives, we expand on the approach described in the seminal work of Churchill (1979) by first determining the conceptual specifications of the constructs (Bisbe et al., 2007) and then, adapting this approach to current statistical analyses tools (Bagozzi, 1994; Cohen et al., 1990; Rossiter, 2002). The development of the conceptual specifications of the constructs involves clearly defining the meaning of the constructs and determining their epistemic relationships (Bisbe et al., 2007). Further, Churchill's (1979) approach employs a strategy of triangulation of methods with the joint use of an exploratory qualitative approach and confirmatory quantitative techniques (Stiles & Taylor, 2001).

This paper offers several contributions to the management accounting literature. First, considering the importance devoted to governance in the academic and practical world, we consider it to be crucial to isolate and specifically examine the deployment of MAI from the standpoint of board members. As previously mentioned, the context of boards of directors differs from that of the organization overall. Furthermore, we intend to contribute to the survey-based research by developing a specific measurement instrument adapted to the use of MAI by board of directors. Our extensive review of the management accounting and governance literatures demonstrates that no measurement instrument pertaining to the use of financial and non-financial information by the board of directors for oversight of the strategic plan has been developed or could be easily adapted to our theoretical properties. Lastly, because construct validity is an essential condition of knowledge development, and considering that survey research has often been criticized for measurement error, we follow recent calls arguing that more effort and attention should be devoted to the careful development of questionnaires and meticulous psychometric assessment of the measures in order to improve the quality of the data (Bisbe et al., 2007; Roberts, 1999).

The remainder of the paper presents an integrated approach of development combining the determination of theoretical properties and the development of a measurement model. The rest of this section is separated into nine subsections each dealing with a step shown in Fig. 1.

2. Integrated approach of development

2.1. Overview of the approach

In this section, we cover following nine subsections: (i) specification of the domain, (ii) development of the items, (iii) content validity, (iv) first data collection, (v) first purification, (vi) second and third data collection, (vii) second purification, (viii) evaluation of reliability and validity, and (ix) preliminary evidence and face validity. Furthermore, we present an integrated framework which combines the establishment of theoretical properties and the development of a measurement model. Our approach merges the basic steps of the seminal work of Churchill (1979) for the construction and validation of a survey instrument with the guidelines of Bisbe et al. (2007) to improve the conceptual specifications of the constructs and current statistical analytical tools (Bagozzi, 1994; Cohen et al., 1990; Rossiter, 2002). Churchill's approach (1979) has been used repeatedly in many fields of research, notably psychology (Nunnally, 1978; Nunnally & Bernstein, 1994), human resource management (Roussel & Wacheux, 2005; Schmitt & Klimoski, 1991), and marketing (Evrard et al., 1993; Peter, 1981; Rossiter, 2002). The purpose of this approach is to develop measures that are close to the true values of the domain studied by maximally reducing errors. The integrated approach of development comprises two phases, as Fig. 1 illustrates. Overall, the first phase involves the specification of the domain before generating the first list of items whose relevance are evaluated by experts in the field. Throughout this exploratory phase, the first data collection process resulted in a preliminary recommendation to improve the measurement instrument using statistical tests. The second phase is the confirmatory phase, whose main objective is to confirm the reliability and validity of the items based on two extended samples of board members and to provide preliminary evidence based on the final instrument.

¹ Budget refers to the forecast of revenue and expenses over a specified future period of time. Financial information refers to the monetary indicators included in the performance measurement systems, such as ROI and earnings, whilst non-financial information includes non-monetary indicators, such as customer satisfaction, market share and productivity.

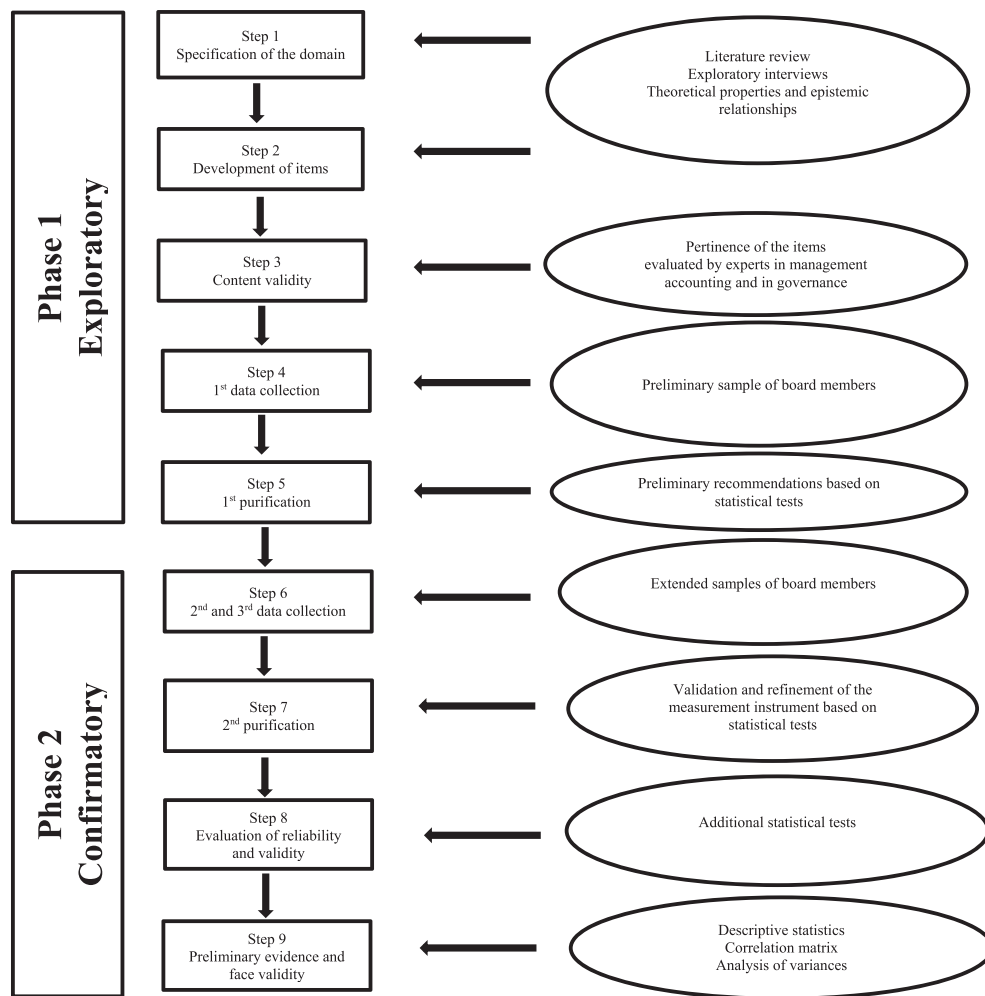


Fig. 1. Integrated approach of development.

2.2. Step 1 - Specification of the domain

Specifying the domain of the use of MAI-BD to oversee strategy implementation first involves determining the unit of analysis and then creating a formal definition of the phenomena under study. The unit of analysis is the board of directors of organizations, and not the individual board members. No restrictions were set on the type of organization because we wanted to identify a variety of contexts in which the use of MAI-BD for strategy implementation exists, to obtain maximum variance and capture different contexts of use. Although the strategic use of MAI may differ from one board to another, it involves a generic and common governance activity that pertains to any kind of board.

The specification of the domain also involves the development of the conceptual specifications of its constructs (Bisbe et al., 2007).² The notion of conceptual specification corresponds to the process whereby vague notions of constructs are made more specific and precise (Babbie, 2004). Bisbe et al. (2007) have devised a set of guidelines to improve the conceptual specifications of constructs in management accounting research. They recommend to (i) clearly define the meaning of the constructs, notably through theoretical properties; and (ii) determine the epistemic relationships between constructs by identifying the nature and direction of the relationships between the constructs and the items (Hulland, 1999).

When the constructs are defined according to a practice-based approach, specifying what the constructs should include or omit can be structured by an in-depth examination of the practice, and/or by examining the pertinent literature related to the practice of interest (Bisbe et al., 2007). In this paper, the establishment of theoretical properties is supported both by semi-structured exploratory interviews with board members, and by the management accounting and governance literatures.

² A construct is a conceptual term used to describe a phenomenon of theoretical interest (Babbie, 2004; Edwards & Bagozzi, 2000).

These same literatures are used to determine and support epistemic relationships between these constructs. This approach provides more anchors concerning the attributes of the phenomenon, and allows us to draw parallels with some conceptual frameworks that are discussed below, such as Levers of Control (Simons, 1990) and learning framework (Argyris & Schön, 1978).

Ten members of boards of directors from diverse organizational contexts are asked to attend an individual semi-structured exploratory interview. This qualitative approach allows us to capture respondents' beliefs and perceptions of a situation and its context (Pratt, 2009). The contact information for each participant is gathered from the directory of Certified Company Directors of the Collège des Administrateurs de Sociétés (hereafter CAS)³ and by personal contacts. The interviews are mainly intended to provide a general understanding of the phenomena to support the development of the theoretical properties and to eventually generate a preliminary list of items. Among the ten individual exploratory semi-structured interviews, seven are conducted face-to-face and three by telephone. The average duration of the interview is 70 min. Six participants sit on the board of directors of a listed organization, two participants sit on a board of directors of a private organization, and one each on the board of a non-profit organization and a governmental organization. Furthermore, 50% of the organizations are large, 30% are medium and 20% are small. On average, the participants have 31 years of experience and 50% have completed graduate studies. Table 1 presents the diversity of the type and size of organizations and participants that allowed us to gather a variety of viewpoints and practices.

A semi-structured interview guide was used. The interviewees were asked about how the strategic planning process functions at board meetings and about the use of the budget and of non-financial and financial indicators during the oversight of the strategic plan. Before the end of each interview, the guide was reviewed to ensure that no important element was omitted. As expected, confidentiality is crucial. To protect the anonymity of the board members interviewed, no links between individuals and their organizations appear in this article because this information could reveal the identity of some respondents. Moreover, numerous measures have been put in place to reinforce participants' confidence as recommended by Lincoln and Guba (1985) and permission to record the interview is also granted.

2.2.1. Theoretical properties of the use of MAI-BD to oversee strategy implementation

Theoretical properties are attributes, aspects or inherent characteristics through which constructs are manifested (Babbie, 2004; Edwards, 2001; Law et al., 1998). We propose two main theoretical properties for the strategic use of MAI-BD that mirror activities executed by boards of director: (i) monitoring the implementation of the strategic plan, and (ii) questioning the strategic plan. These properties will be discussed in detail below. The conceptual domain is based on a matrix approach combining the three management accounting practices discussed (horizontal axis) and two activities executed by boards of directors (vertical axis). The eventual items will be distributed among the six resulting cells.

2.2.1.1. Monitoring the implementation of the strategic plan. For the board of directors, monitoring the implementation of the strategic plan consists of evaluating and measuring progress when intended strategies are applied (Davies, 1991). Nadler et al.

Table 1
Profile of participants and characteristics of their organizations.

#	Profile of participants	Duration of interview	Type and of organization
P1	Education: Master's degree Experience: 35 years	1 h 6 min	Type: Listed organization (manufacturing company) Size: Large (>500 employees)
P2	Education: Master's degree Experience: 33 years	56 min	Type: Listed organization (manufacturing company) Size: Medium (between 51 and 499 employees)
P3	Education: Master's degree Experience: 36 years	1 h 10 min	Type: Listed organization (manufacturing company) Size: Large (>500 employees)
P4	Education: Bachelor's degree Experience: 25 years	1 h 14 min	Type: Listed organization (manufacturing company) Size: Medium (between 51 and 499 employees)
P5	Education: Master's degree Experience: 21 years	1 h 6 min	Type: Listed organization (manufacturing company) Size: Medium (between 51 and 499 employees)
P6	Education: Bachelor's degree Experience: 34 years	1 h 18 min	Type: Private organization (manufacturing company) Size: Small (<50 employees)
P7	Education: Bachelor's degree Experience: 33 years	1 h 4 min	Type: Non-profit organization (service company) Size: Large (>500 employees)
P8	Education: Bachelor's degree Experience: 24 years	1 h 23 min	Type: Listed organization (manufacturing company) Size: Small (<50 employees)
P9	Education: Master's degree Experience: 37 years	1 h 13 min	Type: Governmental organization (crown corporation) Size: Large (>500 employees)
P10	Education: Bachelor's degree Experience: 30 years	1 h 2 min	Type: Private organization (service company) Size: Large (>500 employees)

³ The CAS, an institution dedicated to training company directors, is positioned as a leader in education because it offers a program that grants university level certification in governance, recognized in Canada and France.

(2006) argue that the board of directors is involved not only in major strategic decisions, but also in the implementation process that includes the actions necessary to ensure that strategic decisions are put in place within the desired time frames. This echoed the traditional notions of feedback displayed by a mechanistic use of management accounting practices and single-loop learning (Argyris & Schön, 1978). Participant P7 expresses this view:

Once the strategic plan was completed, there was, at a board meeting, a presentation of the plan, and also with, of course, five-year financial projections, indicators and very clear objectives. We agreed to review it every year, that is not to take it for granted [...] It's important for board members, without their ... I would say, meddling in operations, to clearly understand where the issues are, and the possible strategic orientations currently for each of these issues. [...] But as I said before, without the board coming and meddling in the operations of the organization, it is important that it be there to cooperate with the management team, to ensure that we follow the game plan and that we make the changes accordingly each year, if necessary.

Nonetheless, the board can monitor the strategic plan more effectively when top management provides information specifically regarding progress concerning the attainment of financial objectives, and of non-financial and financial performance indicators, associated with the strategic plan (Parker, 2008). Participant P2 makes an interesting comment on this topic:

There is the president's report that is done every quarter. It's a report, in fact, that the president tries to do fairly concisely, which is sent one week before the board meeting so that members can look at it. It's an indicator that shows each division, for example, their financial and operational performance. [...] They will also use human resources indicators, like for example the employee turnover rate. [...] So it's a table that the president sends: it is maximum three pages long. One page that is more narrative, qualitative, one page that is financial, and one page that has performance indicators like those I mentioned before.

More specifically, the literature reveals that as part of the levers of control approach (Simons, 1990), the diagnostic use of the budget can support the strategic process (Abernethy & Brownell, 1997). In addition, the implementation of a balanced scorecard (Kaplan & Norton, 1992, 1996) can identify non-financial and financial measures aimed at clarifying the strategic role of the board of directors in terms of performance follow-up based on the strategic plan (Siciliano, 2002). In keeping with the first theoretical property of the strategic use of MAI-BD, Langfield-Smith (2007) asserts that management accounting practices are adapted explicitly to support the organizational strategy. The following quote by participant P5 clearly exemplifies this process:

I think that once the strategy was approved by the members, by top management of course, but after that by the board, it means making sure later: are we giving ourselves all the financial tools that we need for this plan to succeed?

Monitoring the strategic plan also involves an evaluation of top management regarding the execution of the strategic plan (Stiles & Taylor, 2001). The following quote from participant P9 illustrates this point.

[...] The two most important tasks of a board of directors: is to ensure that we have the right CEO and a good strategy. [...] In addition, financial results are exactly linked to the quality of management, for which the CEO is responsible and not to mention strategy, for which the CEO is also responsible. So if we have a good strategy that everyone likes, with a CEO who everyone likes too, and we don't make money: something's going wrong there.

Baysinger and Hoskisson (1990) maintain that organizational control theory was traditionally centred on problems linked to managing relationships between supervisors and employees, and suggests that the quality of these relationships affects employees' behaviors (Eisenhardt, 1985; Ouchi, 1979). The extension of this theory to relationships between the board of directors and top management through agency relationships (Berle & Means, 1932; Jensen & Meckling, 1976) emphasizes similar questions, namely that the board of directors may, given its legal authority, hire, compensate and dismiss members of top management (Williamson, 1984). Oversight of the strategic plan thus becomes an important parameter used to evaluate the top management team. Participant P4 expresses this view:

In 10 years, it happened once that we dismissed a president precisely because he made excuses every time there were major departures, large differences between what should've been done in the strategic plan, including the budget and the actual.

2.2.1.2. Questioning the strategic plan. The second theoretical property of the strategic use of MAI-BD concerns the board of directors' questioning the strategic plan. This property refers to the activity of determining whether the fundamental orientations of the strategic plan should be modified in light of past events, and should systematically and continually be monitored to ensure that the premises of the plan remain valid (Schreyögg & Steinmann, 1987). This refers to general notions of organic use of management accounting practices and double-loop learning (Argyris & Schön, 1978). Commenting on this topic, participant P5 notes that:

The goal of the board of directors is also to validate this strategic plan, but validate is one thing and we can say 'Ah, it's good,' but it also means challenging it. Because when we say challenge, it's everybody, eh? [...] Then ask questions, to

better understand what it is, the issues, the success factors. Then after that, do we have the assets we need, at the financial or human level to make this plan succeed?

Moreover, by setting financial and non-financial objectives and following them through the budget and performance indicators, the board of directors makes strategic decisions regarding these objectives. Thus, they approve, reject or reformulate the strategic proposals of top management (Hendry & Kiel, 2004). In other words, the board favors the reconsideration of the strategic plan using MAI strategically, as illustrated in this quote from participant P6:

So the president did his work with his vice-presidents and the board members came back with the first phase of analysis. So then, it was an intense and full day and they went and presented the strategic plan to us, then we, we went and burst their bubble. We came along and set them straight. We said to them: 'You forgot this' or 'There is that element,' things to do with the style. [...] In this phase of strategic analysis, you validate your objectives, your action plan, and then you tack on budgets around it.

More specifically, the strategic use of MAI allows the board of directors to critique the effects of the implementation of the strategies whose proposals it evaluates and progress it follows (Parker, 2008). Relating to the levers of control approach (Simons, 1990), the interactive use of the budget (Abernethy & Brownell, 1997) and of non-financial and financial performance indicators through the balanced scorecard (Kaplan & Norton, 1992, 1996), not only guides efforts during the implementation of the strategic plan phase, but also provides a mechanism that enables the board of directors to adopt a more active role, and thus become deeply involved in the strategic management process by contributing to the emergence of new strategic insights (Siciliano, 2002). Some participants shared the views expressed by participants P2 and P8:

Management control in an organization, it's what will make the board feel that it is informed: one. That it can ask the right questions: two. And that it will be able to bring value to an organization. [...] But if the board doesn't have effective management control tools to be able to inform it, if it cannot understand the organization, then it cannot understand the strategic challenges of the organization. [...] In fact, then often, the budget is a prelude to strategic discussions that will happen later. [...] One thing that will be questioned by the board: It's whether the budget presented does not reflect the strategy. The budget is there to support planning, the strategic plan. This makes it more than just a follow-up, so that's how we deploy the money that we put into executing the strategy.

Furthermore, questioning the strategic plan also involves encouraging discussions between the board of directors and top management about the long-term concerns of the organization, beyond the current results and the period covered by the strategic plan in effect. To adequately oversee the strategic plan, the board of directors must encourage discussions of long-term objectives; short-term results should be evaluated in terms of progress toward long-term objectives (Davies, 1991). Participant P1 confidently asserts:

As a board member, I always look at the short term, the medium term and the long term at meetings. [...] So there is the long term, sometimes it's trying to understand new trends that will be there in 5 years, 10 years. That means that I will not put 80% of my efforts on the long term. But I will weigh my actions so that at least there will be 10%–20% that is the long-term watch. Let's say we make sure we know what's coming. Make sure not to miss what's ahead, not to miss the boat. So we have our medium and short term measures after that. The strategic plan is good for that too.

The board of directors uses the budget to be more engaged in the evolution and future of strategy implementation (Ekholm & Wallin, 2000; Parker, 2008). Participant P1 adds later in the interview:

The board will debate to make sure the budget is aligned with the strategy. Because when we make the strategic plan, at the end of that, there is a three-year or five year financial plan with financial projections.

In contrast, participant P9 points out that:

The budget is an essential tool and the problem with the strategic plan is exactly this linkage. And I think that when it's done well, we can see the implementation of the strategic plan and the long-term objectives through the budget. As for that, some do it better than others, but I would say that it's one of the challenges of this whole budget and strategic process, you always have targets, you always have performance indicators in your strategic plan, but attaching this to a budget and results, it's quite a challenge.

Despite this challenge, Siciliano (2002) argues that the use of the balanced scorecard by the board of directors favors the implementation of long-term strategies. Participant P4 commented on the use of non-financial and financial performance indicators over the long term:

For us, the scorecard, it was like the Bible, it was our own means to know how the company was acting in its strategy, where it came from and where it was going, in a sense.

2.2.2. Epistemic relationships of constructs of use of MAI-BD to oversee strategy implementation

In addition to specifying the theoretical properties of the strategic use of MAI-BD, it is also important to determine the epistemic relationships among the constructs. Epistemic relationships fill the gap between abstract theoretical constructs and

a measurable empirical phenomenon (Edwards & Bagozzi, 2000). The nature and direction of epistemic relationships between the constructs, their theoretical properties and items must be specified conceptually before being specified empirically (Hulland, 1999; Jarvis et al., 2003).

The first issue is to determine the conceptual nature of the three individual management accounting practices. We consider these three practices to be conceptually distinct and we argue that they should be considered as unidimensional constructs. In fact, depending on the boards of directors, only one, only two or all three of these practices may be used, with varying degrees of intensity, to oversee the strategic plan. Although these management accounting practices could be used for the purpose of conformity and accountability – one of the two main roles of board of directors (Labelle et al., 2010) – their use for strategic purposes, the other main role, may not be formally integrated in board routines. In other words, because the strategic plan can be monitored through all or a limited number of management accounting practices, the strategic use of MAI-BD is not conceptualized as a single multidimensional construct. Furthermore, the three individual management accounting practices are not the only practices that could potentially be used by a board of directors to oversee the strategic plan. Because we do not expect to examine all of the MAI used by the board of directors, they cannot, on the one hand, be considered as complete constituent facets of a multidimensional construct. On the other hand, the three individual practices are not interchangeable. In other words, considering the nature of the information provided by the budget and performance indicators, they all facilitate the oversight of the strategic plan, but in their own way. Therefore, each theoretical property relates to each management accounting practice.

The next issue is to determine whether those two theoretical properties refer to one or multiple theoretical dimensions, which ultimately would lead to unidimensional or multidimensional constructs. In other words, based on the previous discussion, the strategic use of the three management accounting practices could be conceptualized as three first-order models or 3 s-order models. Based on the strategy literature, we argue that the strategic-decision making process is not necessarily a sequential and rational process, but instead a chaotic, iterative and disorderly process (Langley et al., 1995). In other words, despite the structured and organized nature of board meetings, sometimes based on protocol, strategic discussions are more haphazard and dispersed. For instance, when the board of directors oversees the strategic plan, the two theoretical properties of the strategic use of MAI-BD can be manifested simultaneously during discussions. As none of them is mandatory for the board, they may or may not be integrated and it could be in a sequential and targeted way, or not. A comment from a board member may simultaneously mirror one aspect of the monitoring of the current strategic plan and of questioning the validity of this plan, along with its long-term relevance. Being strongly intertwined, the two theoretical properties are therefore not conceptually distinct from one another as they both refer to one single theoretical dimension, which is one aspect of the strategy formation process, namely the implementation of strategy. They represent observable examples of board members monitoring the strategic plan and they can be captured by a series of interchangeable and measurable items. In sum, the two theoretical properties are conceptualized as a unidimensional construct related to each management accounting practice, which leads to the determination of three first-order models.

The last issue relates to whether the items that result from the theoretical properties characterize a reflective or a formative model. In other words, to what extent the items (i) represent manifestations or constituent facets of the construct, (ii) co-vary among themselves or not, and (iii) are interchangeable or not (Bisbe et al., 2007). We favor a reflective model as we argue that the theoretical properties and their resulting items represent manifestations of the strategic use of MAI-BD. Therefore, causality implies that the constructs lead to different items reflecting the theoretical properties. More specifically, because the board of directors decides to use MAI strategically, the information provided by top management is used to monitor and question the strategic plan, rather than be used simply for compliance purposes or short-term considerations, for example. That is precisely the mere presence of the information provided by management accounting practices and its potential use by boards for fiduciary or advisory purposes that preclude a formative conceptualization. As board members choose to use the information to monitor the strategic plan, the more they make strategic use of MAI, the more strongly the items reflecting the theoretical properties will be displayed. Furthermore, we anticipate covariance between the items that are attributed to a common theme, specifically the oversight of the strategic plan. Consequently, because the items resulting from the theoretical properties co-vary, they are considered interchangeable, and the removal of one of them would not alter the conceptual domain of the constructs. In other words, the strategic use of MAI-BD is not made up of fixed attributes, but rather of a range of possible effects that can be observed through the actions of the board members.

2.3. Step 2 - Development of items

The aim of this second step is to develop an initial list of items that have a broad coverage to support content validity, bearing in mind that later steps would let us discriminate from among the items. Based on our literature review, the exploratory interviews and our two theoretical properties, we first establish a preliminary list of items generated without constraints. An initial purification is done qualitatively by the two researchers. This step consists of eliminating (i) redundant items conveying the same idea (e.g., *performance indicators support the evaluation of the progress in the deployment of the strategic plan vs the assessment of the advancement in the implementation of the strategic plan*), (ii) items describing the general functioning of management accounting practices (e.g. *budget is comprised of operating and investment components*), (iii) items that did not reflect the involvement of the board of directors, but rather the role of top management (e.g. *top management discuss key performance indicator on a regular basis*), and (iv) items related to the adoption of the budget as part of strategic

planning. The budget adoption is not part of our study in comparison to the budget review executed to monitor the strategic plan that is the focus of our research (e.g. *budget is prepared by management but ratified by the board*). By applying these decision rules, we establish a preliminary set of 45 items.

The items retained are distributed fairly equally among the three unidimensional latent constructs, namely the use of information provided by budget (16 items), non-financial performance indicators (15 items) and financial performance indicators (14 items) to oversee strategy implementation. Regarding the theoretical properties, the 45 items are distributed as follows: monitoring the implementation of the strategic plan (18 items) and questioning the strategic plan (27 items).

2.4. Step 3 - Content validity

The third step was organized in two phases. First, experts in the field evaluate the pertinence of the items of the measurement instrument in line with the theoretical properties. To do so, the 45 items retained are pretested among three academic experts in management accounting and governance who are all senior, highly-respected professors. They are invited to evaluate and closely examine the form and content of the items. Following their comments, the formulation and presentation of the items are adjusted to better reflect the theoretical properties and four items are eliminated, bringing the total to 41. For instance, the item *"Generate lively discussions between the members of your board of directors"* has been eliminated because of its redundancy with another item in the questionnaire and considering the use of an unclear adjective that could be interpreted differently depending of the respondent.

Secondly, two other highly knowledgeable academic experts and seven expert practitioners actively involved on boards of directors are invited to participate in the second phase. Among those expert practitioners having between 25 and 35 years of experience in various organizations, 4 have completed an MBA program and 4 hold professional titles (CPA or CFA). Those nine academic and practitioner experts are asked to examine and evaluate the pertinence of the 41 items on a three-point Likert scale (1 = not representative, 2 = somewhat representative, 3 = clearly representative). To evaluate the items' content validity, one decision rule pertaining to the overall evaluation of the experts is used. Under this rule, we retain the items if at least 80% of the experts found them to be somewhat representative, or 60% of the experts rated them as clearly representative (Hardesty & Bearden, 2004; Zaichkowsky, 1985). For instance, the item *"Make more informed decisions about the strategic plan"* has not been retained because of its ambiguity. It was indeed considered as being more related to the decision-making process than the monitoring process. Following the application of the decision rule and based on the theoretical properties, we retain 36 items after this phase. From these 36 items, 8 are common for the three management accounting practices (and thus $8 \times 3 = 24$ items) and 12 are specific for one of the practices.

2.5. Step 4 - 1st data collection

In order to proceed to a first refinement of the measurement instrument, a small number of respondents was targeted, distinct from the participants questioned during the semi-structured exploratory individual interviews. The data are collected from 30 members of boards of directors. The survey is completed in class by a sample of participants enrolled in a university certification program in governance offered by the CAS. These respondents all hold a director's position in Canadian organizations of all sizes, types and sectors. Specifically, 40% of the respondents sit on boards of directors of private organizations (large enterprises or SMEs), 33% on boards of non-share capital organizations (non-profit, associations, orders and foundation), 20% on boards of governmental organizations, 3% on boards of listed organizations and 4% on boards of cooperatives. Additionally, 63% of the organizations in the sample are small or medium-sized organizations (up to 499 employees) and 37% are large organizations (500 or more employees).

The average age of respondents is 52, and 77% are men. Regarding the level of education, 33% hold an undergraduate degree, 54% a master's degree, 3% a doctorate degree and 10% do not hold a degree. Respondents had sat on 2.4 boards of directors on average, for 13 years, and 83% of boards of directors included fewer than 12 members. A paper survey is used to gather the data and it takes about 20 min to complete. To encourage participation, respondents are given the opportunity to receive a summary of the results upon request.

2.6. Step 5 - 1st purification

As preliminary evidence, the 36 items of the measurement instrument identified in step 3 are analyzed in two phases. In the first phase, an exploratory factor analysis (EFA) with a varimax rotation is done to define the dimensions of the budget and of non-financial and financial performance indicators (Anderson & Gerbing, 1988; Hair et al., 1998). The objective is to verify that each set of items measures only one dimension. The second phase includes establishing the validity of constructs via Cronbach's Alpha. The constructs have to exceed the recommended threshold of 0.70 to reflect an acceptable level (Nunnally, 1978). However, no items are formally removed from the instrument at this stage; only preliminary observations are provided for the following steps. The results are presented in Table 2 and discussed below.

2.6.1. Part A - Use of budget to oversee strategy implementation

The exploratory factor analysis indicates the presence of three dimensions with eigenvalues greater than 1, which explain 54.63%, 13.16% and 7.78% of the variance respectively. The analysis therefore suggests that the 13 items do not converge on a

Table 2

Analyses of the results following the 2nd and 3rd data collection.

Items	Theoretical properties	Confirmatory factor analysis						Decision
		Sample 2 (n = 98) Initial model		Sample 3 (n = 185) Initial model		Sample 3 (n = 185) Respecified model		
		Standardized loading	R ²	Standardized loading	R ²	Standardized loading	R ²	
Part A - Use of budget to oversee strategy implementation								
Question: The information provided by the budget allows your board of directors to ... [Scale: 1- Disagree completely to 7- Agree completely]								
1- Evaluate progress in the deployment of the strategic plan.	1	.894**	.80	.811**	.66	.838**	.70	Retained
2- Do a critical analysis of the deployment of the strategic plan.	1	.882**	.78	.807**	.65	.841**	.71	Retained
3- Judge the performance of top management in the execution of the strategic plan.	1	.872**	.76	.734**	.54	.767**	.59	Retained
4- Encourage discussions of the long-term challenges of the organization.	2	.855**	.73	.716**	.51	.711**	.51	Retained
5- Confirm the feasibility of the strategic plan.	2	.883**	.78	.841**	.71	.860**	.74	Retained
6- Validate the fit between the strategic plan and the resources of the organization.	2	.864**	.75	.823**	.68	.828**	.69	Retained
7- Question the actions foreseen in the strategic plan.	2	.879**	.77	.836**	.70	.869**	.76	Retained
8- Question important changes in macroeconomic forecasts and key assumptions affecting the budget.	2	.743**	.55	.746**	.56	.719**	.52	Retained
9- Examine major budget variance and obtain justifications where appropriate.	1	.678**	.46	.631**	.40	—	—	Eliminated
10- Examine major budget variance to question corrective measures proposed by top management.	1	.669**	.45	.654**	.43	—	—	Eliminated
11- Question rolling forecasts for the current budget year.	1	.637**	.41	.607**	.37	—	—	Eliminated
12- Question reasons for adjustments to the budget.	1	.728**	.53	.719**	.52	.710**	.50	Retained
13- Hold in-depth discussions of budget issues that actively involve all board members.	2	.718**	.52	.642**	.41	—	—	Eliminated
Fit statistics:		$\chi^2 = 408.5$; p < .00; NNFI = .704; CFI = .753; SRMR = .097		$\chi^2 = 860.7$; p = .01; NNFI = .849; CFI = .874; SRMR = .116		$\chi^2 = 80.32$; p = .01; NNFI = .972; CFI = .979; SRMR = .039		
Cronbach's Alpha:		.93		.94		.94		
Composite reliability:		.95		.94		.94		
Variance extracted:		.64		.55		.63		

(continued on next page)

Table 2 (continued)

Items	Theoretical properties	Confirmatory factor analysis						Decision
		Sample 2 (n = 98) Initial model		Sample 3 (n = 185) Initial model		Sample 3 (n = 185) Respecified model		
		Standardized loading	R ²	Standardized loading	R ²	Standardized loading	R ²	
Part B - Use of non-financial performance indicators to oversee strategy implementation								
Question: The information provided by the non-financial performance indicators (e.g., <i>market share, new product development, customer satisfaction, etc.</i>) allows your board of directors ... [Scale: 1- Disagree completely to 7- Agree completely]								
1- Evaluate progress in the deployment of the strategic plan.	1	.893**	.80	.875**	.77	.881**	.78	Retained
2- Do a critical analysis of the deployment of the strategic plan.	1	.920**	.85	.870**	.76	.875**	.77	Retained
3- Judge the performance of top management in execution of the strategic plan.	1	.891**	.79	.867**	.75	.872**	.76	Retained
4- Encourage discussions of the long-term challenges of the organization.	2	.909**	.83	.862**	.74	.861**	.74	Retained
5- Confirm the feasibility of the strategic plan.	2	.905**	.82	.888**	.79	.901**	.81	Retained
6- Validate the fit between the strategic plan and the resources of the organization.	2	.892**	.80	.851**	.72	.859**	.74	Retained
7- Question the actions foreseen in the strategic plan.	2	.919**	.84	.880**	.78	.881**	.78	Retained
8- Examine the combined effect of non-financial indicators on each other.	1	.837**	.70	.790**	.62	.759**	.58	Retained
9- Examine the combined effect of financial and non-financial indicators.	1	.847**	.72	.822**	.68	—	—	Eliminated
10- Examine the results of the current period to question corrective measures proposed by top management.	2	.883**	.78	.844**	.71	.837**	.70	Retained
11- Ask top management for new non-financial indicators to have all relevant information in hand.	1	.819**	.67	.810**	.66	.798**	.64	Retained
12- Hold in-depth discussions of non-financial indicators that actively involve all board members.	2	.806**	.65	.838**	.70	—	—	Eliminated
Fit statistics:		$\chi^2 = 262.09$; p < .00; NNFI = .921; CFI = .935; SRMR = .047		$\chi^2 = 357.3$; p = .01; NNFI = .941; CFI = .952; SRMR = .044		$\chi^2 = 179.1$; p = .01; NNFI = .958; CFI = .967; SRMR = .034		
Cronbach's Alpha:		.98		.96		.96		
Composite reliability:		.98		.97		.96		
Variance extracted:		.77		.72		.73		

Part C - Use of financial performance indicators to oversee strategy implementationQuestion: The information provided by the financial performance indicators (e.g., *ROI*, *earnings*, etc.) allows your board of directors ... [Scale: 1- Disagree completely to 7- Agree completely]

1- Evaluate progress in the deployment of the strategic plan.	1	.954**	.91	.849**	.72	.870**	.76	Retained
2- Do a critical analysis of the deployment of the strategic plan.	1	.954**	.91	.856**	.73	.876**	.77	Retained
3- Judge the performance of top management in the execution of the strategic plan.	1	.915**	.84	.845**	.71	.866**	.75	Retained
4- Encourage discussions of the long-term challenges of the organization.	2	.944**	.89	.828**	.69	.827**	.68	Retained
5- Confirm the feasibility of the strategic plan.	2	.940**	.88	.840**	.71	.849**	.72	Retained
6- Validate the fit between the strategic plan and the resources of the organization.	2	.921**	.85	.805**	.65	.786**	.62	Retained
7- Question the actions foreseen in the strategic plan.	2	.933**	.87	.836**	.70	.833**	.69	Retained
8- Examine the combined effect of financial indicators on one another.	1	.869**	.76	.691**	.48	—	—	Eliminated
9- Examine the results of the current period to question corrective measures proposed by top management.	2	.920**	.85	.737**	.54	.737**	.54	Retained
10- Ask top management for new financial indicators to have all relevant information in hand.	1	.901**	.81	.657**	.43	—	—	Eliminated
11- Hold in-depth discussions of financial indicators that actively involve all board members.	2	.872**	.76	.691**	.48	—	—	Eliminated
Fit statistics:		$\chi^2 = 79.62$; $p < .00$; NNFI = .959; CFI = .968; SRMR = .037		$\chi^2 = 321.4$; $p = .01$; NNFI = .912; CFI = .930; SRMR = .076		$\chi^2 = 107.8$; $p = .01$; NNFI = .948; CFI = .963; SRMR = .041		
Cronbach's Alpha:		.98		.96		.95		
Composite reliability:		.98		.95		.95		
Variance extracted:		.85		.62		.69		

Notes: Theoretical properties: 1 - Monitoring the implementation of the strategic plan; 2 - Questioning the strategic plan.

*Significant at .05. **Significant at .01.

single dimension. The Cronbach's Alpha of 0.93 meets the minimum thresholds. Additional analyses suggest removing items 9, 10 and 11 would improve this coefficient.

2.6.2. Part B - Use of non-financial performance indicators to oversee strategy implementation

The exploratory factor analysis identifies two dimensions with eigenvalues greater than 1, which explain 64.48% and 16.06% of the variance respectively. The analysis therefore suggests that the 12 items do not converge on a single dimension. The Cronbach's Alpha of 0.95 meets the minimum thresholds, whilst no deletion of item would improve this result.

2.6.3. Part C - Use of financial performance indicators to oversee strategy implementation

The exploratory factor analysis indicates the presence of two dimensions with eigenvalues greater than 1, which explain 62.90% and 11.21% of the variance respectively. The analysis therefore suggests that the 11 items do not converge on a single dimension. Although the Cronbach's Alpha of 0.91 meets the minimum thresholds, additional analyses suggest that the removal of items 8 and 10 would improve this result.

To summarize, this first purification step suggests that items of the three constructs do not converge on a single dimension. It appears that some items might have to be deleted to improve the reliability of the scales. Following these initial results, additional analyses are required to validate these preliminary observations. The reliability and validity of the measurement instrument are evaluated in subsequent analyses using two extended samples of board members.

2.7. Step 6 - 2nd and 3rd data collection

To validate the measurement instrument, still containing 36 items, data were gathered from two additional samples. The two samples differ in terms of size and origin of the respondents. The latter are distinct from the sample of board members solicited for individual exploratory interviews and from the respondents surveyed during the first data collection phase. In both cases, to encourage participation, respondents are given the opportunity to receive a summary of the results upon request.

The second sample is made up of 736 directors holding the title of Certified Company Directors. An online survey is used to facilitate the data collection process. Respondents are first contacted by email sent by the CAS. This email describes the objectives of the questionnaire, invites directors to participate and provides a web address to complete the survey. The email is followed by two reminder emails sent at two-week intervals to all directors included in the sample.

In total, 98 useable surveys are received for a response rate of 13.3%. The respondents all hold the position of director in Canadian organizations of all sizes, types and sectors. More specifically, 34% of respondents sit on boards of directors of non-share capital organizations (non-profit, association, orders and foundations), 31% on boards of governmental organizations, 23% on boards of private organizations (large enterprises or SMEs), 5% on boards of listed organizations and their subsidiaries, and 7% on boards of cooperatives. In addition, 66% of the organizations are small or medium-sized (up to 499 employees) and 34% are large organizations (500 or more employees). Regarding respondents' individual characteristics, their average age is 58, and 55% are men. Regarding the level of education, 35% hold an undergraduate degree, 51% a master's degree, 8% a doctorate degree, and 6% do not hold a degree. Respondents had sat on 2.6 boards of directors on average, for 17 years, and 61% of boards of directors include fewer than 12 members.

The third sample is made up of 927 directors of board of private and listed Canadian organizations. The directors have been identified from the Infomart database, LinkedIn and the new members added to CAS directory.⁴ One again, an online survey is used to facilitate the data collection process. Respondents are first contacted by email sent by a private research firm, directly by one of the researchers, or by the CAS. This email describes the objectives of the questionnaire, invites directors to participate and provides a web address to complete the survey. The email is followed up by reminder emails and/or follow-up phone calls to all directors included in the sample.

In total, 185 useable surveys are received for a response rate of 20%. More specifically, 54% of respondents sit on boards of directors of organizations operating in the industrial sector and 46% are from the service sector. In addition, 67% of the organizations are small or medium-sized (up to 499 employees) and 33% are large organizations (500 or more employees). Regarding respondents' individual characteristics, 84% pertain to the group of 51 years old and more, and 78% are men. Regarding the level of education, 38% hold an undergraduate degree, 48% a master's degree, 8% a doctorate degree, and 6% do not hold a degree. Respondents had sat on 2.7 boards of directors on average, for 17 years, and 85% of boards of directors include fewer than 12 members.

For both samples, we performed an analysis of the non-response bias to confirm the validity of the data. The comparison between the first and last 10% of respondents (the latter being used as a proxy for the non-respondents) did not reveal any significant differences in the responses obtained. Hence, it appears that non-response bias is not a major concern in this sample.

⁴ These directors are different from those surveyed in the second sample. They represent new members holding the Certified Company Directors recently.

2.8. Step 7 - 2nd purification

This step is carried out by conducting three first-level confirmatory factor analyses (CFA): (i) the *initial model* containing all items of the instrument using data from sample 2, (ii) the *initial model* containing all items of the instrument using data from sample 3, and (iii) the *respecified model* is the optimal model based on the conclusions suggested by the previous two models and based on data from sample 3. The analyses also include other statistical tests such as Cronbach's Alpha, composite reliability and variance extracted.⁵ Regarding the CFAs, three main elements are examined: (i) the standardized loading factor and the R^2 for each item,⁶ (ii) the global acceptability of the measures of the model using statistical chi-square statistics, and (iii) three fit indices.⁷ For an item to be retained, all thresholds in samples 2 and 3 have to be exceeded.

2.8.1. Part A - Use of budget to oversee strategy implementation

The results of the initial model run on samples 2 and 3 show that all the items are statistically significant ($p < .01$). The set of three fit indices does not meet the minimum thresholds and the analysis of R^2 suggests an inadequate level for items 9, 10, 11 and 13. Regarding the other statistical tests, namely Cronbach's Alpha, composite reliability and variance extracted, they all meet the minimum thresholds. These results are in line with the preliminary recommendation provided in the purification step. The respecified model is conducted by removing the four problematic items. It not only respects all the thresholds and decision criteria, it also outperforms the initial model. Therefore, the nine remaining items of the instrument exhibit satisfactory dimensionality and are retained in the final instrument.

2.8.2. Part B - Use of non-financial performance indicators to oversee strategy implementation

The results of the initial model based on data from samples 2 and 3 respect the threshold and decision criteria (except for the CFI indice that is under 0.95 for sample 2). However, the analysis of this model shows that some items have very high correlations, thus creating multicollinearity problems. The structural equation technique requires that the function that represents the entry matrix be reversible, that is, the function must possess an inverse function. This is not the case if some conditions are violated; one of the main violations is the presence of multicollinearity (Roussel et al., 2002). Considering the multicollinearity issues between items 8 and 9, items 9 and 10, items 7 and 12, and items 11 and 12, we decided to eliminate items 9 and 12 in the respecified model. The set of three fit indices of the respecified model, Cronbach's Alpha, composite reliability, variance extracted, as well as the R^2 and loadings of the specific items, they all meet the minimum thresholds and globally outperform the initial model. Therefore, the ten residual items of the instrument exhibit satisfactory dimensionality and outperform the initial model. They are retained in the final instrument.

2.8.3. Part C - Use of financial performance indicators to oversee strategy implementation

The results of the initial model conducted on sample 2 respect all the thresholds and decision criteria. However, the analysis of the initial model using the data from sample 3 reveals various concerns: (i) items 8, 10 and 11 did not reach the minimal threshold for the R^2 , (ii) the CFI indices is insufficient. Therefore, those three items have been removed in the respecified model. The results of the latter respect all the thresholds and decision criteria. Therefore, the eight residual items of the instrument exhibit satisfactory dimensionality and they are retained in the final instrument.

In sum, the results of various statistical analyses have resulted in the elimination of 9 out of the 36 items. Conceptually, these items are less representative of an action emanating from a strategic role of board members than the others. More specifically, these items are more oriented towards informational content or they are more processual. The set of factor analyses and other statistical tests support the reliability, validity, and dimensionality of the remaining 27 items included in the measurement instrument. From those 27 items, 7 are common for the three management accounting practices (and thus $7 \times 3 = 21$ items) and 6 are specific to one of the practices.

2.9. Step 8 - Evaluation of reliability and validity

To evaluate the reliability and validity of the measurement instrument, three additional statistical tests are performed: (i) discriminant validity (Anderson & Gerbing, 1988; Fornell & Larcker, 1981), (ii) statistical power analysis (Bentler & Chou, 1987), and (iii) sector analysis (Messner, 2016).

2.9.1. Discriminant validity

Discriminant validity corresponds to the capacity of a measure to provide different results from those of measures of other constructs (Roussel et al., 2002). It is evaluated first by comparing the variance extracted for each individual construct with

⁵ Cronbach's Alpha and composite reliability of the constructs have to exceed the recommended threshold of 0.70 to reflect an acceptable level (Fornell & Larcker, 1981; Nunnally, 1978). Variance extracted must exceed the recommended threshold of 0.50 to reflect acceptable validity (Hair et al., 1998).

⁶ Following past literature, the decision rule is to accept items that had R^2 greater than 0.50 (Fornell & Larcker, 1981).

⁷ The three fit indices, namely the non-normed fit index (NNFI), the comparative fit index (CFI) and Standardized Root Mean Square Residual (SRMR), are used because of their broad acceptance (Roussel & Wacheux, 2005). The thresholds to meet to evaluate the model are: NNFI > 0.90 (Tabachnick & Fidell, 2001), CFI > 0.95 (Hu & Bentler, 1995) and SRMR < 0.08 (Hu & Bentler, 1999).

the square of the correlation between the latent constructs (Fornell & Larcker, 1981). In this case, to support discriminant validity, the variance extracted for each construct must exceed the correlation squared. For both samples, the variance extracted of the budget (.64/.63), of non-financial performance indicators (.77/.73) and of financial performance indicators (.85/.69) exceed the correlation squared between their construct and the two other unidimensional constructs of the use of MAI-BD to oversee strategy implementation.

In addition, discriminant validity is evaluated by the Chi-square difference test for nested models (Anderson & Gerbing, 1988). The first step of this test is to compare the complete model with a latent variables model. The complete model corresponds to the 27 items retained in the measurement instrument converging on a single latent variable, which thus represents a unique construct (use of MAI-BD to oversee strategy implementation). The model by latent variables corresponds to the 27 items retained in the measurement instrument that converge specifically on one of the three unidimensional constructs of the model (budget, non-financial and financial performance indicators). For the second and third sample, the analysis of the results indicates that the difference in Chi-squares is positive and significant ($p < 0.01$), with a Chi-square of respectively 954 and 969 for the model by latent variables and a Chi-square of 3099 and 6413 for the complete model. This first step of the test is therefore conclusive because the model by latent variables outperforms the complete model.

The second step consists of repeating the test but taking the three unidimensional constructs two by two, for example budget and non-financial performance indicators. In this case, the complete model corresponds to the 19 items retained in the measurement instrument for these two specific dimensions (9 items for the budget and 10 items for non-financial performance indicators) converging on a single latent construct. The model by latent constructs corresponds to the 18 items retained in the measurement instrument converging specifically on the two constructs of the model (budget and non-financial performance indicators). As in the case of the first step of the test, to support discriminant validity, the model by latent constructs must demonstrate that it performs better than the complete model following the positive and significant difference in their chi-squares (Anderson & Gerbing, 1988). For both samples, the Chi-square difference test for nested models demonstrates a positive and significant difference ($p < 0.01$) of chi squares in favor of the latent construct approach, for all combinations of the three constructs of strategic use of MAI-BD. In sum, the results of the tests of discriminant validity strongly suggest that the strategic use of information provided by budget, non-financial and financial performance indicators make up three different constructs.

2.9.2. Statistical power

Statistical power analysis entails detecting a difference, if one in fact exists. There are two main reasons that a study may not show a significant difference between the groups examined: (i) there was no significant difference and (ii) there was in fact a difference but the study could not detect it. This may have resulted from a lack of statistical power because the sample is too small (Roussel et al., 2002). To adequately support the statistical power of a study for small and medium structural equation models, sample size must range from 5 to 10 observations per parameter (Bentler & Chou, 1987). The statistical power analysis shows that the number of observations (98 or 185) divided by the number of parameters resulting from the construct of strategic use of budget (18), non-financial performance indicators (20) and financial performance indicators (16) reaches the minimal threshold of the ratio required, respectively in both samples for the three constructs of use of MAI-BD to oversee strategy implementation.

2.9.3. Sector analysis

Sector analysis is used to (i) empirically examine the issue of heterogeneity of the population and (ii) demonstrate the applicability of the measurement instrument to different types of organizations. Regarding sample 2, given that non-share capital organizations (non-profit, associations, orders and foundations) and governmental organizations (hereafter group 1 – not-for-profit organizations) are different from listed and public organizations, private firms and cooperatives (hereafter group 2 – for-profit organizations), we must ensure that the measurement instrument can adapt to the realities of these two types of organizations. A large body of literature has examined the differences between these two groups (Forbes & Milliken, 1999; Miller-Millesen, 2003). Thus, sector analysis, separating the organizations in group 1 ($n = 63$) from those in group 2 ($n = 35$), indicates the presence of one dimension with an eigenvalue greater than 1, which respectively explains more than 72% and 75% of the variance for each of the three unidimensional constructs of use of MAI-BD to oversee strategy implementation. The analysis therefore suggests that, for each group, each set of items measures a single dimension. In addition, the evaluation of the construct validity shows that the Cronbach's Alpha is higher than 0.90 for the set of three unidimensional constructs for both groups of organizations. These results indicate strong construct validity and the applicability of the instrument for both for-profit and not-for-profit organizations.

Regarding sample 3, given that organizations from industrial sectors (hereafter group 1) might differ from organizations from service sectors (hereafter group 2), we must ensure that the measurement instrument can adapt to the realities of these two types of organizations. Some studies have examined the differences between these two groups (Auzair & Langfield-Smith, 2005; Cugini et al., 2007). Thus, sector analysis, separating the organizations in group 1 ($n = 100$) from those in group 2 ($n = 85$), indicates the presence of one dimension with an eigenvalue greater than 1, which respectively explains more than 69% and 64% of the variance for each of the three unidimensional constructs of use of MAI-BD to oversee strategy implementation. The analysis therefore suggests that, for each group, each set of items measures a single dimension. In addition, the evaluation of the construct validity shows that the Cronbach's Alpha is higher than 0.93 for the set of three

Table 3
Descriptive statistics and correlation matrix.

	Use of budget to oversee strategy implementation	Use of non-financial performance indicators to oversee strategy implementation	Use of financial performance indicators to oversee strategy implementation	Board members involvement in monitoring the implementation of organizational strategy
Panel A: 2nd sample (n = 98)				
Descriptive statistics				
No. of items	9	10	8	1
Theoretical range	1–7	1–7	1–7	1–7
Minimum	1.67	1	1	2
Maximum	7	7	7	7
Mean	5.26	5.12	4.96	5.31
Standard deviation	1.22	1.35	1.58	1.21
Median	5.33	5.35	5.25	5.00
Correlation matrix				
Use of budget to oversee strategy implementation	1			
Use of non-financial performance indicators to oversee strategy implementation	.741**	1		
Use of financial performance indicators to oversee strategy implementation	.791**	.701**	1	
Board members involvement in monitoring the implementation of organizational strategy	.517**	.544**	.433**	1
Panel B: 3rd sample (n = 185)				
Descriptive statistics				
No. of items	9	10	8	1
Theoretical range	1–7	1–7	1–7	1–7
Minimum	1.67	1.2	2	1
Maximum	7	7	7	7
Mean	5.54	5.37	5.63	5.82
Standard deviation	1.07	1.06	.95	1.35
Median	5.67	5.40	5.63	6.00
Correlation matrix				
Use of budget to oversee strategy implementation	1			
Use of non-financial performance indicators to oversee strategy implementation	.367**	1		
Use of financial performance indicators to oversee strategy implementation	.636**	.698**	1	
Board members involvement in monitoring the implementation of organizational strategy	.476**	.213**	.406**	1

Note: * Significant at the .05 level. ** Significant at the .01 level.

unidimensional constructs for both groups of organizations. These results indicate strong construct validity and the applicability of the instrument for both industrial and service sector.

In sum, the results of the sector analysis demonstrate that the measurement instrument is adapted to the context of a wide variety of organizations.

2.10. Step 9 - Preliminary evidence and face validity

Table 3 first presents the descriptive statistics as preliminary evidence for the second and third sample. The mean score of the strategic use of the three types of MAI-BD are respectively: (i) budget: 5.26/5.54, (ii) non-financial performance indicators: 5.12/5.37, and (iii) financial performance indicators: 4.96/5.63.⁸ In the second sample, the difference between the mean score of budget and financial performance indicators is statistically significant ($p < .01$), but not the other pairs. In the third sample, two pairs are significant, namely budget and non-financial performance indicators, and non-financial and financial performance indicators ($p < .05$). This suggests that management accounting information is well-integrated into the boards' routines to support its strategic role.

In order to assess the degree to which the measurement instrument captures the construct that it is supposed to measure, we examine the correlations between the three constructs of use of MAI-BD to oversee strategy implementation and one additional variable derived from the questionnaire, namely the involvement of board members in the implementation of organizational strategy (one item using a seven-point Likert scale). The table shows that, for both samples, the correlations

⁸ This difference in the mean score of use of financial performance indicators to oversee strategy implementation between the two samples is explained by the composition of the samples. The second sample is comprised of 35% of for-profit organizations compared to 100% in the third sample.

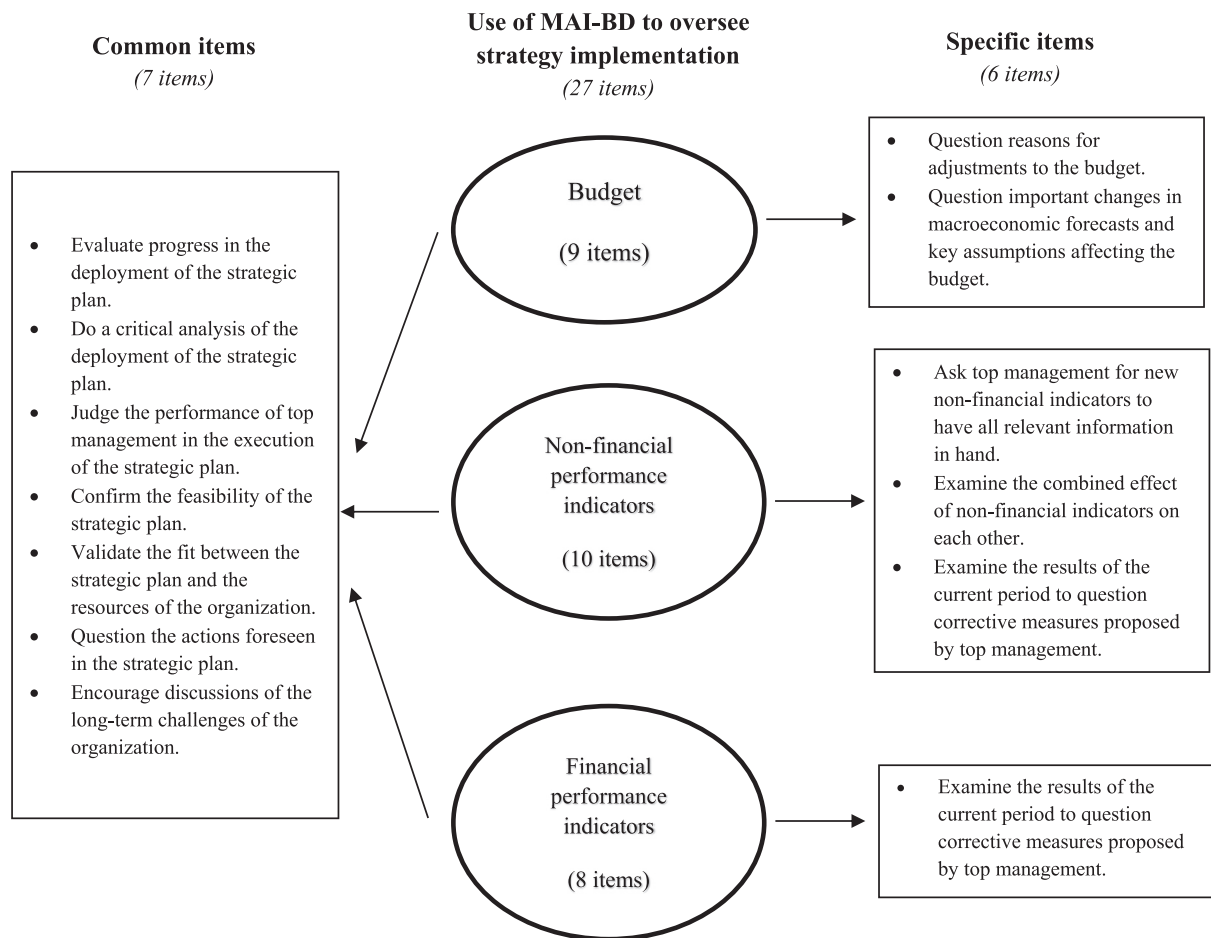


Fig. 2. Synthesis of the measurement model.

between the measurement of the three constructs of use of MAI-BD for strategy implementation and involvement of board members in the implementation of organizational strategy are all positive and statistically significant ($p < .01$). As expected, these results therefore suggest that there is a link between the use of MAI-BD to oversee the strategic plan and the importance devoted by the board of directors in following the implementation of strategy, and thus support face validity.

Regarding the second sample, an additional analysis (not tabulated) was conducted to compare the mean scores of the three types of MAI-BD for two sub-groups, namely not-for-profit organizations (group 1) and for-profit organizations (group 2). The results suggest a more extensive use of MAI-BD to oversee the strategic plan in the group of for-profit organizations compared to the group of not-for-profit organizations: (i) budget 5.63 versus 5.04; $p < .05$, (ii) non-financial performance indicators 5.48 versus 4.91; $p < .05$; and (iii) financial performance indicators 5.62 versus 4.59; $p < .01$. This suggests that the measurement model proposed is not only suitable for various organizational contexts as discussed in the previous step, but it also has the ability to capture and show the variations of strategic use of MAI-BD between those contexts. For the third sample, no significant difference is observed between the strategic use of MAI-BD for firms conducting business in the sector service compared with the industrial sector.

In conclusion, the various statistical analyses support the conceptual bases that have been established and demonstrate the validity and reliability of the instrument developed to measure the use of MAI-BD to oversee strategy implementation. Fig. 2 presents the summary of the items retained in the final measurement model.

3. Conclusion

The aim of this study was to examine the use of management accounting information to oversee strategy implementation in the context of board of directors. Specifically, our goal was to contribute to the management accounting literature by establishing theoretical properties and by proposing a measurement model that captures the use of budget, financial and non-financial performance indicators by boards of directors to oversee the strategic plan. To develop the measurement

instrument, conceptual specifications of constructs have been established and the validity and reliability of the instrument have been evaluated and discussed using a rigorous multi-method integrated approach that includes a literature review, exploratory interviews, consultation of experts in management accounting and governance, and three samples of boards of directors.

The conceptual domain of the use of MAI-BD to oversee strategy implementation was based on a matrix approach that combines (i) the information conveyed by three management accounting practices, namely the budget, and non-financial and financial performance indicators, along with (ii) two theoretical properties reflecting board activities, namely monitoring implementation of the strategic plan, and questioning the strategic plan. The empirical data support these conceptual bases by demonstrating that the use of MAI-BD to oversee strategy implementation is comprised of three unidimensional reflective constructs. The results of the different statistical tests demonstrate strong reliability and validity of the three constructs expressed in 27 items, of which 7 are common to the three management accounting practices and 6 are specific.

This study contributes mainly to management accounting literature. Past research has overlooked the specific informational needs and use of MAI by board of directors, which constitute a distinctive unit of analysis, by focusing mainly on organizational actors within the boundaries of the firm. By developing a measurement model based on careful establishment of conceptual specifications and rigorous psychometric assessment, we aim to contribute to the survey-based research by providing a specific measurement instrument adapted to the use of MAI for strategic oversight by the board of directors. To our knowledge, no such instrument has been developed in the management accounting, strategy or governance literatures. It will provide bases for future empirical research for academics interested in management accounting information in the context of governance.

This study also contributes to governance literature. The contribution of this study lies in the specific investigation of the strategic-based advisory role of the board of directors rather than the conformity-based fiduciary role. The empirical literature on governance is extensively supported by the agency theory. Although it expands the sphere of influence of governance, this theory suggests that the main role of the board is to protect shareholders from opportunistic behavior by top management. In addition, this theory sheds little light beyond control problems because it largely supports the role of conformity of the board of directors. Although the strategic role of the board of directors has been examined in the governance literature, it does not rely on the same kind of theoretical foundation. It is therefore worth developing an instrument that could reveal some aspects of this reality in order to support other researchers in testing new or existing theory. Secondly, this paper also contributes by focusing on the informational dynamic of boards of directors. Current governance literature mainly addresses corporate control by distancing itself from informational needs in a strategic context. More specifically, a generic view of information availability and utilization is provided as no clear distinction is made depending on the source of the information (Zhu et al., 2016).

Beyond these theoretical contributions, this study would allow directors to grasp the importance and relevance of obtaining varied management accounting information and assembling various practices with which to fulfill their strategic role. Because their role entails questioning and challenging top management, directors should consult or at least request different forms of financial and non-financial information to facilitate their work. Our measurement instrument can also be useful to help board members diagnose their current strategic use of MAI-BD, and to make adjustments and corrections where necessary.

This study nonetheless has some limitations. These limitations concern the choice of management accounting practices and their use emphasizing the oversight strategy implementation. First, the three management accounting practices examined in this study are not the only practices potentially used by a board of directors. Therefore, we do not claim or attempt to capture all of the MAI used by boards of directors in overseeing the strategic plan. In addition, we have emphasized the use of management accounting information by boards of directors during the oversight of the strategic plan, and therefore we did not specifically examine the potential use of this information in the strategy formulation process. Lastly, concerning sample size, although the statistical power analysis is adequate, it would have been interesting to obtain a larger response rate. Considering that time is limited among directors and top executives, the response rates obtained are satisfactory and are similar to the 15–25% range reported in similar recent studies in management accounting (e.g., Guenther & Heinicke, 2019) and governance (e.g., Derdowski et al., 2018).

The results of this study pave the way to future research. The development of theoretical properties and of the items of the measurement instrument would allow future studies to examine the link between the oversight of the strategic plan by the board of directors using MAI and another phenomenon. Supplementary research could include more qualitative aspects to deepen our understanding of the strategic use of MAI by boards of directors. It would also be worth expanding the scope of management accounting practices applied to boards of directors and to examine their role in influencing top management's behavior.

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References

- Abernethy, M. A., & Brownell, P. (1997). Management control systems in research and development organizations: The role of accounting, behavior and personnel controls. *Accounting, Organizations and Society*, 22, 233–248.
- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103, 411–423.
- Argyris, C., & Schön, D. (1978). *Organizational learning*. Reading, MA: Addison Wesley.
- Auzair, S. M., & Langfield-Smith, K. (2005). The effect of service process type, business strategy and life cycle stage on bureaucratic MCS in service organizations. *Management Accounting Research*, 16, 399–421.
- Babbie, E. (2004). *The practice of social research* (10th ed.). Belmont, CA: Wadsworth.
- Bagozzi, R. P. (1994). Measurement in marketing research: Basic principles of questionnaire design. *Principles of marketing research*, 1, 1–49.
- Baysinger, B., & Hoskisson, R. E. (1990). The composition of boards of directors and strategic control: Effects on corporate strategy. *Academy of Management Review*, 15, 72–87.
- Bentler, P. M., & Chou, C. P. (1987). Practical issues in structural modeling. *Sociological Methods & Research*, 16, 78–117.
- Berle, A., & Means, G. (1932). *The modern corporation and private property*. New York: Macmillan.
- Bisbe, J., Batista-Foguet, J. M., & Chenhall, R. (2007). Defining management accounting constructs: A methodological note on the risks of conceptual misspecification. *Accounting, Organizations and Society*, 32, 789–820.
- Churchill, G. (1979). A paradigm for constructing better measures of marketing concept. *Journal of Marketing Research*, 16, 64–73.
- Cohen, P., Cohen, J., Teresi, J., Marchi, M., & Velez, C. N. (1990). The problems in the measurement of latent variables in structural equations causal models. *Applied Psychological Measurement*, 14, 183–196.
- Cugini, A., Caru, A., & Zerbini, F. (2007). The cost of customer satisfaction: A framework for strategic cost management in service industries. *European Accounting Review*, 16, 499–530.
- Daily, C. M., Dalton, D. R., & Cannella, A. A. (2003). Corporate governance: Decades of dialogue and data. *Academy of Management Review*, 28, 371–382.
- Davies, A. (1991). Strategic planning for the board. *Long Range Planning*, 24, 94–100.
- Derdowski, L., Øgaard, T., Marnburg, E., & Mathisen, G. E. (2018). Creative and innovative behaviours of corporate directors: An elusive role of task-related conflicts. *Journal of Management & Governance*, 22, 1045–1069.
- Edwards, J. R. (2001). Multidimensional constructs in organizational behavior research: An integrative analytical framework. *Organizational Research Methods*, 4, 144–192.
- Edwards, J. R., & Bagozzi, R. P. (2000). On the nature and direction of relationships between constructs and measures. *Psychological Methods*, 5, 155–174.
- Eisenhardt, K. M. (1985). Control: Organizational and economic approaches. *Management Science*, 31, 134–149.
- Ekholm, B. G., & Wallin, J. (2000). Is the annual budget really dead? *European Accounting Review*, 9, 519–539.
- Evrard, Y., Pras, B., & Roux, E. (1993). *Market, études et recherches en marketing. Fondements, méthodes*. Paris: Nathan.
- Forbes, D. P., & Milliken, F. J. (1999). Cognition and corporate governance: Understanding boards of directors as strategic decision-making groups. *Academy of Management Review*, 24, 489–505.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 39–50.
- Guenther, T. W., & Heinicke, A. (2019). Relationships among types of use, levels of sophistication, and organizational outcomes of performance measurement systems: The crucial role of design choices. *Management Accounting Research*, 42, 1–25.
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis with readings*. New York: Prentice Hall.
- Hardesty, D. M., & Bearden, W. O. (2004). The use of expert judges in scale development: Implications for improving face validity of measures of unobservable constructs. *Journal of Business Research*, 57, 98–107.
- Hendry, K., & Kiel, G. C. (2004). The role of the board in firm strategy: Integrating agency and organizational control perspectives. *Corporate Governance: An International Review*, 12, 500–520.
- Hu, L., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Doyle (Ed.), *Structural equation modeling*. Thousand Oaks, CA: Sage.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1–55.
- Hulland, J. (1999). Use of PLS in strategic management research: A review of four recent studies. *Strategic Management Journal*, 20, 195–203.
- Jarvis, C. B., Mackenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research*, 30, 199–218.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behaviour, agency costs and ownership structure. *Journal of Financial Economics*, 3, 305–360.
- Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard: Measures that drive performance. *Harvard Business Review*, 70, 71–79.
- Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard: Translating strategy into action*. Boston: Harvard Business School Press.
- Labelle, R., Gargouri, M., & Francoeur, C. (2010). Ethics, diversity management and financial reporting quality. *Journal of Business Ethics*, 93, 335–353.
- Langfield-Smith, K. (2008). Strategic management accounting: How far have we come in 25 years? *Accounting, Auditing & Accountability Journal*, 21, 204–228.
- Langfield-Smith, K. (2007). A review of quantitative research in management control systems and strategy. In C. S. Chapman, A. G. Hopwood, & M. D. Shields (Eds.), *Handbook of Management Accounting Research*. Oxford, UK: Elsevier.
- Langley, A., Mintzberg, H., Pitcher, P., Posada, E., & Saint-Macary, J. (1995). Opening up decision making: The view from the black stool. *Organization Science*, 6, 260–279.
- Law, K. S., Wong, C., & Mobley, W. H. (1998). Toward a taxonomy of multidimensional constructs. *Academy of Management Review*, 23, 741–755.
- Lincoln, J. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.
- Messner, M. (2016). Does industry matter? How industry context shapes management accounting practice. *Management Accounting Research*, 31, 103–111.
- Miller-Millesen, J. L. (2003). Understanding the behavior of nonprofit boards of directors: A theory-based approach. *Nonprofit and Voluntary Sector Quarterly*, 32, 521–547.
- Nadler, D., Behan, B., & Nadler, M. (2006). *Building better boards: A blueprint for effective governance*. San Francisco, CA: Jossey-Bass.
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.
- Ouchi, W. (1979). A conceptual framework for the design of organization control mechanisms. *Management Science*, 25, 833–848.
- Parker, L. D. (2008). Boardroom operational and financial control: An insider view. *British Journal of Management*, 19, 65–88.
- Peter, J. P. (1981). Construct validity: A review of basic issues and marketing practices. *Journal of Marketing Research*, 133–145.
- Pratt, M. G. (2009). For the lack of a boilerplate: Tips on writing up (and reviewing) qualitative research. *Academy of Management Journal*, 52, 856–862.

- Roberts, E. S. (1999). In defence of the survey method: An illustration from a study of user information satisfaction. *Accounting and Finance*, 39, 53–77.
- Roberts, J., McNulty, T., & Stiles, P. (2005). Beyond agency conceptions of the work of the non-executive director: Creating accountability in the boardroom. *British Journal of Management*, 16, 5–26.
- Rossiter, J. R. (2002). The C-OAR-SE procedure for scale development in marketing. *Research in Marketing*, 19, 305–331.
- Roussel, P., Durieu, F., Campoy, E., & El Akremi, A. (2002). *Méthodes d'équations structurelles: Recherche et application en gestion*. Paris: Economica.
- Roussel, P., & Wacheux, F. (2005). *Management des ressources humaines. Méthodes de recherche en sciences humaines et sociales*. Bruxelles: De Boeck.
- Roy, M.-J. (2011). Board information: Meeting the evolving needs of corporate directors. *Management Research Review*, 34, 773–789.
- Rutherford, M. A., & Buchholtz, A. K. (2007). Investigating the relationship between board characteristics and board information. *Corporate Governance: An International Review*, 15, 576–584.
- Schmitt, N. W., & Klimoski, R. J. (1991). *Research methods in human resources management*. Cincinnati: South-Western Publishing Co.
- Schreyögg, G., & Steinmann, H. (1987). Strategic control: A new perspective. *Academy of Management Review*, 12, 91–103.
- Siciliano, J. I. (2002). Governance and strategy implementation: Expanding the board's involvement. *Business Horizons*, 45, 33–38.
- Simons, R. (1990). The role of management control systems in creating competitive advantage: New perspectives. *Accounting, Organizations and Society*, 15, 127–143.
- Stiles, P., & Taylor, B. (2001). *Boards at work, how directors view their roles and responsibilities*. New York: Oxford University press.
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Needham Heights, MA: Allyn and Bacon.
- Williamson, O. E. (1984). The economics of governance: Framework and implications. *Journal of Institutional Economics*, 140, 195–223.
- Zaichkowsky, J. L. (1985). Measuring the involvement construct. *Journal of Consumer Research*, 12, 341–352.
- Zhu, H., Wang, P., & Bart, C. (2016). Board processes, board strategic involvement, and organizational performance in for-profit and non-profit organizations. *Journal of Business Ethics*, 136, 311–328.