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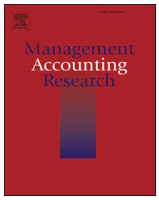

The influence of organizational structure on value-based management sophistication

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ABSTRACT

Despite the widespread use of value-based management (VBM) in European companies, studies investigating the reasons for the differences in its sophistication remain scarce and are predominantly focused on environmental and intra-organizational aspects. Since the structure of a firm as a major organizational determinant is assumed to have a considerable impact on the fit between an organization and an administrative innovation, we examine the influence of organizational structure on VBM sophistication. Based on survey data from 117 large for-profit firms in Austria, Germany and Switzerland, our findings indicate that the organizational structure variables centralization, formalization and horizontal integration are positively associated with VBM sophistication. Our data provide insight into the interconnection of specific organizational structure variables on particular VBM subdimensions. The findings illustrate that a high level of centralization is positively associated with the political fit of an organization with VBM, while vertical differentiation seems to have a negative relationship with the cultural fit with VBM. High levels of formalization and horizontal integration indicate a technical, political and cultural fit with VBM, which helps to achieve and prevail a high extent of VBM implementation in late diffusion stages. While firms that are listed on the stock market show a positive association with VBM sophistication, the interconnections of organizational structure variables with VBM sophistication appear both in listed and unlisted firms.

1. Introduction

Value-based management (VBM) systems are designed to motivate managers to engage in actions that maximize shareholder value (Knauer et al., 2018; Brück et al., 2018). Despite the widespread use of VBM in European firms and its relevance for academic research (Firk et al., 2019a; Firk et al., 2016), little is still known about the reasons for frequently reported differences in the extent of VBM implementation (Firk et al., 2019a; Malmi and Ikäheimo, 2003).

Recent publications on drivers of VBM implementation focus on environmental and intra-organizational factors (Firk et al., 2019b; Burkert and Lueg, 2013) and mostly neglect organizational factors. While specifically the structure of a firm as a major organizational factor has been reported as an important factor influencing the adoption of administrative innovations and the design of management control systems (e.g., Lee and Yang, 2011; Nahm et al., 2003; Gosselin, 1997), its impact has only partially been tested in a VBM setting (Blume, 2016; Dekker et al., 2012).

The investigation of organizational structure in the implementation of VBM is relevant for the following reasons: First and foremost, specific findings about the organizational drivers of VBM usage remain controversial. For example, the VBM literature describes a positive influence of decentralization on VBM usage (Dekker et al., 2012; Hogan and Lewis, 2005; Young and O'Byrne, 2001), while qualitative studies (Chiwamit et al., 2017; McLaren et al., 2015) report negative effects of decentralization in their case firms. Second, the VBM literature emphasizes the relevance of an adequate organizational structure to successfully use VBM in business practice (Young and O'Byrne, 2001; Haspeslagh et al., 2001; Ittner and Larcker, 2001), while it is still unclear which structural factors facilitate or hamper VBM implementation. In a VBM-driven organization, the organizational structure supposedly has an impact on the proper allocation of actual capital costs and the unit-specific calculation of the value creation of the corresponding business units. However, this situation is hampered if the design of the organizational structure causes problems in the attribution of capital costs and value creation between business units (Dekker et al., 2012; Hogan and Lewis, 2005; Young and O'Byrne, 2001). Due to such attribution problems, unit managers face incentive and controllability issues and must fear negative consequences

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on their performance evaluation. Furthermore, it is argued that the organizational structure should regulate decision-making authority according to the degree of participation of lower hierarchical levels (Nahm et al., 2003). The level of participation determines how middle managers can influence value creation and is a precondition for influencing the value-based metrics of their business units. Finally, VBM should explicitly be designed to align the interests of managers (agents) and shareholders (principals) by harmonizing their goals towards value creation (Brück et al., 2018; Firk et al., 2016; Claes, 2006). Since information asymmetry is higher in a more complex organizational structure, there is a need to consider the complexity of organizational structures when analysing the drivers of successful VBM implementation.

To obtain a better understanding of how normative guidelines for VBM implementation can be transferred into business practice and to better explain differences between empirical findings and normative claims, we analyse the impact of the most relevant subdimensions of organizational structure on the implementation of VBM. Centralization, formalization, horizontal integration and vertical differentiation are considered primary dimensions of organizational structure and have therefore been widely investigated in corresponding studies (e. g. Lee and Yang, 2011; Pertusa-Ortega et al., 2010; Nahm et al., 2003; Koufteros/Vonderembse, 1998; Gosselin, 1997). We propose that these subcomponents of organizational structure influence the fit of an organization with VBM and hence have an impact on the extent of VBM implementation. We argue that centralization, formalization and horizontal integration facilitate the implementation of VBM, whereas vertical integration has a negative impact on the extent of VBM implementation.

Our study uses survey data from 2016 and provides empirical insights from a late diffusion stage of VBM, in which internal and/or external factors should already have affected the level of implementation of VBM in the sample (e.g., Firk et al., 2019b; Chiwamit et al., 2017; McLaren et al., 2016). Our analysis indicates that the organizational structure variables centralization, formalization and horizontal integration are positively correlated with the extent of VBM implementation. We argue that centralization serves to deliver a compatible framework for an organization to deeply implement VBM due to a higher political fit. Centralization seems to uphold the VBM system against potential social pressures (Oliver, 1992). Formalization and horizontal integration seem to facilitate the implementation and enduring application of VBM. High degrees of these structural variables are suggested to create an overall higher organizational fit (technical, political and cultural fit), which also helps to preserve VBM according to potential de-institutionalization in late diffusion stages. While vertical differentiation has no significant effect on VBM implementation in general, our data show a highly significant negative influence on the conviction of organizational members of VBM, which we interpret as a cultural misfit with VBM.

We contribute to the literature on the diffusion of MAI and VBM in the following ways: We find that organizational structure is associated with differences in VBM implementation and argue that specific structural attributes of an organization determine the fit with the attributes of a specific MAI (Ansari et al., 2010). With our study, we provide detailed findings regarding the interactions of different structural aspects on the subdimensions of VBM implementation. In particular, the centralization results contradict normative claims that decentralization is generally favourable for VBM (e.g., Stern et al., 2001; Young and O'Byrne, 2001) and confirm recent qualitative findings related to the hampering effects of decentralization in a VBM setting (Chiwamit et al., 2017; McLaren et al., 2016).

The paper proceeds as follows: In section two, we summarize the relevant theoretical literature about the characteristics of VBM and the diffusion of administrative innovations. In section three, we describe the hypothesis development. We thereby use the framework of organizational fit by focusing on the specific characteristics of VBM and its compatibility with the structural characteristics of an organization that has adopted and is using VBM. In the fourth section, we report the method of data collection and how we operationalized our construct measures. The results of our study are presented in section five. In section six, we discuss the implications of our results and avenues for future research.

2. Theoretical background

2.1. Specific characteristics of VBM

VBM is described as an integrated management control system (MCS) that aligns the whole organization with the strategic goal of maximizing shareholder value (Schultze et al., 2018; Firk et al., 2016; Blume, 2016; Burkert and Lueg, 2013). Even though VBM is not a recently developed MCS, it is considered an innovation once it is introduced into an organization (Brück et al. 2018). VBM defines value creation interdependencies within the organization (value drivers) and organizational procedures by cause and effects (action plans), and it establishes incentives to act in the prescribed way (target setting and reward system) (Ittner and Larcker, 2001). Due to its clear rules, guidelines and measures, which aim to align an organization with the strategic goal of value creation, VBM is characterized as a formal MCS (Brück et al., 2018; Koufteros et al., 2014). As a consequence, it can be considered a formal innovation once it is initially adopted in an organization.

Since VBM is not directly applied to the production process itself but rather to the management of the organization, its structure or its administrative processes (Lee and Yang, 2011; Sisaye and Birnberg, 2010; Daft, 1978), VBM can be more precisely described as an administrative innovation.[1] VBM is a radical innovation when it involves "basic changes in the task system, so that new values, goals, power structures, and cognitive systems are needed" (Nahm et al., 2003: 282; similar McLaren et al., 2016). This is the case when firms focus on capital costs and value creation, which can increase firms' profitability, especially in industries characterized by high levels of capital intensity and diversification (Firk et al., 2019a; Dekker et al., 2012).

VBM systems are claimed to be suitable and beneficial for both listed and unlisted firms (Brück et al., 2018; McLaren et al., 2016). Since unlisted firms cannot monitor their company value based on the share price, value-based key metrics can serve as a basis to derive the firm's value, which can be used as a basis for evaluation and benchmarking purposes with listed competitors or between internal divisions (McLaren et al., 2016). As a result, unlisted firms may improve their funding conditions for company bonds or bank financing (Fiss and Zajac, 2004) when implementing VBM.

Despite the existence of several different VBM concepts and their respective key metrics, all of them share common basic elements that have initially been described as six steps of overall VBM by Ittner and Larcker (2001). Burkert and Lueg (2013) referred to this approach and developed a framework of *VBM sophistication*. In our study, we also concentrate on VBM sophistication (Firk et al., 2019a; Burkert and Lueg, 2013; Claes, 2006; Malmi and Ikäheimo 2003), which is used as a synonym for "the extent to which the [VBM] practice is implemented within a company" (Burkert and Lueg, 2013, p. 5). According to Burkert and Lueg (2013), VBM sophistication defines the major elements of VBM: (1) the selection among alternative strategies according to the highest expected value added to the company portfolio; (2) the provision of information on pertinent generic financial value drivers; (3) the provision

[1] The described attributes of VBM are referred to as integrated (strategic) performance measurement systems (PMS – Lee and Yang, 2011), management accounting systems (MAS – McLaren et al., 2016) or management control systems (MCS) (Schultze et al., 2018), which are also administrative innovations (Gosselin, 1997).

of information on relevant, company-specific non-financial value drivers and/or key performance indicators (KPIs); (4) the empowerment and development of actions plans based on KPIs; (5) target setting to employees with a focus on long-term value creation including synergies; and (6) the establishment of a value-based mindset among all employees.[2]

2.2. Organizational fit and drivers of the implementation of administrative innovations

Studies based on diffusion theory indicate that VBM has spread among organizations over time, similar to other administrative innovations (Cooper and Crowther, 2008; Fiss and Zajac, 2004). These studies report a widespread VBM in German-speaking countries (Firk et al., 2019a; Burkert and Lueg, 2013; Rapp et al., 2010). Recent studies, however, report that companies have started to question the VBM approach and replace it as their main management model (Firk et al., 2019b; McLaren et al., 2016).

VBM research has been criticized for neglecting the extent to which new practices are implemented inside an organization (Firk et al., 2019a; Burkert and Lueg, 2013). When separating non-adopters from full-scale implementers dichotomously, differences in the extent of the innovation's implementation remain uncovered (Firk et al., 2019a; Burkert and Lueg, 2013). To address this issue, Ansari et al. (2010) focused on the adaptation of new practices inside organizations after their initial adoption. They argue that the "characteristics of the diffusing practice" (p. 73) and the characteristics of the adopting organization affect the compatibility between the innovation and the organization (organizational fit). The attributes of a specific innovation may therefore fit better to one organization than to another because of a higher compatibility with the organizations "needs, demands, goals, objectives and/or structure" (Nadler and Tushman, 1980: 45).

Based on Oliver (1992), Ansari et al. (2010) distinguish the following three separate forms of fit that individually affect adaptation mechanisms in adopting organizations: (1) technical fit, (2) political fit and (3) cultural fit. Technical fit refers to the functionality of a practice and determines whether the specific characteristics of an innovation are compatible with the already existing and institutionalized practices in an organization. Technical fit also concerns the perceived functional value of the practice, e.g., efficiency or effectiveness (Oliver, 1992). Political fit considers the "degree to which the implicit or explicit normative characteristics of a diffusing practice are compatible with the interests and agendas of potential adopters" (Ansari et al., 2010: 80). Cultural fit considers the compatibility of specific characteristics with the values, beliefs and practices established in organizations and refers to the perception of the appropriateness of the diffusing practice. Ansari et al. (2010) argue that these different forms of fit trigger different adaptation patterns of corporate practices after their adoption.

Hence, the frequently reported differences in the implementation of VBM and continuous adaptations of the practice (e.g., Chiwamit et al., 2017; McLaren et al., 2016; Malmi and Ikäheimo, 2003) may be caused by an organizational misfit between the specific attributes of VBM and the structural attributes of the firms that adopted VBM. Furthermore, internal or external pressures may occur on the timeline that may individually affect the technical, political and/or cultural fit with VBM and, hence, result in different adaptations of VBM implementation (McLaren et al., 2016; Ansari et al., 2010; Oliver, 1992). For example, a political fit between the structural attributes of an organization and the specific characteristics of VBM may enable a firm to enforce VBM inside the organization but may also cause internal pressures due to a technical and/or cultural misfit. The resulting problems associated with functionality may hamper the application of VBM or even cause resistance against the innovation. This may finally trigger adaptations of VBM and therefore lead to less VBM sophistication. Likewise, a high technical fit of an organization with VBM may not necessarily lead to high VBM sophistication if the organization experiences a political and/or cultural misfit with VBM: Dissenting political agendas of top management or incompatible norms and beliefs of organizational members might hamper VBM sophistication.

3. Hypotheses

3.1. The effect of organizational structure on the adoption of administrative innovations

Organizational structure has been reported to have considerable effects on the adoption of administrative innovations (Lee and Yang, 2011; Gosselin, 1997; Damanpour, 1991). As it is naturally a characteristic feature of the adopting organization, organizational structure can be expected to influence the level of VBM sophistication, depending on the fit between the VBM logic and the way the organizational structure is formed (Ansari et al., 2010; Malmi and Ikäheimo, 2003; Ittner and Larcker, 2001). Organizational structure is defined as "the way responsibility and power are allocated, and work procedures are carried out, among organizational members" (Nahm et al., 2003: 283). It is predominantly conceptualized as a continuum between a mechanistic and an organic organizational design (Lee and Yang, 2011; Nahm et al., 2003). In contrast to organic organizations, mechanistic organizations consist of more hierarchical levels (vertical differentiation), formal work and process rules (formalization) and a centralized decision authority in top management (centralization) (Lee and Yang, 2011; Nahm et al., 2003). This structural design enables mechanistic organizations to achieve higher efficiency in more stable markets under conditions of low environmental uncertainty. In contrast, organic organizations are composed of an inverse structural design to enable high flexibility in dynamic and uncertain environments (Lee and Yang, 2011; Nahm et al., 2003; Gosselin, 1997).

Since organizations seldom establish pure mechanistic or organic structures, we investigate the effect of the most important structural variables in this continuum separately: centralization, formalization, horizontal integration and vertical differentiation. These variables represent the primary and most relevant dimensions of organizational structure (Lee and Yang, 2011; Pertusa-Ortega et al., 2010; Nahm et al., 2003; Koufteros and Vonderembse, 1998; Gosselin, 1997). A separate consideration of these variables enables us to investigate their specific effects on VBM sophistication, which might remain uncovered when using aggregated organizational variables, such as mechanistic or organic organizations (e.g., Lee and Yang, 2011; Gosselin, 1997). In doing so, we apply a sophisticated analysis of the technical, political and cultural fit of these organizational variables with VBM (Ansari et al., 2010). Furthermore, the innovation and organizational theory literature argues that implementing a radical innovation can be facilitated or hindered by the organization's structural design (Ettlie et al., 1984; Damanpour, 1991). This literature stream also differs between two phases of adopting radical innovations: the initiation phase and the implementation phase (e.g., Koufteros and Vonderembse, 1998). As VBM has already been initiated in many firms in German-speaking countries (Burkert and Lueg, 2013; Rapp et al., 2010), we focus on the required characteristics of centralization, formalization, horizontal integration and vertical differentiation in the implementation phase of VBM.

3.2. Centralization

Centralization is defined as the locus of decision making on top of the organization's hierarchy and is referred to as the degree of participation of lower hierarchical levels in strategic decisions (Nahm et al., 2003). The normative literature concerning VBM argues that organizations need to delegate adequate decision rights to achieve more independence

[2] Firk et al. (2019a) use a similar approach to define VBM sophistication.

in the decision making of business units and influence value-based metrics at a decentralized level (Dekker et al., 2012; Hogan and Lewis, 2005; Young and O'Byrne, 2001).

From a technical fit perspective, decentralization is assumed to be favourable for the functionality of VBM, as normative VBM research explicitly defines employees as addressees for the empowerment and development of action plans; additionally, VBM-specific targets are set for employees and not for managers only.[3] In contrast, Lee and Yang (2011) argue that centralization leads to higher effectiveness in using integrated performance measures, which is a constitutive part of the VBM system. This is because a centralized decision-making authority increases information processing efficiency and effectiveness. Decentralization also seems to cause difficulties in the designation of unit assets as the capital basis and resulting capital costs, which could cause the need for centralized coordination between decentralized units (Chiwamit et al., 2017; McLaren et al., 2016).

Considering political fit, we argue that centralization better fits VBM implementation, as centralized strategic decision making "gives an organization the capacity to select and enforce innovations" (Koufteros and Vonderembse, 1998: 2871; Zaltman et al., 1973). A high degree of centralization enables top management to enforce the implementation of administrative innovations by direct actions, allocations of required resources and control of the implementation process, which specifically applies to radical innovations (Sisaye and Birnberg, 2010; Burns, 1999; Koufteros and Vonderembse, 1998). Qualitative research also shows that decentralization has hampering effects on VBM in reference to power structures and resource dependencies. McLaren et al. (2016) found that in a decentralized setting, business units reduced collaboration with other units (similar findings in Claes, 2006) and attempted to maximize their compensation profit at the cost of other units by transfer pricing mechanisms and reduced investments (see also Wallace, 1997). The decentralized implementation of VBM provides incentives for managers to act towards achieving short-term profit instead of long-term value creation for the firm (McLaren et al., 2016). Dekker et al. (2012) report that senior managers overrule the decentralized decisions of middle managers by referring to important value drivers, such as asset use intensity. As a consequence, the delegation of decision authority to middle managers is limited by the importance of certain value drivers for the whole company. Scapens and Roberts (1993) and Chiwamit et al. (2017) describe decentralization as a potential source of resistance against accounting innovation, which is supposedly the case if a new system is perceived as a central control instrument that may interfere with divisional managers' decision rights.

From a cultural fit perspective, centralization should help an organization create a strong value-based culture, as the influence of central authority on the organization's employees' mindsets can be expected to be high (Haspeslagh et al., 2001). Since the creation of a VBM-focused mindset of all employees in an organization is defined as a central element of a VBM system (Burkert and Lueg, 2013), the assumed positive effect of centralization on a value-based culture might provide an important contribution to VBM sophistication in an organization.

In summary, we expect that centralization facilitates the implementation of VBM, as it generally supports the implementation of radical administrative innovations and serves to overcome potential resistance against VBM. While arguments related to the delegation of decision rights (more decentralization) from a technical fit perspective are controversial, we assume that centralization has an overall positive effect on VBM sophistication due to a higher political and a cultural fit. Therefore, we formulate the following hypothesis:

H1: Centralization is positively related to VBM sophistication.

[3] Burkert and Lueg (2013) measure the latent construct "action plan", with others, explicitly by the following survey item on: "All employees possess the necessary decision rights to resolve non-standard problems on the spot (empowerment)". (p. 13).

3.3. Formalization

Formalization is reflected by the "extent to which an organization uses rules and procedures to prescribe behaviour" (Koufteros and Vonderembse, 1998: 2865) and depicts the standardization of processes (Gosselin, 1997). The use of integrated performance measures is supposed to be facilitated in organizations with a highly formalized organizational structure because this high amount of formalization results in "clearly delineated rules and instructions" (Lee and Yang, 2011: 99). A high degree of formalization further increases the transparency of actions in the organization as "a means for activity control … [that] specifies how, where and by whom tasks are to be performed" (Koufteros and Vonderembse, 1998: 2865).

From a technical fit perspective, organizations with highly formalized procedures are expected to implement highly formalized performance evaluations more often since these formal mechanisms functionally fit the established processes better (Lee and Yang, 2011; Sisaye and Birnberg, 2010). In a VBM setting, an established coherent set of value drivers needs to be revised continuously (e.g., Burkert and Lueg, 2013; Ittner and Larcker, 2001; Malmi and Ikäheimo, 2003); these adjustments on a regular basis may be facilitated if processes are clearly regulated, standardized and transparent. Furthermore, established formalized processes in the company are supposed to facilitate the implementation of formal innovations such as VBM, as employees already have experience with formal systems (Ansari et al., 2010). In particular, a structured and formalized target setting with a clear focus on VBM-specific targets can be seen as an enabler of VBM implementation (Burkert and Lueg, 2013).

Concerning political fit, previous studies have already shown that organizations respond to agency conflicts with the adoption of VBM (Firk et al., 2019a; Brück et al., 2017; Blume, 2016). While formalization itself is supposed to reduce agency conflicts by providing more transparency and clear guidance in the organization's processes, we further argue that high formalization also provides the structural preconditions to better translate the political agenda of value creation into the organization. Based on transparent structures and standardized procedures, top management is better able to translate its VBM agenda to clear VBM targets and to communicate them to employees. Clear VBM targets serve as the basis for a VBM-oriented incentive system. Such VBM-oriented incentive systems reduce the probability that employees act opportunistically against shareholders' goal of value creation, as the systems reduce information asymmetry and enhance congruency between employees' goals and the shareholders' and top management's political agenda (Brück et al., 2017). We hence expect that high formalization supports the alignment of the (normatively set) characteristics of a VBM system with the interests and agendas of its adopters.

From a cultural fit perspective, we expect that a formal structure supports employees' understanding of how a VBM system should be implemented and how it affects established work processes (Koufteros and Vonderembse, 1998). A better understanding of a new system, based on clear guiding rules and procedures, may reduce role conflicts and ambiguity and therefore decrease the potential of resistance against a radical innovation such as VBM.

Despite these expected positive effects on the implementation of VBM, the literature shows some evidence that high formalization hampers the initial adoption of radical innovations: Highly formalized organizations seem to be less capable of processing new external information according to change and less open to change, as this would question institutionalized rules and procedures (Lee and Yang, 2011; Nahm et al., 2003; Koufteros and Vonderembse, 1998). As a highly formalized structure might already provide clear guidelines and routines, highly formalized organizations might not perceive the need to initially adopt VBM, even though high formalization is expected to positively influence the subsequent implementation of VBM.

In summary, we expect that a higher level of formalization not only enables an organization to achieve a higher extent of VBM

implementation due to higher functional, political and cultural fit but also preserves the level of VBM sophistication once it has been institutionalized. We therefore hypothesize:

H2: Formalization is positively related to VBM sophistication.

3.4. Horizontal integration

Horizontal integration is defined as "the degree to which departments and works are functionally specialized (i.e., low level of horizontal integration) versus integrated in their work, skills, and training (i.e., high level of horizontal integration)" (Nahm et al., 2003: 287). A high level of horizontal integration connects specialized and formerly more branch-isolated employees in cross-sectional teams to combine the skills and knowledge of different departments. It enables the creation of a common knowledge base of joint team members who are organized in cross-sectional teams (Lee and Yang, 2011; Nahm et al., 2003). Lee and Yang (2011) show that integrated performance measures are used more often in organizations with a higher level of horizontal integration since their operations are functionally integrated and therefore benefit from metrics that focus on integrated functions.

We assume from a technical fit perspective that a high degree of horizontal integration will increase the level of VBM sophistication. We argue that normative theory actively asks for VBM-focused targets that "link together all business unit activities/projects to the key financial ratio" (Burkert and Lueg, 2013, p. 13) and to focus especially on those targets that "show how activities of each business unit/project affect other units/projects within the organization" (ibd.). In particular, the latter can be better realized if the adopting organization has a horizontally integrated structure.[4] As the availability of information about value drivers is a key element of VBM systems from a normative perspective (Burkert and Lueg, 2013), we assume that an improved exchange of information and shared knowledge by a more horizontally integrated organization also positively affects the functional compatibility of an organization with VBM. Hence, we expect from a technical fit perspective that a higher level of horizontal integration is favourable for the implementation of VBM.

Considering political fit, we assume that a high level of cooperation between organizational units (which means a high level of horizontal integration) creates more transparency inside the organization. This is supported by the claim of normative VBM literature that in a VBM system, targets should "show how activities of each business unit/project affect other units/projects within the organization" ((Burkert and Lueg, 2013), p. 13). More transparency can better avoid department managers and employees from following department-specific interests and setting their individual targets. Furthermore, job specialization, which indicates a low level of horizontal integration, is expected to result "in parochialism and excessive attention to sub-goals" (Koufteros and Vonderembse, 1998: 2870). A salience of personal goals is expected to "decrease the impact of organizational-level goals and produce strategic actions that are only incremental departures from the organization's current state" (Koufteros and Vonderembse, 1998): 2870).

Concerning cultural fit, we also suggest positive implications of horizontal integration on VBM sophistication: a radical change that might be induced by a VBM implementation may cause unforeseen problems that can be better solved by a cooperating team of experts with different specializations (Koufteros and Vonderembse, 1998). This has consequences for the cultural fit of organizations with a VBM system: Employees that are used to work together in an integrated structure are expected to be better able to cooperatively adjust action plans and solve non-standard problems when significant changes in KPIs occur (Burkert and Lueg, 2013). Additionally, we assume that employees who are familiar with a wide spectrum of tasks "have a clearer picture of how a proposed change may affect a large part of the work system" and "are more comfortable making proposals for radical innovations that have system-wide implications" (Koufteros and Vonderembse, 1998: 2870).

In summary, we expect horizontal integration to increase the technical, political and cultural fit of an organization with VBM and therefore help to achieve and preserve VBM sophistication in late diffusion stages. We formulate the following hypothesis:

H3: Horizontal integration is positively related to VBM sophistication.

3.5. Vertical differentiation

Vertical differentiation measures the depth of an organizational structure by the number of layers in the hierarchy. It describes how bureaucratically the decision-making processes in the organization are executed (Nahm et al., 2003; Gosselin, 1997). According to the normative concept of VBM, the system has to be implemented among the whole organization, including all hierarchical levels (Young and O'Byrne, 2001; Haspeslagh et al., 2001). From a technical fit perspective, we therefore expect that the more hierarchical levels exist in an organization, the more complicated the proper allocation of capital costs and relevant value drivers for each hierarchical level is, as well as the delegation of adequately tailored decision rights. This latter factor, however, is necessary to enable managers to actively control capital costs and other value drivers as a basis for a level-specific (value-based) performance evaluation in the sense of controllability (Burkert and Lueg, 2013; Dekker et al., 2012). In this context, lower hierarchical levels are assumed to face higher challenges by limited controllability and constrained decision rights (Dekker et al., 2012). Hence, we assume that a high degree of vertical differentiation reduces the technical fit of an organization with VBM, as it hampers the functional application of the practice.

Considering political fit, we assume, in line with Koufteros and Vonderembse (1998), that a high level of vertical differentiation increases the constraining effects in the implementation process of VBM. Every additional layer in the hierarchy is able to influence information flows and enlarge the risk of information asymmetries and opportunistic behaviour in the organization. As a consequence, a high level of vertical integration represents a potential source for resistance against the implementation of VBM. Concerning cultural fit, organizations with a high level of vertical differentiation are also described in a way that their members "may not recognize threats and opportunities that are strategically significant" for the whole organization, as the employees, which work on many different layers, "may ignore these threats and opportunities because of parochial perceptions" (Koufteros and Vonderembse, 1998: 2870). We expect that such cultural influences will hamper the implementation of a VBM system, which includes the need to permanently adjust "actions plans of all relevant employees" (Burkert and Lueg, 2013: 11).

In summary, we assume that vertical differentiation hampers the implementation of VBM due to organizational misfit as well as continuous application in firm practice. We therefore formulate the following hypothesis:

H4: Vertical differentiation is negatively related to VBM sophistication.

Fig. 1 shows our conceptual framework.

4. Data and research design

4.1. Operationalization of variables

4.1.1. Independent variables

To measure the independent variables *centralization, formalization, horizontal integration* and *vertical differentiation,* we rely on constructs adapted from the literature (Lee and Yang, 2011; Nahm et al., 2003;

[4] Nevertheless, a high level of horizontal integration may complicate the allocation of capital costs as it could be more difficult to relate value-creating activities to specific business units.

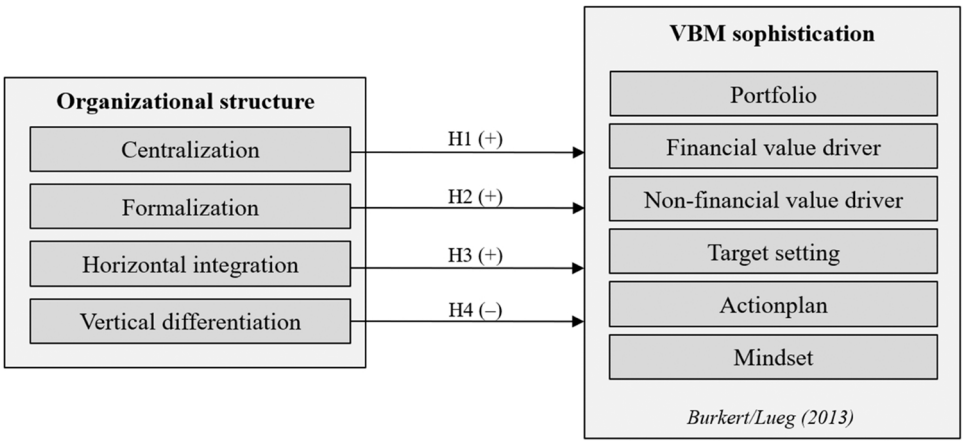

Fig. 1. Conceptual Framework.

Menon et al., 1999). All constructs consist of a minimum of three reflective items that are measured on a Likert scale from 1 ("does not apply at all") to 7 ("fully applies"); see Appendix 1.

4.1.2. Dependent variable

We use Burkert's and Lueg's (2013) construct of *VBM sophistication* to measure the extent of VBM implementation as the dependent variable. With this construct, we focus on the implementation of VBM instead of the initial adoption because previous studies concerning the adoption of administrative innovations have been criticized (Firk et al., 2019a; Burkert and Lueg, 2013). For example, Ansari et al. (2010) argue that most relevant studies concerning the diffusion of corporate practices only dichotomously distinguish between the adoption and non-adoption of innovations and, thereby, neglect the actual extent of the implementation of new practices within organizations. While adoption refers to the decision of an organization to initiate the integration of an innovation, implementation considers the actual extent of its integration, its adaptation or its rejection (Firk et al., 2019a; Ansari et al., 2010; Zaltman et al., 1973). The actual extent of a practice's implementation inside an organization is further reported to change over time after the initial institutionalization of the practice, which is triggered by internal and/or external factors (Ansari et al., 2010; Firk et al., 2019b; McLaren et al., 2016; Becker, 2014).

In Burkert's and Lueg's (2013) work, VBM sophistication consists of six constructs, each measured by three reflective items on a Likert scale from 1 ("does not apply at all") to 7 ("fully applies"). For reliable and valid construct measurement purposes, we add one further item to each of the six constructs due to the consistency of the large characteristics of PLS in the loading estimates with higher numbers of manifest variables per measurement model (Hair et al., 2020). Since the first-order items are interchangeable and consequences of the construct, the first-order constructs are reflective items. The second-order constructs (VBM subdimensions) are different aspects of the construct VBM sophistication by definition. Therefore, they are not interchangeable. As a consequence, the second-order constructs are formatively defined (Becker et al., 2012). The first-order constructs that refer directly to Burkert's and Lueg's (2013) six dimensions of VBM are considered as follows:

Portfolio (Port) investigates whether the organization's strategic decisions and resource allocations pursue the aim of maximizing long-term equity value (shareholder value) by following and maintaining only strategic options that create a positive net present value (NPV). *Financial value driver* (*F_valuedr)* focuses on the consideration of financial value drivers in top and middle management, especially the cost of capital, invested capital and interdependencies of financial value drivers. These value drivers are aggregated to the value-based key metric, e.g., EVA™ or CFROI. *Non-financial value driver* (*NF_valuedr)* reflects whether organizations derive non-financial value drivers from generic financial value drivers and KPI, whether the organizations are aware of their interdependencies and whether the value drivers are adapted regularly. *Actionplan (Actpl)* examines whether organizations provide instructions for their decision-makers about how to influence value drivers and KPI in the organization and whether these action plans are adjusted when significant changes occur. *Target setting* (*Targ_set)* focuses on the consistency of firms' value creation through value drivers and KPIs, considering a long-term orientation and synergies of targets across business units. *Mindset* investigates whether the decision-makers in the firm follow the idea of value creation by conviction.

4.1.3. Control variables

We consider factors that have been reported to have a possible influence on the diffusion of administrative innovations and/or on VBM implementation as control variables. Control variables are related to VBM sophistication and are operationalized as follows: Firm size is measured based on the number of employees (Damanpour, 1991) in equal range increments of 5,000 employees between "below 5,000" and "above 100,000". The variables *listed* (Firk et al., 2019a) and *free float* $> 25\%$ (Brück et al., 2018) are coded as 1 if the organization is reported as listed on the capital market and free float is above 25% and 0 otherwise. We use *fixed assets* as a measure of capital intensity (Ryan and Trahan, 1999; 2007) that ranges equally in 5 billion Euro increments between "below 1 billion Euro" and above "100 billion Euro". We asked the respondents to select their *industry* (Ittner and Larcker, 2001) from a prepared variety of industries (see Table 1) and integrated a variable for each industry into the model. According to *nationality* (Firk et al., 2019a), we further control for national differences by the two variables *Austria* and *Switzerland*, which are considered in relation to Germany. Finally, we control for common method bias by the integration of a marker variable (*CMV*) without a direct theoretical relationship to the measurement model (Chin et al., 2013; Lindell and Whitney, 2001). The marker variable *CMV* considers the product portfolio of a company and is measured by four reflective items (see Appendix 1) on a Likert scale from 1 ("does not apply at all") to 7 ("fully applies") and is integrated as an exogenous construct into the model.

English questions were translated into the German language using the translation/back-translation method (Mullen, 1995). The results were verified by a native lecturer and three researchers. In a pre-test, ten participants (managers and researchers) evaluated the correct understanding of the questions and the duration of five to ten minutes and provided suggestions for improvements. Fig. 2 shows our research model including the control variables.

Table 1
Descriptive information on the 117 organizations in the sample.

Total assets in Bn EUR		Employees (size)		Industry			
> 100	4	> 100,000	4	Automotive and supply	11	Pharma and Medical	11
65.000–69.999	1	80,000–84,999	1	Bank and insurance	10	Craft	2
60.000–64.999	1	55,000–59,999	3	Building	3	Consumer goods	1
50.000–54.999	1	50,000–54,999	1	Chemistry and synthetics	3	Logistics and Transport	9
45.000–49.999	2	35,000–39,999	1	Whole and retail trade	7	Mechanical engineering	7
40.000–44.999	1	30,000–34,999	1	Electrical and optical engineering	7	Administration	1
30.000–34.999	3	25000–29,999	4	Energy	5	Telecommunications	1
25.000–29.999	1	20,000–24,999	4	Aerospace	5	Other	31
15.000–19.999	2	15000–19,999	5	Research	0	No selection	3
10.000–14.999	1	10,000–14,999	11				
5.000–9.999	6	5000–9999	38	**Nationality**		**Listed companies and free float**	
1.000–4.999	24	< 5000	44	Austria	10	Not listed	72
< 1.000	64	No selection	0	Germany	94	Free float < 25%	15
No selection	6			Switzerland	11	Free float ≥ 25%	30
				No selection	2	No selection	0
n = 117							

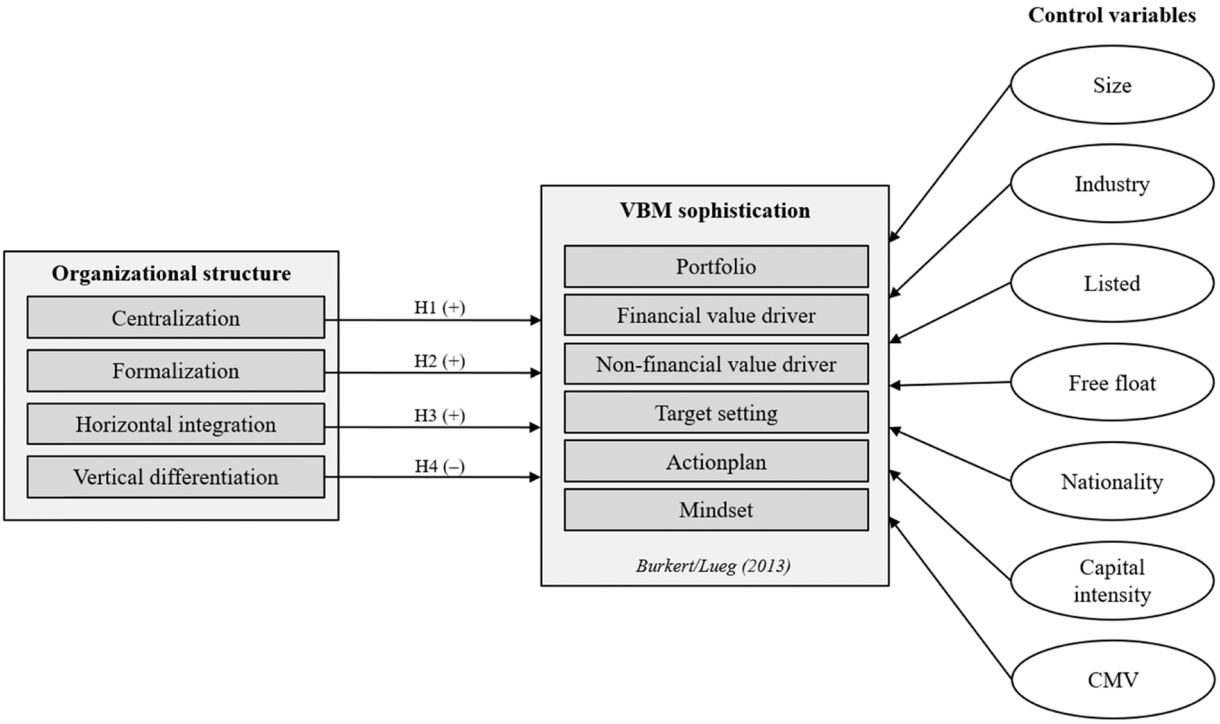

Fig. 2. Research model.

4.2. Data collection and research method

Since VBM seems to not be extensively spread in middle- and small-sized companies (Krol, 2009) and multiple studies report a positive relation of firm size with VBM adoption (e.g., Brück et al., 2017; Dekker et al., 2012; Rapp et al., 2010), we focus on large companies to avoid coverage bias. While most VBM studies examine only listed firms (e.g., Firk et al., 2019a/b; Firk et al., 2018; Knauer et al., 2018; Brück et al., 2017; Burkert and Lueg, 2013; Rapp et al., 2010; Fiss and Zajac, 2004) and only a few studies investigate firms that are not listed on the capital market (Brück et al., 2018; Dekker et al., 2012) and/or state-owned firms (Chiwamit et al., 2017; McLaren et al., 2016), we follow Burkert's and Lueg's (2013) suggestion to not focus on only listed firms.

We believe that the German-speaking context is suitable for our study because a high-scale adoption of VBM has been reported (Burkert and Lueg, 2013; Rapp et al., 2010; Fiss and Zajac, 2004). Furthermore, German-speaking countries fairly represent Continental Europe and show a traditional scepticism towards shareholder value orientation that may cause adaptations of VBM systems (Burkert and Lueg, 2013). We use the Hoppenstedt[5] database to select the largest for-profit companies based on turnover in Austria, Germany and Switzerland with a minimum of 2500 employees, resulting in a population of 1122 companies.

Although publicly available data such as annual reports may serve to investigate VBM adopters, the reports' content about the actual extent of VBM sophistication differs among reporting firms and may be biased by their willingness to disclose this information (Burkert and Lueg, 2013; Schäffer and Lueg, 2010). Furthermore, this research needs to collect detailed data about the organizations' structure, which are typically not published in annual reports or other publicly available sources. Hence, it is necessary to collect data from inside organizations. Key informants remain the only source of expert knowledge of the organization's

[5] The Hoppenstedt database is a part of Bisnode.

internal affairs (Phillips, 1981). Therefore, one key informant (CFO, head of management accounting department or CEO, in that order) of each company in the sample received a personal invitation via e-mail containing a hyperlink to our web-based survey starting in November 2016. We guaranteed anonymity, offered participants exclusive study results and assured them that we would donate 3 EUR for each completed questionnaire to the charitable organization *Doctors without Borders*[6] as an incentive to improve the response rate. Two and four weeks after starting the survey, key informants who had not yet participated received reminders via E-Mail. Finally, 121 companies (10.78%) participated in our study. Four observations had to be removed because of missing data or invalid response behaviour. The resulting 117 organizations (10.43%) consist of 94 German, ten Austrian and eleven Swiss companies; two companies did not indicate their nationality. All Swiss respondents report being located in German-speaking Switzerland; hence, we do not further differentiate between French- and Italian-speaking Switzerland. Forty-five of the 117 companies are listed on the capital market, 30 of them with a free float of more than 25%. For descriptive information, see Table 1; for unstandardized mean values of constructs, see Appendix 3.

We use the partial least squares (PLS) method to analyse the data since it is a well-established research method that is especially suitable for small-size samples (Nitzl, 2016). Data analysis was conducted with SmartPLS 3.2.9 (Ringle et al., 2015). For the basic settings, we apply a path weighting scheme. Significance tests were conducted based on no sign-change bootstrapping with 5000 drawings, bias-corrected and accelerated (BCa), and a two-tailed test. We handle the very small amount of incomplete data (40 missing item values in 5616 measured items in the model, overall 0.712%) by mean replacement as recommended by Hair et al. (2017). The missing values are not concentrated in single constructs and are distributed among multiple items, with a maximum of four missing values related to item Port4 (Portfolio). A t-test is conducted separating the quantile of 29 early respondents and the quantile of 29 late respondents in the study (Van der Stede et al., 2005). Only three of the 48 items were significant at the 5% level. Hence, we expect that our data are unlikely to be affected by a non-response bias. The descriptive data also show that respondents used the whole range of the Likert scale from 1 to 7 for nearly all the items, which indicates a high variation of the responses (see Appendices 1 and 2).

5. Results

5.1. Reliability and validity of constructs

For the assessment of the reliability and validity of the construct measurements, we follow a confirmatory composite analysis (Hair et al., 2020). The large majority of items of the four *organizational structure* constructs meet the criteria of outer loadings > 0.708 (see Table 2) (Hair et al., 2017). Four items range closely below this threshold, with values of 0.605–0.667, and can be accepted in accordance with common practice in social sciences due to sufficient values in average variance explained (AVE) (Hair et al., 2017). We removed item Hor_int1, as this is the only item that ranges close to the critical value of outer loadings below 0.4 (0.461). Except for the value of AVE of the construct formalization, all AVE, composite reliability and Cronbach's alpha values are above the critical threshold. Hence, we decided to remove items Form4 (0.631) and Form6R (0.605), as the removal of these items improves the AVE to above the critical value of 0.5 from 0.483 to 0.571 (Hair et al., 2017). This adjustment causes only minor changes in the composite reliability (CR) from 0.848 to 0.840 and Cronbach's alpha from 0.794 to 0.752 in the formalization construct. After item removal, all constructs showed sufficient AVE values from 0.561 to 0.732. The Cronbach's alpha ranges from 0.742 to 0.930, and CR ranges from 0.836 to 0.890.

VBM sophistication is calculated in a separate model and later integrated as a formative construct into the main model. Three of the 21 items range closely below the threshold for outer loadings of 0.708 (Port2, Port3, TargetSet4R); only NF_Valuedr3R is near the critical threshold of 0.4 (0.433). In the calculation of the higher-order construct, the number of items for each sub-construct needs to be equal to prevent an implicit weighting of the first-order constructs in the second-order construct (Becker et al., 2012). We therefore removed Targ_set4R (0.667) to have four items for the construct *target setting*. Since all validity criteria for the six sub-constructs are met, the single item near the threshold for outer loadings (NF_Valuedr3R) is acceptable (Hair et al., 2017): AVE ranges from 0.570 to 0.732, CR ranges from 0.831 to 0.916 and Cronbach's alpha ranges from 0.722 to 0.878.

(Henseler et al., 2015) show that HTMT is a more reliable criterion for the evaluation of discriminant validity than the often used Fornell-Larcker criteria or cross-loadings. As shown in Table 2, HTMT confidence intervals do not include 1 for all constructs (Hair et al., 2017). Hence, the reflective construct measurements can be viewed as conceptually different. All VBM subdimensions show moderate path coefficients to VBM sophistication that are all significant ($p < 0.001$) (Table 3). VIF values are below 5 (Table 3). Furthermore, we report the correlation matrix in Appendix 4. The relatively small correlations between the subdimensions of organizational structure and the low VIF values allow a separate analysis of their associations with VBM sophistication.

In summary, all construct measures are reliable and valid. Hence, we continue with the structural model assessment.

5.2. Results of hypothesis testing

In the assessment of the structural model, all constructs show VIF values below 5, indicating that multi-collinearity is not an issue (see Table 4) (Hair et al., 2017). We further calculate f^2 effect sizes and Stone-Geisser's Q^2 (Stone, 1974; Geisser, 1975) for predictive relevance.

In the data, we find a positive and significant ($p = 0.033$) association of *centralization* with VBM sophistication, although the path coefficient of 0.175 is rather weak. The results support Hypothesis H1. *Formalization* and *horizontal integration* both have path coefficients of 0.380 and 0.415, respectively, indicating a moderate positive association with VBM sophistication, which is highly significant ($p < 0.001$) and hence provides support for Hypotheses H2 and H3. Finally, we find no association of *vertical differentiation* with *VBM sophistication*, resulting in the rejection of Hypothesis H4. The structural variables explain 46.3% (R^2=0.463) of *VBM sophistication*, which is an acceptable moderate effect compared to other studies in this context (e.g., Burkert and Lueg (2013) report an R^2 of 0.446). The values of Stone-Geisser's Q^2 of 0.247 and f^2 effect sizes (small for H1 (0.045), medium for H2 (0.223) and H3 (0.217)) confirm predictive relevance (see Table 4).

Considering the control variables, we find that the stock market listing of firms has a weak significant association with VBM sophistication (0.190; $p = 0.054$) (Table 4). Mechanical engineering as a capital-intensive industry shows a weak but significant association with VBM sophistication (0.101, $p = 0.049$), which is in line with results from other studies (e.g., Firk et al., 2019a; Dekker et al., 2012). The remaining industry effects and all other control variables are non-significant.

5.3. Individual effects on VBM subdimensions

We further investigate the effects of the organizational structure variables on each of the VBM sophistication subdimensions separately[7]:

[6] *Doctors without Borders* did not participate in this study and did not have a personal or professional relationship with the authors.

[7] We thank an anonymous reviewer for this advice.

Table 2
Results of constructs.

Latent Variable	Indicators	Convergent validity		Internal consistency reliability		Discriminant validity
		Loadings	AVE	Composite reliability	Cronbach's Alpha	HTMT confidence interval does not include 1
Centralization	Centr1	0.772	0.561	0.836	0.742	yes
	Centr2R	0.710				
	Centr3	0.727				
	Centr4	0.785				
Formalization	Form1	0.795	0.571	0.840	0.752	yes
	Form2	0.794				
	Form3	0.810				
	Form5	0.667				
Horizontal integration			0.605	0.858	0.781	yes
	Hor_int2	0.761				
	Hor_int3	0.819				
	Hor_int4	0.787				
	Hor_int5R	0.644				
Vertical differentiation	Vert_diff1	0.994	0.732	0.890	0.930	yes
	Vert_diff2R	0.817				
	Vert_diff3R	0.735				
Portfolio	Port1	0.847	0.570	0.839	0.749	yes
	Port2	0.685				
	Port3	0.602				
	Port4	0.856				
Financial value driver	F_valuedr1	0.775	0.728	0.914	0.874	yes
	F_valuedr2	0.833				
	F_valuedr3	0.918				
	F_valuedr4	0.880				
Non-financial value driver	NF_valuedr1	0.833	0.566	0.831	0.722	yes
	NF_valuedr2	0.883				
	NF_valuedr3R	0.433				
	NF_valuedr4	0.777				
Target setting	Targ_set1	0.870	0.692	0.894	0.851	yes
	Targ_set2	0.809				
	Targ_set3	0.855				
	Targ_set5R	0.747				
Actionplan	Actpl1	0.809	0.732	0.916	0.878	yes
	Actpl2	0.852				
	Actpl3	0.893				
	Actpl4	0.865				
Mindset	Mindset1	0.883	0.690	0.899	0.851	yes
	Mindset2	0.853				
	Mindset3	0.774				
	Mindset4	0.810				
Common Measurement Bias Control Variable (CMV)	CMV1	0.862	0.573	0.841	0.784	yes
	CMV2	0.638				
	CMV3	0.679				
	CMV4R	0.826				

Reverse coded items marked with an "R". Crossed items were removed for individually explained reasons.

Table 3
VBM sophistication second order constructs.

Construct	Path coefficients	VIF	p-values
Portfolio	0.201	1.960	< 0.001
Financial value driver	0.210	2.147	< 0.001
Non-financial value driver	0.222	2.370	< 0.001
Target setting	0.222	1.891	< 0.001
Actionplan	0.230	2.602	< 0.001
Mindset	0.178	1.948	< 0.001

each structure variable and the control variables are directed to each of the six VBM subdimensions. The results are illustrated in Table 5. *Centralization* has a significant association with target setting (0.169, $p = 0.052$) and actionplan (0.209, $p = 0.015$), while the association with the other VBM subdimensions are non-significant. *Formalization* shows positive and significant associations with all VBM subdimensions. We also find significant associations of *horizontal integration* with financial (0.405, $p < 0.001$) and non-financial value drivers (0.367, $p = 0.001$), target setting (0.429, $p < 0.001$) and actionplan (0.304, $p = 0.005$). Finally, *vertical differentiation* remains a structural variable with no association with the VBM subdimensions, although the detailed analysis shows an important association with mindset: while all other path coefficients are non-significant, the association of vertical differentiation with mindset is significantly negative (−0.309, $p = 0.002$). We also take the associations of the control variables for each of the VBM subdimensions into consideration: listed firms show significant associations only with financial value driver (0.216, $p = 0.047$) and target setting (0.271, $p = 0.008$). The association of fixed assets with financial value driver is also significantly positive (0.118, $p = 0.076$). We find a significant association of automotive and supply with actionplan (0.130, $p = 0.059$), of logistics and transport with financial value driver (0.136, $p = 0.062$) and target setting (0.119, $p = 0.021$), of mechanical engineering with target setting (0.185, $p = 0.007$) and of whole and retail trade with mindset (0.177, $p = 0.029$). Pharma and medical showed a negative and significant association with the target setting (−0.152, $p = 0.079$). R^2 values range from 0.241 (mindset) to 0.384 (target setting), and all Q^2 values are above zero.

Table 4
Results of hypotheses testing, main structural model, full sample (n = 117).

Hypotheses	Independent variable -> dependent variable	Path coefficients	p-values	support	VIF	f^2
H1	Centralization -> VBM sophistication	0.175	**0.033**	yes	1271	0.045
H2	Formalization -> VBM sophistication	0.380	**< 0.001**	yes	1206	0.223
H3	Horizontal integration -> VBM sophistication	0.415	**< 0.001**	yes	1475	0.217
H4	Vertical differentiation -> VBM sophistication	-0.095	0.333	no	1231	0.013
	Control variables					
	Listed	0.190	**0.054**		2518	0.026
	Free float > 25%	-0.093	0.314		2444	0.007
	Size	0.071	0.381		1301	0.007
	Fixed assets	0.013	0.858		1124	0.000
	CMV	-0.095	0.479		1069	0.016
	Austria	-0.067	0.510		1150	0.007
	Switzerland	0.039	0.522		1118	0.003
	Industry control variables					
	Automotive and supply	0.031	0.579		1221	0.001
	Bank and insurance	-0.016	0.579		1098	0.000
	Electrical and optical engineering	-0.037	0.504		1089	0.000
	Logistics and transport	0.087	0.127		1119	0.013
	Mechanical engineering	0.101	**0.049**		1119	0.018
	Pharma and medical	-0.100	0.298		1127	0.017
	Whole and retail trade	0.036	0.475		1103	0.002
	R2	**0.463**				
	Q2	**0.247**				

Missing industries could not be estimated due to an individually insufficient number of respondents and are hence excluded.

Table 5
Effects of structural and control variables on VBM sophistication sub-dimensions.

	Dependent variable: VBM sophistication sub-dimension					
Independent variable	Porfolio	Financial value driver	Non-financial value driver	Target setting	Actionplan	Mindset
Centralization	0.146 (0.129)	0.098 (0.316)	0.100 (0.304)	0.169 (**0.052**)	0.209 (**0.015**)	0.155 (0.109)
Formalization	0.413 (<**0.001**)	0.260 (**0.006**)	0.328 (**0.002**)	0.191 (**0.052**)	0.324 (<**0.001**)	0.307 (**0.001**)
Horizontal integration	0.179 (0.101)	0.405 (<**0.001**)	0.367 (**0.001**)	0.429 (<**0.001**)	0.304 (**0.005**)	0.137 (0.191)
Vertical differentiation	-0.079 (0.414)	-0.042 (0.636)	0.006 (0.955)	-0.063 (0.494)	-0.142 (0.145)	-0.309 **(0.002)**
Control variables						
Listed	0.079 (0.513)	0.216 (**0.047**)	0.055 (0.635)	0.271 (**0.008**)	0.104 (0.419)	0.188 (0.118)
Free float > 25%	0.043 (0.697)	-0.099 (0.343)	-0.107 (0.351)	-0.097 (0.321)	-0.079 (0.505)	-0.108 (0.368)
Size	0.126 (0.105)	-0.017 (0.829)	0.129 (0.167)	-0.004 (0.955)	-0.043 (0.613)	0.107 (0.829)
Fixed assets	-0.088 (0.332)	0.118 (**0.076**)	-0.011 (0.891)	0.088 (0.380)	-0.043 (0.4526)	0.036 (0.675)
CMV	-0.144 (0.132)	-0.223 (**0.051**)	0.073 (0.522)	-0.025 (0.796)	0.043 (0.729)	-0.056 (0.644)
Austria	-0.083 (0.440)	-0.050 (0.635)	-0.039 (0.686)	0.018 (0.793)	-0.090 (0.455)	-0.001 (0.995)
Switzerland	0.110 (0.176)	-0.006 (0.947)	0.087 (0.278)	-0.004 (0.955)	0.043 (0.613)	0.087 (0.278)
Industry control variables						
Automotive and supply	-0.016 (0.791)	0.057 (0.286)	0.013 (0.851)	-0.035 (0.565)	0.130 (**0.059**)	-0.013 (0.879)
Bank and insurance	-0.067 (0.508)	-0.007 (0.958)	0.005 (0.965)	0.108 (0.246)	0.001 (0.991)	-0.021 (0.853)
Electrical and optical engineering	0.001 (0.985)	-0.087 (0.309)	-0.087 (0.309)	-0.047 (0.606)	0.049 (0.397)	-0.102 (0.218)
Logistics and transport	-0.008 (0.895)	0.136 (**0.062**)	0.117 (0.114)	0.119 (**0.021**)	0.090 (0.271)	0.085 (0.232)
Mechanical engineering	0.068 (0.133)	0.004 (0.945)	0.089 (0.252)	0.185 (**0.007**)	0.081 (0.420)	0.095 (0.232)
Pharma and medical	-0.109 (0.398)	-0.120 (0.249)	0.032 (0.725)	-0.152 (**0.079**)	0.017 (0.852	-0.114 (0.273)
Whole and retail trade	-0.009 (0.927)	0.066 (0.403)	0.045 (0.520)	-0.090 (0.337)	0.085 (0.259)	0.177 (**0.029**)
R^2	0.334	0.364	0.357	0.384	0.309	0.241
Q^2	0.129	0.231	0.156	0.211	0.177	0.121

Figures in the columns show path coefficients and p-values in parentheses. Missing industries are excluded from the model estimation because of an individually insufficient number of respondents.

5.4. Robustness checks

Since we added a fourth item to each of the six first-order sub-dimensions of VBM sophistication, we compared our results with an additional estimation of the model using Burkert's and Lueg's (2013) original VBM sub-dimension constructs with three items. We found no relevant changes in the results as follows: the original three-item constructs of VBM subdimensions also show reliable and valid construct measures. We obtain the same conclusions in the hypothesis testing, indicating positive associations of centralization (0.177, $p = 0.014$), formalization (0.327, $p < 0.001$) and horizonal integration (0.420, $p < 0.001$) with VBM sophistication (R^2=0.413); vertical differentiation shows no significant association. Furthermore, we tested the main model as well as the specific associations with each of the VBM subdimensions for path relation differences between listed and unlisted firms by a multi-group analysis (Hair et al., 2017). The results show no significant differences in the associations for listed and unlisted firms. We further checked the industry results by a separation between manufacturing and retail/service industries (Brück et al., 2018) and found no significant association (0.056, $p = 0.583$). We also checked the association of capital-intensive industries with VBM sophistication in a separate model, which revealed no significant association (−0.088, $p = 0.278$). The relationships in the research model are controlled for a potential common method bias by the inclusion of CMV as a marker variable (Chin et al., 2013). We incorporate a further test based on the variance inflation factor (VIF) to check for potential biases of the estimations by CMV (Kock, 2015). VIF estimates each construct as a dependent variable and indicates the amount that is explained by the

remaining constructs. The VIF values in the inner path model range between the intervals of 1.206 and 1.475 for the Likert-scale measurements (see Table 4), which is much below the critical threshold of 3.3. This indicates that CMV does not seriously bias our data. Therefore, we assume that common method bias only marginally influences the results in our study.

6. Discussion and conclusion

Even though VBM has been widely used in European firms, little is still known about the reasons for frequently reported differences in the extent of VBM implementation (Firk et al., 2019a; Malmi and Ikäheimo, 2003). To address this issue, we investigate the influence of the organizational structure on VBM sophistication in large firms in Austria, Germany and Switzerland. In centralization, formalization and horizontal integration, we find three major structural variables displaying a positive association with VBM sophistication. These results illustrate that the organizational structure is a further reason for the frequently reported differences in VBM sophistication (Firk et al., 2019a; Schäffer and Lueg, 2010). We further argue that these structural subdimensions differently affect the technical, political and cultural fit of a firm with VBM (Ansari et al., 2010).

The positive association of centralization with VBM sophistication contradicts normative claims that decentralization is generally favourable for VBM (e.g., Stern et al., 2001; Young and O'Byrne, 2001). Centralization seems to better enable top management to enforce the adoption decision in their organization while avoiding the potential resistance caused by decentralized decision rights (Koufteros and Vonderembse, 1998; Burns, 1999; Scapens and Roberts, 1993). In the more detailed analysis, the missing effect of centralization on the VBM sub-dimension mindset seems to illustrate that a centralized authority may have the power to push these subdimensions into the organization that refer to guidance by targets (target setting) and the way to achieve them (Burns, 1999; Koufteros and Vonderembse, 1998) but not always into the 'hearts and minds' of its members (mindset). These findings suggest that centralization particularly increases organizations' political fit with VBM, while further actions are required to positively affect technical and cultural fit.

In our data, formalization shows a positive association with VBM sophistication in general and each of the VBM subdimensions. These results are in line with our assumption that formalization increases the transparency of organizational processes and hence seem to facilitate the identification and interconnection of financial and especially non-financial value drivers. A formalized structure seems to create a higher technical fit with formal MAIs, such as VBM, as it functionally better fits the established processes (Lee and Yang, 2011; Sisaye and Birnberg, 2010; Oliver, 1992). The positive association of formalization with target setting indicates that high formalization also increases political fit with VBM: setting specific targets, which is facilitated by formalization, gives clear guidance to employees and therefore reduces agency problems. Clear targets provide a higher conviction of organizational members according to the idea of VBM (cultural fit), which is constituted in the most considerable positive association of formalization with mindset.

Furthermore, our data suggest that a higher degree of horizontal integration drives VBM sophistication. We also find these highly significant positive associations in the more detailed analysis on the VBM subdimensions financial and non-financial value driver, target setting and actionplan. These results underpin the relevance of a cross-functional structure for the implementation of VBM as an integrated performance measurement system (Lee and Yang, 2011) and indicate that horizontal integration increases the technical fit with VBM. Our data also indicate that the opportunistic behaviour of single employees or departments within an organization can be reduced if information about unit activities is spread within the whole organization, which increases political fit with VBM. Furthermore, we argue that in companies with high horizontal integration, cultural practices exist in which employees are willing to adjust action plans when necessary from a VBM logic and therefore seem to show higher conviction towards VBM (cultural fit).

We find no association between vertical differentiation and VBM sophistication, which nevertheless is in line with the results of other studies: Gosselin (1997) reports only the influence of centralization and formalization on the implementation of ABC, while vertical differentiation solely shows the effects of the adoption decision. However, our further analysis shows a significantly negative association of vertical differentiation with the mindset of VBM users. Hence, vertical differentiation may not negatively affect the functional aspects of VBM usage (technical fit) and the political dimension of accepting this administrative innovation, but it seems to reduce the conviction of employees towards VBM (cultural misfit). A higher number of hierarchical levels seems to increase the risk of social pressures and resistance against VBM, especially in later diffusion stages, when internal and/or external factors affect potential de-institutionalization (McLaren et al., 2016; Becker, 2014; Ansari et al., 2010; Oliver, 1992).

Although listed firms achieve a higher VBM sophistication in our data (see Table 4), we find no significant path relation differences between listed and unlisted firms. This finding indicates that the structural influences on VBM sophistication are relevant regardless of whether firms are listed on the capital market or not.

Our research contributes to the existing literature on VBM and the diffusion of MAIs in the following ways: This is the first study to investigate the associations of the major subdimensions of the organizational structure with the diffusion of VBM even though the normative literature has already described the relevance of an adequate organizational structure for VBM implementation (e.g., Stern et al., 2001; Young and O'Byrne, 2001). While recent research reports contingency factors that influence the implementation of VBM at the environmental level, such as perceived environmental uncertainty (Burkert and Lueg, 2013) and the intra-organizational level, such as top management team characteristics (Burkert and Lueg, 2013) and CFO succession (Firk et al., 2019b), we extend these findings by identifying organizational structure as a further relevant factor at the organizational level. We thereby find indications that organizational sub-variables differently and interdependently affect the technical, political and cultural fit of an organization with a VBM (Ansari et al., 2010; Oliver, 1992). Our data suggest that hierarchy-based power and formal rules are associated with the implementation degree of administrative innovations (in this case, VBM) after the initial adoption. Centralization seems to deliver more of a compatible framework for VBM that supports the enforcement of the VBM system inside the organization (political fit), while formalization and horizontal integration are associated with the overall implementation of VBM, as these structural variables seem to create a technical, political and cultural fit with VBM.

Previous studies found that mechanistic organizations were more successful in the implementation of administrative innovations (Gosselin, 1997; Damanpour, 1991). We add to this literature by illustrating that formalization not only provides organizational members the capability to efficiently transfer new rules into routines that become and remain institutionalized (Burns and Scapens, 2000). Moreover, we illustrate that formalization supports an organization's effort to reduce agency conflicts by formulating concrete and (VBM-) specific targets (political fit) and to change the mindsets of employees towards familiarization with VBM. Therefore, a formal organizational structure is suggested to create a higher cultural fit with formal innovations, resulting in a higher extent of the practice's implementation and a preservation of formal practices on the timeline. In the later stages of the use of an innovation, especially when supporting factors vanish or impairing factors evolve, the challenge for organizations mainly shifts from successful implementation to the preservation of the innovation (Firk et al., 2019b; Becker, 2014; Oliver, 1992). While McLaren et al. (2016) monitor the lifecycle of VBM in three case firms, leading to a

demise of EVA at the end of the diffusion process, Firk et al. (2019b) find that successor CFOs have a negative effect on VBM effectiveness if they were not in charge during the initial implementation because they place less emphasis on VBM. Our data show that a higher number of hierarchical levels seems to increase the risk of social pressures and resistance against VBM, especially in later diffusion stages, when internal and/or external factors affect potential de-institutionalization (McLaren et al., 2016; Becker, 2014; Ansari et al., 2010; Oliver, 1992). With this finding, we contribute to the literature on the de-institutionalization of administrative innovations by highlighting the relevance of the inability to convince employees to support a (former) innovation and to change their mindsets.

Finally, we confirm Burkert's and Lueg's (2013) framework of VBM sophistication with a dataset consisting of 117 companies. Using this sample, we enhance the predominant investigation of listed firms in VBM research by also considering unlisted firms. Given the predominant investigation of publicly available data in VBM research (e.g., Firk et al., 2019a; 2018; Knauer et al., 2018), our survey enriches recent empirical studies concerning VBM implementation at a late diffusion stage from a methodological perspective.

Practitioners may use our findings to identify reasons for potential problems with the implementation of VBM in their organization (e.g., Chiwamit et al., 2017; McLaren et al., 2016; Malmi and Ikäheimo, 2003). Low levels of centralization, formalization and horizontal integration might be a reason for an organizational misfit with VBM, resulting in less VBM sophistication. This especially applies for centralization since decentralization normatively has been claimed to be favourable for a VBM application (e.g., Stern et al., 2001; Young and O'Byrne, 2001). To increase organizational fit with VBM, firms could aim to increase the degree of horizontal integration, which we expect to be less complicated compared to the other structural variables and shows the most relevant positive association with VBM sophistication. Firms with a higher level of vertical differentiation, however, should be aware of the potential negative association with the employees' mindset about VBM, which may indirectly promote the demise of VBM (Becker, 2014). These firms may choose further actions to counteract the negative association of many hierarchical levels with a value-based mindset, e.g., by an explicit commitment of top management (Haspeslagh et al., 2001) - especially the CFO - and corresponding central actions that increase political fit with VBM. According to this, Burkert and Lueg (2013) show the positive influence of the CFO on VBM sophistication, while Firk et al. (2019b) find that a reduced emphasis of successor CFOs for VBM may be solved by a tied compensation to VBM.

Like other research, our study faces limitations. Even though we take precautions to address potential biases in surveys, we cannot ensure the absence of these potential weaknesses. Furthermore, our significant results of three important organizational variables, which we specifically derived from the literature for our research topic, do not guarantee that we cover all potential structural variables that influence VBM sophistication. The association of formalization with VBM sophistication may also be affected by reverse influence, as a once-implemented VBM system may also shape an organization's formalization. We assess the response rate of 10.43% (117 organizations) as high enough to derive overall valid conclusions in this study, but the participation of only ten Austrian and eleven Swiss companies limits our study results concerning national differences in VBM sophistication and may be a reason for missing effects when testing control variables. Due to a partially very low number of companies in single branches, we were also unable to control for all industries. Finally, the interpretation of our data is based on the assumption that firms in our sample are in a late stage of VBM usage, which is derived from earlier studies on the diffusion of VBM (e.g., Firk et al., 2019a; Burkert and Lueg, 2013; Rapp et al., 2010). Even though we expect that this late diffusion stage applies for our sample of large firms from German-speaking countries as well, it remains an assumption.

Future research may apply Burkert and Lueg's (2013) framework to identify additional influencing factors on VBM sophistication, e.g., corporate strategy (Blume, 2016; Gosselin, 1997), to enrich our findings according to differences in VBM sophistication and to different countries. Future research on VBM or the diffusion of MAIs could also investigate interrelations of factors that differently influence the different diffusion stages of an MAI. Factors that facilitate the implementation and later-stage use of an MAI might hamper the initial adoption, while vice versa, factors that create the need for a certain MAI might hamper the implementation after the initial adoption. Referring to this, contingency factors such as organizational structure or corporate strategy might also be considered moderating factors on these interrelations. From a theoretical perspective, the consideration of the implementation of an innovation beyond its adoption or non-adoption seems not to be sufficient to fully understand the diffusion process. Future research focusing on the diffusion of MAI should also consider a separate analysis of the technical, cultural and political fit and further external and/or internal factors that are expected to cause a de-institutionalization or a preservation of the practice after its initial adoption and implementation (Becker, 2014; Ansari et al., 2010; Oliver, 1992).

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.mar.2022.100797.

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