



Management accountants and strategic management accounting: The role of organizational culture and information systems

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ABSTRACT

This study aims to contribute to the scant contingency theory literature on the determinants of strategic management accounting (SMA) practices and the role management accountants play. We develop and test a more complex theoretical model than in prior studies, to simultaneously examine the role of three variables: management accountant networking, information systems (IS) quality and organizational culture. These have not been examined in a single model before in the SMA literature. Using data from 149 UK manufacturing business units and the partial least square structural equation modeling, our findings document a positive relationship between management accountant networking and the implementation of SMA practices. However, this relationship is positively moderated by IS quality, which further enables management accountants to implement SMA practices. Unlike IS quality, we do not find empirical support for similar moderating effects by the outcome-oriented culture and innovation-oriented culture. Instead, the innovation-oriented culture has a significant indirect positive effect on SMA implementation through management accountant networking but not a direct one. In contrast, we find a direct positive impact of outcome-oriented culture on SMA implementation but not an indirect one through management accountant networking. These results suggest that in outcome-driven business units, the implementation of SMA practices may not be limited to the accounting function. Managers in other functions may be motivated to implement SMA practices even when management accountants are not part of the process.

1. Introduction

The literature on strategic management accounting (SMA) has significantly expanded since the work of Simmonds (1981) and a number of SMA practices have been introduced (Rigby and Bilodeau, 2015; Cadez and Guilding, 2012, 2008; Langfield-Smith, 2008; Guilding et al., 2000). Since then, interest has been growing to establish the popularity of such practices among firms and determine their impact on firm performance (Rigby and Bilodeau, 2015; Guilding et al., 2000). However, while some empirical studies have documented that SMA practices brought into use have led to better firm performance (Alamri, 2019; Pavlatos and Kostakis, 2018; Turner et al., 2017; Cravens and Guilding, 2001; Guilding et al., 2000), others have reported disappointing implementation rates (Lachmann et al., 2013; Langfield-Smith, 2008; Hyvönen, 2003; Cravens and Guilding, 2001; Guilding et al., 2000). Such results are surprising to many researchers who have expected SMA practices to spread widely in practice given their potential in helping

managers address increasing levels of competition and uncertainty, and to make more informed strategic decisions (Bhimani and Langfield-Smith, 2007; Bromwich and Bhimani, 1994; Dixon and Smith, 1993; Bromwich, 1990; Simmonds, 1981).

To explain the unexpected low implementation rates of SMA practices, a stream of literature has emerged in which scholars contend that they may be context-specific. In other words, they are likely to be implemented in certain situations but not others; therefore, identifying the characteristics of such contexts has become an important goal (Cescon et al., 2019; Baird et al., 2018; Ax and Greve, 2017; Turner et al., 2017; Cadez and Guilding, 2012, 2008; Naranjo-Gil et al., 2009; Cinquini and Tenucci, 2010; Baird et al., 2007; Dunk, 2004).

However, the aforementioned literature is limited in various ways. First, most studies focus on merely one or two SMA practices, such as activity-based costing/management (Baird et al., 2018; Naranjo-Gil et al., 2009; Langfield-Smith, 2008; Al-Omiri and Drury, 2007; Baird et al., 2007), balanced scorecard (Ax and Greve, 2017; Naranjo-Gil et al.,

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2009) or life cycle costing (Dunk, 2004). Yet, these scholarly efforts fail to provide evidence confirming that the appropriate context for one SMA practice could also be conducive to all others. Without evidence through empirical testing, generalization of their findings to other SMA practices could be questionable (Emsley, 2005).

Second, studies analysing a relatively larger set of SMA practices to address the abovementioned limitation remain very few and are thus far unsuccessful in conclusively identifying influential factors associated with the implementation of SMA practices (Cescon et al., 2019; Pavlatos and Kostakis, 2018; Turner et al., 2017; Cinquini and Tenucci, 2010; Cadez and Guilding, 2008). More specifically, while the roles of some of the proposed variables did not gain any empirical support, such as company orientation (Cescon et al., 2019), advanced manufacturing technology (Baines and Langfield-Smith, 2003) and company ownership (Yazdifar et al., 2019), mixed results were reported for all other variables, including business strategy (Cescon et al., 2019; Turner et al., 2017; Naranjo-Gil et al., 2009; Cadez and Guilding, 2008), market orientation (Turner et al., 2017; Cadez and Guilding, 2008), management accountant involvement (Yazdifar et al., 2019; Cadez and Guilding, 2008; Emsley, 2005) and firm size (Cinquini and Tenucci, 2010; Naranjo-Gil et al., 2009; Cadez and Guilding, 2008).

Third, almost all of the studies outlined above have developed and tested perhaps reductive models in which the proposed contingency variables have been assumed to independently influence SMA practices, in isolation from each other (Cescon et al., 2019; Baird et al., 2018; Turner et al., 2017; Cadez and Guilding, 2012, 2008; Cinquini and Tenucci, 2010; Baird et al., 2007; Dunk, 2004). There has been a paucity of attempts at building more holistic, complex models which may better capture the more intricate ways through which variables may interrelate, including potential interactions. Approaches as these would be crucial and timely, given the inconclusive results reported in prior studies on the independent impact of the proposed contingency variables (Otley, 2016). Such insignificant or inconclusive empirical findings leave practitioners and researchers unclear about the influential factors which may facilitate or hinder the implementation of SMA practices. Among others, Cadez and Guilding (2008) acknowledge the limitations of their tested model and urge researchers to undertake more research, in order to identify other significant contingent variables that might aid in establishing and understanding the contexts in which SMA practices could best be implemented. Lachmann et al. (2013) has more recently echoed Cadez and Guilding's (2008) call with similar requests for further research on the determinants of SMA practices.

In the current study, we attempt to address these limitations and respond to the calls by Cadez and Guilding (2008) and Lachmann et al. (2013) in three different ways. Firstly, we include a relatively larger number of SMA practices (twelve) rather than focusing on only one or two, as has been the case in the majority of prior studies (Baird et al., 2018; Gupta and Salter, 2018; Ax and Greve, 2017; Naranjo-Gil et al., 2009; Baird et al., 2007; Dunk, 2004), enabling our reporting on important contingency variables for a larger set (Cadez and Guilding, 2008). Secondly, we explore the potential role of three variables, namely management accountant networking, information systems (IS) quality and organizational culture, which have received little attention in the SMA literature to date, and to our knowledge have not been simultaneously examined in any model in this stream of literature. Thirdly, we develop a more integrated and complex model than in prior studies, by examining not only independent impacts but also potential moderating and mediating effects to better understand how the three main variables influence SMA implementation. Furthermore, we control for the potential effects of a number of other variables, namely competition, product diversity, perceived environmental uncertainty and firm size, for robustness.

Using data from 149 UK manufacturing business units and the partial least square structural equation modeling, our findings document a positive relationship between management accountant networking and the implementation of SMA practices. However, this relationship is

positively moderated by IS quality, which further enables management accountants to implement SMA practices. This implies that, in some companies, management accountants who interact or communicate with other decision makers may find it easier to propose and implement SMA practices in the presence of high-quality IS. This may clarify why management accountants networking with other decision makers did not always lead to greater implementation of SMA practices, as demonstrated by Cadez and Guilding (2012) and Roslender and Hart (2003).

Unlike IS quality, we do not find empirical support for similar moderating effects by the two organizational culture variables (i.e. outcome-oriented and innovation-oriented) on the networking-SMA implementation relationship¹. Nonetheless, our evidence suggests that both types of culture still influence SMA implementation though in different ways. The innovation-oriented culture has an indirect positive impact on SMA implementation through networking but not a direct one. As such, an innovation-oriented culture seems to motivate management accountants to network internally and externally which helps them to acquire the knowledge and skills needed to identify new ideas/practices and implement the most relevant ones including SMA practices (Lapsley and Rekers, 2017; Yigitbasoglu, 2016; Emsley, 2005).

In the case of outcome-oriented culture, we find it to have a direct positive impact on SMA implementation but not an indirect one through networking. This indicates that the implementation of SMA practices in outcome-driven companies is not determined by management accountant networking only. That is, our results suggest that even if management accountants do not network and hence are unable to satisfactorily contribute to SMA implementation, managers in other functions may implement these practices by themselves (Fish et al., 2017; Carlsson-Wall et al., 2015; Lord, 1996). Managers in outcome-driven companies are mainly driven by achievement, actions, results and high performance expectations (Baird et al., 2018, 2007; O'Reilly et al., 1991), and their performance is likely to be evaluated accordingly. To achieve their targets and effectively perform their managerial/strategic responsibilities, our findings suggest that such managers, in the absence of competent management accountants, possibly collect the information they need including through SMA practices (Bruns and McKinnon, 1993). This may explain the significant direct positive impact of outcome-oriented culture on SMA implementation documented in our study.

Prior research has documented empirical evidence of the lack of management accountants' contribution towards the implementation of SMA practices (Yazdifar et al., 2019; Carlsson-Wall et al., 2015; Lord, 1996), and the competing role of operations managers in terms of collecting the information they need including through SMA practices (Fish et al., 2017; Carlsson-Wall et al., 2015; Burns and Vaivio, 2001; Bruns and McKinnon, 1993). However, our findings on the two culture variables propose that this lack of contribution by management accountants and the competing role of operations managers may possibly be more observed in companies with an outcome-oriented culture.

From a theoretical perspective, our study contributes to the SMA literature by developing and testing a more integrated, complex model, to shed light on the potential role of management accountant networking, IS quality and organizational culture in the implementation of SMA practices, which have not been simultaneously examined in a single model. By doing so, we are able to reveal the importance of these three in determining the implementation of a relatively large set of SMA practices. Moreover, we show how quality IS may enhance the ability of management accountants who communicate or interact with internal and external parties to contribute to the implementation of SMA

¹ Throughout this paper, the term "innovation-oriented culture" is used to imply a higher emphasis on this type of culture in organizations as opposed to a lower/no emphasis on it. The same applies to the term "outcome-oriented culture".

practices. Such results offer a potential explanation to the findings of prior studies that document a lack of relationship between management accountant networking and the implementation of SMA practices (Cadez and Guilding, 2012; Roslender and Hart, 2003). Finally, our study also documents how two different types of culture (i.e. outcome-oriented and innovation-oriented) influence SMA implementation in different ways (i.e. directly or indirectly through management accountant networking).

There are two key points to take away from our findings. First, management accountants need to interact or communicate with internal decision makers and others in their supply chain. Those who do are more able to contribute to the implementation of SMA practices, and the existence of quality IS facilitates the implementation of these practices. Second, in the absence of competent management accountants capable of initiating and implementing SMA practices, other managers are likely to implement these practices even if their management accountants are not part of the process.

The remainder of the paper is structured as follows. In section 2, we present a summary of the relevant literature and develop our hypotheses. The methodology and data collection are detailed in section 3, whilst the analyses and results are explained in section 4. The final section is devoted to the discussion and conclusion.

2. Literature review and hypotheses development

2.1. SMA and the need for more empirical research

The term ‘strategic management accounting’ (SMA) was coined about 40 years ago by Simmonds (1981, p.26) describing it as “the provision and analysis of management accounting data about a business and its competitors for use in developing and monitoring the business strategy”. Definitions offered by scholars since tend to vary (Cadez and Guilding, 2008; Langfield-Smith, 2008). Bromwich (1990, p.28) deems it to be “the provision and analysis of financial information on the firm’s product markets and competitors’ costs and cost structures and the monitoring of the enterprise’s strategies and those of its competitors in these markets over a number of periods”. For Dixon and Smith (1993, p.605), SMA is defined as “the provision and analysis of information relating to a firm’s internal activities, those of its competitors and current and future market trends, in order to assist in the strategy evaluation process”.

In this study, we adopt Simmonds’s definition for two reasons. First, unlike Bromwich’s view, Simmonds acknowledges the role of non-financial information provided by management accounting which is also important for decision makers developing and evaluating strategy (Bhimani and Langfield-Smith, 2007). Second, while Dixon and Smith’s definition focuses on “information” in general, Simmonds’s definition relates SMA more clearly to management accounting by focusing on “management accounting data”.

To put the theoretical concept of SMA into action, some techniques/practices are needed and such practices must overcome the lack of strategic orientation of traditional management accounting practices which encourage short-term and internal/inward focuses (Cadez and Guilding, 2012; Guilding et al., 2000). In this respect, prior research has concurred that for a management accounting practice to be helpful in developing and evaluating strategy and hence be identified as a SMA practice, it should possess one or both of the following characteristics: (a) long-term orientation and (b) external/outward focus (Cadez and Guilding, 2012, 2008; Cravens and Guilding, 2001; Guilding et al., 2000).

Building on the aforementioned criteria, a number of introduced practices have been associated with SMA, including target costing, life cycle costing and competitor position monitoring (Langfield-Smith,

2008)². As such, a modest stream of literature has emerged, with interest in measuring the diffusion of such practices among firms and understanding the factors which facilitate or hinder their implementation (Yazdifar et al., 2019; Cescon et al., 2019; Turner et al., 2017; Rigby and Bilodeau, 2015; Cadez and Guilding, 2012, 2008; Hyvönen, 2003; Cravens and Guilding, 2001; Guilding et al., 2000).

However, disappointing implementation rates of SMA practices have been documented (Langfield-Smith, 2008; Cravens and Guilding, 2001; Guilding et al., 2000) along with ambiguous results in relation to the factors proposed to explain variations in the implementation rates of SMA techniques observed in practice (Yazdifar et al., 2019; Cescon et al., 2019; Turner et al., 2017; Cadez and Guilding, 2012, 2008; Hyvönen, 2003). As evident in Table 1, a number of the proposed contingency variables (such as advanced manufacturing technology, company orientation, company ownership and IS quality) were found insignificant in explaining why some companies implemented SMA practices while others did not. However, mixed and inconclusive results were reported for all other variables such as business strategy, market orientation, management accountant involvement and firm size (see Table 1). In line with calls by scholars for more large-scale studies in this relatively neglected area (Lachmann et al., 2013; Cadez and Guilding, 2008), the above results should indeed prompt further empirical research to better understand what may encourage or prevent the implementation of SMA practices.

2.2. Management accountant as a strategic information provider

Since the conception of SMA in the early 1980s, researchers have envisaged a critical role for management accountants in providing strategic information and, by extension, in the initiation and implementation of SMA practices (Dixon and Smith, 1993; Shank, 1989; Simmonds, 1981). Remarkably, however, empirical evidence has revealed they play a limited role in this respect (Yazdifar et al., 2019; Carlsson-Wall et al., 2015; Lord, 1996). Such a limited role may be attributed to five reasons which determine the ability of management accountants to provide relevant strategic information that decision makers can exploit, and to initiate and implement SMA practices. These include:

(1) *Understanding the business environment and operational complexity:* Carlsson-Wall et al. (2015) articulated in their case study how management accountants were excluded from making strategic decisions in an inter-organizational context. They were simply believed to have insufficient awareness of the technical complexity surrounding the development of a strategic inter-organizational relationship. This concurs with Yazdifar et al. (2019) who interviewed management accountants who conceded that other managers were more aware of the business environment and the technicality of operations and hence more equipped to suggest and implement innovations.

(2) *Understanding the information needs and information processing traits of decision makers:* In the majority of the interviews undertaken by Pierce and O’Dea (2003), management accountants did not exhibit an adequate understanding of what information and management accounting practices production managers and sales managers needed or could benefit from. Uecker (1978) and Brecht and Martin (1996) emphasized the importance of understanding the IS user’s behaviour which should be taken into account by accountants when deciding what system design to adopt and what information to provide. Otherwise, the IS they design may not be used by decision makers and they may lose their status as information providers (Van der Veecken and Wouters, 2002; Brecht and Martin, 1996).

(3) *Awareness of management accounting innovations, including SMA practices and the know-how for their implementation:* Tillmann and

² See Guilding et al. (2000) and Cadez and Guilding (2008) for a more complete list of these practices.

Table 1
Summary of the survey-based contingency theory literature on the determinants of SMA practices³.

Study	Business strategy	Market orientation	Management accountant involvement	Firm size	Advanced manufacturing technology	Company orientation	IS quality	Ownership (subsidiary vs. independent)
Booth et al. (2000)							0	
Hyvönen (2003)							0	
Baines and Langfield-Smith (2003)	(+)				0			
Emsley (2005)			+					
Cadez and Guilding (2008)	(+)	0	+	+				
Naranjo-Gil et al. (2009)	(+)			0				
Cinquini and Tenucci (2010)	0			0				
Cadez and Guilding (2012)	0	+	0					
Turner et al. (2017)	0	+		0				
Cescon et al. (2019)	0					0		
Yazdifar et al. (2019)			0					0

The + and 0 represent positive and no relation respectively.

^a The empirical literature focusing on single SMA practices includes hundreds of articles. Therefore, the studies summarized in this table are those which include more than one SMA practice in their empirical analyses.

Goddard (2008) argued that management accountants should be aware of what management accounting practices are available, what information they provide and how they can be correctly implemented in order to generate relevant and useful information that decision makers can exploit effectively. However, Yazdifar et al.'s empirical findings (2019) pointed to the difficulty in addressing Tillmann and Goddard's requirements. The management accountants they interviewed admitted that their knowledge of management accounting innovations was only at theoretical levels and they lacked the capability and confidence to put them into action.

(4) *The ability to identify what practices are appropriate and useful for implementation:* This is an important skill that management accountants should also acquire in order to only implement the most appropriate and useful practices which generate information critical for decision makers, given the task in hand (Cadez and Guilding, 2008; Emsley, 2005; Otley, 1980).

(5) *The competition management accountants face in their own practice from other managers:* Managers in other functions, particularly operations and marketing, have been reported to develop their own information systems including to encompass SMA information (Van der Veeken and Wouters, 2002; Bruns and McKinnon, 1993). For instance, Sedevich-Fons (2018) attributed the low recognition of many SMA practices in the management accounting literature to the fact that they could also fall within the remit of other disciplines such as operations management and marketing. Scholars such as Dixon and Smith (1993) and Lord (1996) detailed how some SMA practices were implemented by individuals in other organizational functions especially marketing and operations with no involvement of their management accountants.

To summarize, to the extent that management accountants face one or more of the five issues outlined above, their contribution to the provision of strategic information and their ability to initiate and implement SMA practices will remain limited.

2.3. Hypotheses development

2.3.1. Management accountant networking and SMA

To overcome the aforesaid five issues facing management accountants, networking has been introduced as a potential solution. Management accountant networking is defined as the communication/interaction between management accountants and other managers in their organizations along with professional accounting institutions and companies across their supply chain (Yigitbasioglu, 2016; Ugrin, 2009; Emsley, 2005; Newell et al., 1998)³. Bruns and McKinnon (1993) and Emsley (2005) urged management accountants to spend more time with other managers in order to understand their needs and hence be proactive in providing the information they need for making informed decisions. Lapsley and Rekers (2017) concluded that for management accountants to play a role in strategizing, they need to move beyond the boundary of the accounting function and interact or communicate with individuals across both other functions and firms in their supply chain.

In general, it has been presumed that management accountants who network with both internal managers and employees, other members of their supply chain and professional accounting institutions may learn about new accounting practices and understand the business environment better, along with the information needs of managers in other functions and their information processing traits (Emsley, 2005).

³ The role of networking in innovation diffusion has been highlighted in the innovation and information system literature. Tushman and Scanlan (1981) emphasized that new ideas and practices could be imported to an organization through employees who are well connected internally and externally. Both such avenues are important since an externally connected employee with access to new knowledge, ideas or practices subsequently needs internal connections to disseminate these. In the case of enterprise resource planning, Ugrin (2009) offered empirical evidence confirming the influence of competitors, customers and suppliers on the decision to adopt this program. Newell et al. (1998) found significant differences in the level of employee interaction between companies implementing business process reengineering and their non-implementing counterparts. Swan and Newell (1995) revealed the positive role professional associations play in diffusing innovations, and Damanpour and Schneider (2006) confirmed their findings using data from 1200 US manufacturing firms.

Further, through communicating and interacting with these parties, management accountants can develop the competence and knowledge to select appropriate accounting practices and implement them successfully (Tillmann and Goddard, 2008). This is expected to ultimately increase their ability to provide strategic information and contribute to the implementation of SMA practices (Lapsley and Rekers, 2017; Emsley, 2005; Pierce and O'Dea, 2003).

Empirical evidence of the importance of networking for the implementation of management accounting practices exists though limited in quantity. Anderson (1995) and Bjørnenak (1997) explicated the role of information gained from professional courses, academics, auditors, other business divisions of the same company and other companies in the decision of General Motors and a sample of Norwegian companies to adopt ABC. In a case study analysis by Ma and Tayles (2009), the main reasons behind changes in the management accounting function and the adoption of certain SMA practices were competition and mimetic behaviour. Roslender and Hart (2002), in their field study of ten companies, articulated how management accountants and marketing managers were continuously engaged and communicated intensively in exploring the feasibility of several SMA practices, especially customer profitability analysis, ABC and benchmarking.

Tillmann and Goddard (2008) reported, by means of a case study, how the intensive involvement of management accountants in the everyday life of managers enabled them to implement a number of SMA practices, including competitor accounting, value chain accounting and ABC. Emsley's survey study (2005) theorized and empirically determined that management accountants who were more engaged with other managers were more likely to be innovative and develop radical management accounting initiatives to meet the needs of other managers and users of information. Further support was provided by Cadez and Guilding (2008) who tested the impact of management accountant involvement in strategic decisions on the usage of SMA practices. Using data from 193 Slovenian companies, their empirical analysis revealed a positive relationship. As such, the following hypothesis will be tested:

H1. Management accountant networking is positively related to the implementation of SMA practices.

Interestingly, however, not all studies were successful in confirming the above hypothesis. Roslender and Hart (2003) observed, in a field study, a high level of communication and cooperation between accountants and marketing managers, although a low level of implementation of SMA practices in the examined firms. Cadez and Guilding (2012) confirmed their findings, with 12 % of a sample of 109 firms reporting a high level of accountant involvement in strategic decision processes, but low-to-moderate levels of SMA practice uptake. The evidence in these two studies suggest that the impact of management accountant networking may also be contingent on other factors. Identifying these could be crucial to understanding the results on the role of management accountants in the implementation of SMA practices reported earlier. Accordingly, we now explore the potential role of IS quality and organizational culture.

2.3.2. IS quality, management accountant networking and SMA

The value and importance of information for decision makers has been well established in the literature (Schaltegger and Zvezdov, 2015; Dunk, 2004; Firmin and Linn, 1968). Many organizations have been trying to develop high-quality integrated IS in order to help managers and decision makers effectively perform their tasks and make informed decisions (Maiga et al., 2014; Booth et al., 2000). High-quality integrated IS are usually defined as systems which facilitate the collection, aggregation, storage and accessibility of data and information from divergent functions, such as accounting, sales, marketing and operations (Al-Omiri and Drury, 2007; Dillard, 2000). Consequently, such IS are believed to enable decision makers from across functions to access and transmit more detailed and relevant information, which can be relied on for various purposes (Maiga et al., 2014; Maiga, 2012; Al-Omiri and

Drury, 2007; Granlund and Mouritsen, 2003). If such IS are updated in real time, the relevance and usefulness of data and information will be further enhanced with an increase in the visibility of organizational processes and consumed resources (Bruns and McKinnon, 1993). In this sense, a few researchers have contended that high-quality IS could facilitate and encourage the adoption of new management accounting practices including SMA practices (Al-Omiri and Drury, 2007; Dunk, 2004).

Conversely, high-quality IS may also hinder the adoption of new management accounting practices, including SMA (Yigitbasioğlu, 2016; Granlund and Mouritsen, 2003; Krumwiede, 1998; Malmi, 1997; Anderson, 1995). This potential negative impact could be attributed to two factors. First, as noted by Luft (2009); Dillard (2000) and Otley (1980), accounting information only represents one dimension of broader IS, which, beyond financial information, may also include physical and non-financial information from other functions like marketing, sales, logistics, management or operations. Physical, non-financial information is increasingly competing with cost and other financial information to the extent that some managers discard the latter and rely mostly on the former for making operational and, to some degree, strategic decisions (Hall, 2010; Luft, 2009; Davila and Wouters, 2007; Van der Veecken and Wouters, 2002; Bruns and McKinnon, 1993). Therefore, insofar as (1) managers perceive the information provided by their existing IS to be sufficient for decision making, planning and control (Van der Veecken and Wouters, 2002; Krumwiede, 1998; Anderson, 1995; Firmin and Linn, 1968) and (2) they rely on physical, non-financial information to effectively perform their tasks (Luft, 2009; Van der Veecken and Wouters, 2002; Bruns and McKinnon, 1993), this could at least downgrade the importance and value of implementing new management accounting practices, especially if such practices mostly just generate cost and other financial information (Davila and Wouters, 2007; Brecht and Martin, 1996).

Second, the introduction of new management accounting practices may be resisted if they are believed to affect the existing balance of information control. According to Bariff and Galbraith (1978); Dillard (2000) and Schaltegger and Zvezdov (2015), information is power and those with it have more power over others. They may control resources previously controlled by other functional managers. Similarly, Markus and Pfeffer contend that an accounting practice can be more easily implemented when aligned with existing power distribution. Otherwise, resistance will surface and challenge the successful implementation of such practice (1983). This may explain the findings by Anderson (1995), who highlights in her study of ABC implementation at General Motors how the compatibility of ABC with existing IS influenced top management decisions to adopt it. The issue of information control and power is especially important in cases where ownership of the IS is in the hands of non-accountants (Schaltegger and Zvezdov, 2015; Abernethy and Bouwens, 2005; Hyvönen, 2003). In such cases, the introduction of new management accounting practices could be perceived as a threat to the controllers of the existing IS since their implementation may increase the value, and by extension the power, of the accounting function (Abernethy and Bouwens, 2005; Burns and Vaivio, 2001; Markus and Pfeffer, 1983).

In line with the competing theoretical arguments outlined above, empirical studies also have produced inconclusive results. Malmi's study (1997) refers to a case where managers were relying on informal estimates for costing whose accuracy was later confirmed by an ABC system implemented for this purpose. Hence, the system was discontinued as they gained the confirmation sought on the accuracy of their informal estimates and whether they were on track to achieve their intended strategy. This shows how the existing IS may substitute for some SMA practices, ABC in this case. Similar empirical evidence was also documented by Krumwiede (1998) in the case of ABC. Booth et al. (2000) found that firms using enterprise resource planning systems did not implement new accounting practices. Al-Omiri and Drury (2007) expected a positive relationship between the usage of high-quality IS and

the implementation of advanced costing techniques. However, their empirical analysis could not prove the proposed association. Hyvönen (2003) found that companies with integrated IS reported a higher adoption rate of advanced management accounting practices than companies without integrated IS, though the difference was not statistically significant. A clearer positive relationship was reported by Dunk (2004) between quality IS and the extent of life cycle costing implementation.

Clearly, the empirical literature on the impact of IS quality on the implementation of SMA practices (1) is fairly limited and with focus on a narrow set of SMA practices, particularly ABC (Al-Omiri and Drury, 2007; Krumwiede, 1998; Malmi, 1997) and (2) has reported inconclusive results. Therefore, building on the theoretical argument outlined at the beginning of this subsection, we do expect quality IS to influence the implementation of SMA practices though the direction of that influence remains an empirical question. As such, the following hypothesis is non-directional:

H2. There is a relationship between quality information systems and the implementation of SMA practices.

Whilst H1 and H2 propose independent impacts of management accountant networking and quality IS on the implementation of SMA practices, we will argue that quality IS may also moderate the impact of management accountant networking on SMA practices implementation. As noted, management accountants who network with other employees and managers internally and externally are more likely to have an up-to-date knowledge of the management accounting practices available and what information they generate along with the know-how to implement them (Lapsley and Rekers, 2017; Cadez and Guilding, 2008; Tillmann and Goddard, 2008; Emsley, 2005). In addition, they will better understand the information needs of other managers (Emsley, 2005; Pierce and O'Dea, 2003). However, whether such knowledge and understanding will be translated into greater implementation of SMA practices may depend on the quality of the existing IS. It is possible that, as a result of interacting with managers and other employees, management accountants may encounter satisfaction with the existing IS; hence there is no need for additional management accounting practices to be implemented (Bruns and McKinnon, 1993). If management accountants attempt to implement additional accounting practices, they are likely to face difficulties in justifying the related costs, and face resistance (Abernethy and Bouwens, 2005; Burns and Vaivio, 2001; Firmin and Linn, 1968). In this case, the role of the existing IS will be to weaken the impact of management accountant networking on SMA practices implementation.

In contrast, by interacting with other employees and managers, management accountants may conclude that the implementation of some SMA practices could help in meeting the information needs of decision makers. In this case, quality IS may further encourage management accountants to implement those practices by (1) offering a conducive environment through the provision of some of the necessary data for implementing the practices (Al-Omiri and Drury, 2007; Dunk, 2004) and/or (2) by enabling the dissemination of the output of such practices (information) to those decision makers who could benefit from it (Maiga et al., 2014; Al-Omiri and Drury, 2007; Granlund and Mouritsen, 2003). This could enhance the value and justify the costs of implementing those particular accounting practices and possibly reduce the degree of resistance. Following this logic, we test the following non-directional hypothesis:

H3. Quality information systems moderate the impact of management accountant networking on the implementation of SMA practices.

2.3.3. Culture, management accountant networking and SMA

Organizational culture is generally defined as the “shared norms and values that set expectations about appropriate attitudes and behavior for members of the group” (O'Reilly and Chatman, 1996, p.160). In this

sense, some scholars have presumed it to play a role in the implementation of accounting practices, including SMA practices (Ax and Greve, 2017; Baird et al., 2007; Markus and Pfeffer, 1983).

For instance, in some organizations, the shared norms and values may result in an innovation-oriented culture which can be defined as the pursuit of and experimentation with innovative ideas; seeking new opportunities and accepting higher levels of risk (O'Reilly et al., 1991, p.505). Such organizations are more likely to accept new ideas and innovative accounting and non-accounting practices with less resistance (Baird et al., 2018; Gupta and Salter, 2018). They are more poised to experiment with and respond positively to new practices and willing to invest the necessary time, money and other resources in their implementation (Baird et al., 2018). Similarly, an outcome-oriented culture may also play a role in the implementation of SMA practices. An outcome-oriented culture can be defined as the extent to which the shared norms and values emphasize achievement, actions, results and high-performance expectations⁴ (O'Reilly et al., 1991, p.505). Therefore, organizations with an outcome-orientation culture are thought to implement practices believed to drive performance and help in achieving their pre-determined goals (Baird et al., 2018, 2007). They are expected to be more committed to providing the necessary infrastructure to successfully implement and benefit from such practices (Baird et al., 2004).

Empirical research in the SMA literature on the role of organizational culture has been very limited (for example, Baird et al., 2018; Ax and Greve, 2017; Zhang et al., 2015; Baird et al., 2007, 2004). Baird et al. (2004) empirically captured a positive association between the outcome dimension of culture and the extent of adopting ABC. However, the innovation dimension of culture was found to be insignificant. Similarly, Baird et al. (2007) and Zhang et al. (2015) found evidence for a positive impact of the outcome dimension of culture on the success of ABC. However, the impact of the innovation dimension of culture was not supported. In contrast, Baird et al. (2018) reported the innovation dimension to be positively related to environmental ABC whilst the outcome dimension was not an important determinant. Ax and Greve (2017) empirically demonstrated that a fit between organization culture and the characteristics of an accounting innovation – the balanced scorecard in this study – is not a sufficient reason for adopting or rejecting the innovation.

Given the very limited number of studies in the SMA literature on the role of organizational culture and their focus on single SMA practices like ABC and balanced scorecard, we believe it is worth re-examining the respective theoretical arguments, especially in that we include a larger set of SMA practices. The following hypotheses are tested:

H4a. There is a positive relationship between an innovation-oriented culture and the implementation of SMA practices.

H4b. There is a positive relationship between an outcome-oriented culture and the implementation of SMA practices.

In addition to the potential independent impact of organizational culture on the implementation of SMA practices proposed in H4a and H4b, we argue that organizational culture may also moderate the impact of management accountant networking on the implementation of SMA practices. Through networking internally and externally, management accountants should be exposed to updated knowledge on new management accounting practices, the information they generate, the information needs of other decision makers in their organizations, and how such practices could potentially help these managers in carrying out their tasks effectively through the information they generate

⁴ It is worth remembering that the innovation-oriented culture and outcome-oriented culture are not mutually exclusive. The shared norms and values in some organizations may encourage behaviors in line with both (Baird et al., 2018; Zhang et al., 2015; O'Reilly et al., 1991).

(Lapsley and Rekers, 2017; Cadez and Guilding, 2008; Tillmann and Goddard, 2008; Emsley, 2005; Pierce and O'Dea, 2003). However, to initiate and implement such practices, management accountants could benefit from a conducive organizational culture. Yazdifar et al. (2019) revealed a lack of confidence management accountants experience in practice, which is a major reason for not initiating or proposing new management accounting practices. Therefore, organizations with an innovation-oriented culture can help knowledgeable and well-connected management accountants in two different ways. First, an innovation-oriented culture may motivate management accountants, like other employees, to propose innovative solutions to problems with more confidence that their ideas will not be criticized. This could be crucial for those who lack confidence or believe that only managers in operations or marketing are entitled to introduce and implement new ideas and practices (Yazdifar et al., 2019).

Second, an innovation-oriented culture may also help management accountants to avoid significant resistance to their proposals from other functions, since such a culture, by definition, encourages employees and managers to (1) appreciate any experimentation with new ideas and practices and (2) respond positively to them (Baird et al., 2018; Gupta and Salter, 2018; O'Reilly et al., 1991). Markus and Pfeffer (1983) and Taipaleenmäki (2014) advised that an accounting system can be more easily implemented if it is congruent with organizational culture. Otherwise, resistance will surface and undermine its implementation or uptake. Similarly, Malmi's study (1997) referred to a case where, due to the dominant culture of engineers, accounting was neglected. It becomes clear that an innovation-oriented culture may strengthen the relationship between management accountant networking and the implementation of SMA practices.

Likewise, organizations with an outcome-oriented culture can also offer a conducive environment for management accountants to initiate and implement SMA practices. Driven by a focus on achievements, actions, results and high-performance expectations (O'Reilly et al., 1991), organizations with an outcome-oriented culture are believed to support initiatives which help them to achieve their pre-determined goals and become competitive (Baird et al., 2018, 2007). As such, after gaining knowledge on what information decision makers need to effectively carry out their tasks and achieve organizational goals through networking (Cadez and Guilding, 2012, 2008; Tillmann and Goddard, 2008; Emsley, 2005), management accountants will be able to defend their proposals to implement new management accounting practices by highlighting the value of such practices and their role in the achievement of organizational goals. This may enfranchise the support needed to implement the proposed accounting practices (Baird et al., 2018, 2004). In addition, given the available evidence for the superior performance of organizations implementing SMA practices (Alamri, 2019; Pavlatos and Kostakis, 2018; Cravens and Guilding, 2001; Guilding et al., 2000), once management accountants use the knowledge gained through networking to articulate and emphasize the relevance of such practices and their generated information to what decision makers are trying to achieve, this is likely to facilitate the decision to implement the proposed SMA practices (Abernethy and Bouwens, 2005; Emsley, 2005). As such, the following hypotheses are tested:

H5a. Innovation-oriented culture positively moderates the impact of management accountant networking on the implementation of SMA practices.

H5b. Outcome-oriented culture positively moderates the impact of management accountant networking on the implementation of SMA practices.

Fig. 1 visually presents the research model and associated hypotheses.

3. Method

Data were drawn from a survey of CIMA members from the UK manufacturing sector. The questionnaire was mailed to 1456 business units that a) are medium or large (over 200 employees) in size, and b) have at least one CIMA member with a minimum of five years' CIMA membership. The Dillman (2000) survey method resulted in 149 usable responses and a final response rate of 10 %⁵. The main reasons given for non-participation were high workload and company policy. The responding firms covered a range of manufacturing activities, and no one industry dominated or exceeded 15 % of the total sample. Table 2 breaks down our sample per industry. The respondents had an average work history of approximately six years in their current job and 24 years overall. The average number of employees was 842 and the average annual sales was £131 million. These profiles indicate that the respondents are suitable and more likely to have the knowledge needed to respond to the questionnaire.

Non-response bias was assessed by comparing responses from participants and non-participants using Chi-square and Mann-Whitney U tests in terms of industry type and the duration of the respondents' CIMA membership. These were also used to determine whether there was any significant difference between early and late respondents regarding the number of employees and annual sales. The tests showed no significant differences, thus suggesting that non-response bias is not a serious issue in this study and does not threaten the validity of our findings.

3.1. Variable measurement

3.1.1. Dependent variables

SMA practices: 12 SMA practices used in prior research were included in this study (Cadez and Guilding, 2012, 2008; Emsley, 2005; Baines and Langfield-Smith, 2003). They are: strategic costing (SC), life cycle costing (LCC), activity-based techniques (ABT), target costing (TC), quality costing (QC), environmental cost management (ECM), competitive position monitoring (CPM), competitor performance appraisal (CPA), economic value added (EVA), value chain analysis (VCA), balanced scorecard (BSC), and customer profitability analysis (CPAN). Respondents were asked to indicate on a seven-point scale (1 = not at all, 7 = to a great extent) the extent to which each of the 12 SMA practices was implemented in their business unit. Following the practice of prior research and to maintain consistency in interpretation (Cadez and Guilding, 2012, 2008; Baird et al., 2004), we provided the respondents with a glossary sheet containing definitions of each of the selected SMA practices.

In selecting the 12 practices, the conditions (i.e. long-term orientation and/or external focus) presented in the literature review section were adopted⁶. Table 3 presents the 12 SMA practices and explains how each practice meets the conditions of being strategically-oriented.

3.1.2. Independent and control variables

Networking: To measure the extent of management accountant networking, we adapted the items initially developed by Newell et al. (1998). Respondents were asked to indicate on a seven-point scale (1 =

⁵ This paper is based on the same dataset already used by Al-Sayed and Dugdale (2016). However, all hypotheses examined in this paper have not been tested by Al-Sayed and Dugdale (2016). We used only 149 observations of the 152 ones used by Al-Sayed and Dugdale (2016) due to missing information on important variables to this current study.

⁶ While we have included more SMA practices than the majority of prior studies, we cannot claim to cover all possible SMA practices. However, we believe that the 12 practices included in our study adequately operationalize the SMA definition we adopted through practices which (1) meet the conditions for being strategically oriented (see Table 3) and (2) provide information on the firm and its competitors.

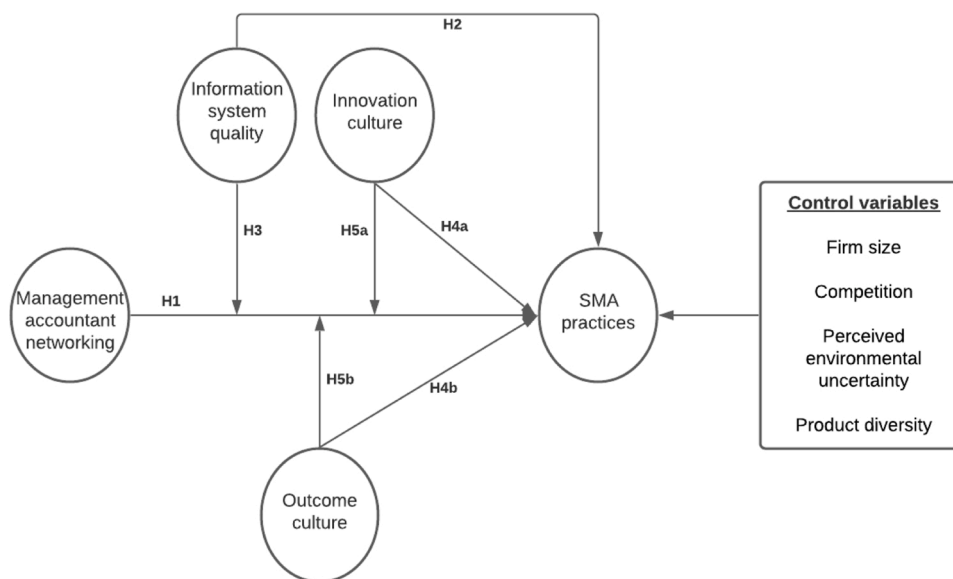


Fig. 1. The research model and associated hypotheses.

Table 2
The distribution of sample firms per industry.

Manufacturing activity/industry	Frequency	Percent
Aerospace, Aircraft and defence Manufacturing	4	2.7
Manufacture of food products and beverages	21	14.1
Manufacture of tobacco products	1	0.7
Manufacture of textiles	3	2.0
Manufacture of wearing apparel; dressing and dyeing of fur	3	2.0
Tanning and dressing of leather; manufacture of luggage	2	1.3
Manufacture of wood and of products of wood and cork	6	4.0
Manufacture of pulp, paper and paper products	6	4.0
Publishing, printing and reproduction of recorded media	5	3.4
Manufacture of coke, refined petroleum products and nuclear	4	2.7
Manufacture of chemicals and chemical products	17	11.4
Manufacture of rubber and plastic products	9	6.0
Manufacture of basic metals	3	2.0
Manufacture of fabricated metal products	10	6.7
Manufacture of machinery and equipment not elsewhere classified	14	9.4
Manufacture of office machinery and computers	3	2.0
Manufacture of electrical machinery and apparatus not elsewhere	5	3.4
Manufacture of radio, television and communication equipment	4	2.7
Manufacture of medical, precision and optical instruments	11	7.4
Manufacture of motor vehicles, trailers and semi-trailers	3	2.0
Manufacture of other transport equipment	3	2.0
Manufacture of furniture; manufacturing not elsewhere classified	4	2.7
Other products including glass, bricks, toys	8	5.4
Total	149	100

never, 7 = extensively) how often they used various networks to learn of recent ideas in the field of management accounting. The scale consisted of eight items representing eight different networks, including contact with colleagues within the respondent’s department, colleagues in other

departments, colleagues in the wider company, CIMA members, members of other professional associations, suppliers, customers and consultants.

Organizational culture: Two different dimensions of organizational culture were measured and included in this study. To measure the innovation-oriented and outcome-oriented cultures, we followed prior studies (Baird et al., 2018; Zhang et al., 2015; Baird et al., 2007, 2004)⁷. Five items for each dimension were used. Respondents were asked to indicate on a seven-point scale (1 = not valued at all, 7 = valued to a great extent) the extent to which each item was valued in their business unit.

Information system quality: To measure the quality of IS, we followed prior studies (for example, Al-Omiri and Drury, 2007) and used Krumwiede’s 5-item scale (1998). Respondents were asked to indicate on a seven-point scale (1 = strongly disagree, 7 = strongly agree) the extent to which they agree with five statements that reflect the quality of their business unit’s IS.

Competition: Intensity of competition was measured using a five-item scale adapted from Williams and Seaman (2001), which was a modified version of Khandwalla (1977), having also been used by Libby and Waterhouse (1996). Respondents were asked to indicate on a seven-point scale (1 = low, 7 = extremely high) the intensity of competition for their business unit in relation to raw materials, technical personnel, selling and distribution, quality, prices and variety of products.

Perceived environmental uncertainty: We followed prior studies that used Khandwalla (1972; 1977) to measure perceived environmental uncertainty (Abdel-Kader and Luther, 2008; Govindarajan, 1984). We adopted Govindarajan (1984), which included 8 items. Respondents were asked to indicate on a seven-point scale (1 = highly predictable, 7 = highly unpredictable) how predictable each of the following factors is in the context of their business unit: manufacturing technology, competitor actions, market demand, product attributes/design, raw material availability, raw material price, government regulation and

⁷ A more recent measure for organizational culture was introduced by House et al. (2004) and used by Gupta and Salter (2018). However, because the majority of the empirical survey papers we identified on SMA adopted the measure developed by O’Reilly et al. (1991), we decided to adopt the same measure in order to minimize the impact of using different measures on our results and produce as comparable findings as possible to prior studies in the SMA literature.

Table 3
The strategic orientation of each of the 12 practices.

SMA practice	Reasons	References
Competitor performance appraisal (CPA)	Emphasizes external orientation by focusing on competitor performance.	Pavlatos and Kostakis (2018); Cinquini and Tenucci (2010); Guilding et al. (2000)
Competitive position monitoring (CPM)	Emphasizes external orientation by focusing on competitor strategy and market position.	Cescon et al. (2019); Cinquini and Tenucci (2010); Guilding et al. (2000)
Environmental cost management (ECM)	Emphasizes external orientation by focusing on the firm's impact on the environment and the associated costs.	Cadez and Guilding (2017); Henri et al. (2016); Burnett and Hansen (2008)
Life cycle costing (LCC)	Emphasizes long-term orientation by taking into account the whole life cycle of a product including after sales.	Cadez and Guilding (2008); Cravens and Guilding (2001); Guilding et al. (2000)
Balanced scorecard (BSC)	Emphasizes long-term focus and external orientation by including non-financial and customer-related perspectives.	Cescon et al. (2019); Cadez and Guilding (2008); Cravens and Guilding (2001)
Quality costing (QC)	Emphasizes long-term focus and external orientation by taking into account the impact of quality issues on customers and stressing the importance of preventing quality issues.	Cescon et al. (2019); Cravens and Guilding (2001); Guilding et al. (2000)
Strategic costing (SC)	Emphasizes long-term focus and external orientation by taking into account market-related information and strategic decisions associated with market penetration and product positioning.	Turner et al. (2017); Cravens and Guilding (2001); Guilding et al. (2000)
Target costing (TC)	Emphasizes external orientation by taking into account the price that customers are willing to pay for a product.	Cinquini and Tenucci (2010); Cadez and Guilding (2008); Guilding et al. (2000)
Economic value added (EVA)	Emphasizes long-term focus by driving managers to avoid decisions for short-term gains and less efficient use of the capital employed.	McLaren et al. (2016); Woods et al. (2012)
Value chain analysis (VCA)	Emphasizes external orientation by attempting to understand how and where value is added in all processes required for a product from the initial design to distribution to customers.	Pavlatos and Kostakis (2018); Turner et al. (2017); Guilding et al. (2000)
Activity-based techniques (ABT)	While ABT may appear inward looking, its role in supporting strategy through its focus on activities has been documented in a number of studies. Hence, it has been identified as a SMA practice.	Hadid, 2019; Cravens and Guilding (2001); Gosselin (1997)
Customer profitability analysis (CPAN)	Emphasizes external orientation by focusing on customer-related data	Turner et al. (2017); Cadez and Guilding (2012), 2008

labour union actions (Govindarajan, 1984).

Product diversity: To measure product diversity, we followed prior studies (Abdel-Kader and Luther, 2008; Brown et al., 2004) and used Krumwiede's 4-item scale (1998). Respondents were asked to indicate on a seven-point scale (1 = strongly disagree, 7 = strongly agree) the extent to which they agree with four statements which point to the diversity and complexity of product lines within their business unit.

Firm size: This was measured by the number of employees (Schoute,

2011; Brown et al., 2004) and sales turnover (Al-Omiri and Drury, 2007; Krumwiede, 1998). Respondents were asked to specify the approximate number of employees and the approximate annual sales turnover for their business unit in the last financial year. All measures used in this study are presented in the Appendix.

4. Analyses and results

Table 4 provides some descriptive statistics for the 12 SMA practices included in this study. Supporting the conclusions of prior research (Cadez and Guilding, 2008; Cravens and Guilding, 2001; Guilding et al., 2000), the implementation rate of SMA practices in our sample is low, with the majority of practices scoring, on average, below the midpoint (4) on the 7-point scale used to measure them. CPAN has the highest average implementation rate (4.41) whilst LCC is the least implemented practice (2.23) on average.

To test our proposed model and the associated hypotheses, partial least squares structural equation modeling (PLS-SEM), which has been commonly adopted in prior accounting research (Caglio, 2018; Fayard et al., 2012; Lee et al., 2011), is used. PLS-SEM is a variance-based technique which enables the testing of multiple relations simultaneously using multi-item measures (Hair et al., 2012). In addition, PLS-SEM produces p values based on the bootstrapping method with replacement, and hence does not make assumptions on the variables' distribution, including the normality assumption (Hair et al., 2011). PLS-SEM is deemed the most appropriate analysis because of the violation of the normality assumption by a number of the measured variables including some SMA practices, the sample size and the model complexity stemming from the number of constructs and interaction terms to be included (Hair et al., 2012). For confidence in increased reliability of our results, our model will be estimated and assessed using 5000 bootstrapped samples.

4.1. Validity and reliability

To test the convergent validity of each multi-item construct⁸, we inspected the indicators loading. An indicator loading, on its construct,

Table 4
Descriptive statistics for SMA practices.

SMA practices	Mean	Std. deviation
ABT	3.03	1.787
BSC	3.59	2.083
CPA	3.17	1.843
CPM	3.58	1.956
ECM	2.69	1.766
LCC	2.23	1.591
QC	2.54	1.738
SC	3.18	1.973
TC	3.21	1.894
VCA	2.73	1.887
CPAN	4.41	2.040
EVA	2.40	1.766

Activity-based techniques (ABT), the balanced scorecard (BSC), competitor performance appraisal (CPA), competitive position monitoring (CPM), environmental cost management (ECM), life cycle costing (LCC), quality costing (QC), strategic costing (SC), target costing (TC), value chain analysis (VCA), customer profitability analysis (CPAN), and economic value added (EVA).

⁸ All constructs included in our study have been treated as reflective constructs and have been evaluated accordingly. Some may argue that the SMA construct could or should be a formative construct. However, since prior studies (e.g. Pavlatos and Kostakis, 2018; Cadez and Guilding, 2012, 2008) have modeled it as a reflective construct, we have adopted a similar perspective to increase the comparability of our results to theirs (Otey, 2016).

greater than 0.5 was evidence of convergent validity (Hair et al., 2011).

Table 5 presents the indicators loading for the constructs included in this study and includes all indicators with loading $>.5$ ⁹. Composite reliability higher than 0.7 was evidence of construct reliability (Hair et al., 2011). Table 5 confirms the reliability of all constructs with the majority having a reliability value greater than 0.8. Discriminant validity was evaluated by comparing the square root of the average variance extracted (AVE) of each construct with its correlation with other constructs. As evident in Table 6, in all cases the square root of AVE of any construct was higher than its correlation with any other construct

Table 5
The measurement model.

Construct/item	Loading	Composite reliability
Competition (COMP)		0.755
COMP 1	0.835	
COMP 2	0.719	
Innovation-oriented culture (CULT-INNO)		0.895
CULT-INNO 1	0.873	
CULT-INNO 2	0.836	
CULT-INNO 3	0.782	
CULT-INNO 4	0.837	
CULT-INNO 5	0.624	
Outcome-oriented culture (CULT-OUTC)		0.871
CULT-OUTC 1	0.818	
CULT-OUTC 2	0.686	
CULT-OUTC 3	0.584	
CULT-OUTC 4	0.862	
CULT-OUTC 5	0.821	
Product diversity (DIVERS)		0.834
DIVERS 1	0.805	
DIVERS 2	0.738	
DIVERS 3	0.829	
Quality information system (IS-QUAL)		0.913
IS-QUAL 1	0.810	
IS-QUAL 2	0.835	
IS-QUAL 3	0.833	
IS-QUAL 4	0.819	
IS-QUAL 5	0.815	
Management accountant networking (NETWORK)		0.877
NETWORK 1	0.666	
NETWORK 2	0.775	
NETWORK 3	0.598	
NETWORK 4	0.721	
NETWORK 5	0.759	
NETWORK 6	0.636	
NETWORK 7	0.646	
NETWORK 8	0.682	
Firm size (SIZE)		0.806
SIZE 1	0.780	
SIZE 2	0.863	
Strategic management accounting practices (SMA)		0.866
SMA 1	0.574	
SMA 2	0.520	
SMA 3	0.684	
SMA 4	0.706	
SMA 5	0.658	
SMA 6	0.600	
SMA 7	0.612	
SMA 8	0.661	
SMA 9	0.553	
SMA10	0.679	

⁹ The items of the PEU construct all had very low loadings ($<.5$) and hence the whole construct was removed from the analysis. In addition, CPAN and EVA (SMA construct), competition in relation to price, raw materials and selling and distribution (competition construct), and product lines diversity (product diversity construct) were all removed due to their loadings below .5.

supporting the discriminant validity (Hair et al., 2012).

4.2. Hypotheses testing

After ensuring the validity and reliability of the constructs included in our model, we tested the structural model and associated hypotheses. Table 7 presents the results. In model 1, the main and control variables were included whilst, in model 2, three interaction terms were added to the analysis to test the moderation hypotheses¹⁰.

As seen in Table 7, our proposed variables in model 1 explain a substantial portion ($R^2 = 49\%$, $p = 0.000$) of the variation in SMA practices. This explained variance is higher than what the models in prior studies could explain, such as Emsley (2005) ($R^2 = 21\%$), Cinquini and Tenucci (2010) ($R^2 = 16\%$), and Pavlatos and Kostakis (2018) ($R^2 = 29\%$).

Moving to the hypotheses testing, model 1 reveals a significant positive impact ($\beta = 0.37$, $p < 0.05$) of networking on the implementation of SMA practice, which supports H1. In addition, Table 7 also documents a significant positive impact of outcome-oriented culture ($\beta = 0.32$, $p < 0.05$) on the implementation of SMA practices, and only a marginal one for quality IS ($\beta = 0.13$, $p < 0.10$). These results fully support H4b but only partially H2. However, whilst the innovation-oriented culture (H4a) has a positive coefficient, this is not statistically significant ($\beta = 0.11$, $p > 0.10$). Regarding the control variables, firm size has a marginally positive impact ($\beta = 0.14$, $p < 0.10$) on SMA practice implementation, whilst product diversity and competition are not significant ($p > 0.10$). After including the three interaction terms (model 2), the documented impacts of networking, IS quality and the outcome-oriented culture remain qualitatively unchanged. However, model 2 in Table 7 suggests a marginally significant moderating impact ($\beta = 0.18$, $p < 0.10$) of quality IS only, which partially supports H3, whilst the other interaction terms are found insignificant. Thus, H5a and H5b are not supported. Fig. 2 visually presents the results of model 2 in Table 7.

4.3. Additional analyses

Our results in relation to the two culture variables raise some “why” questions. We found the innovation-oriented culture to have neither an independent impact on SMA implementation nor did it play a moderating role in the networking-SMA implementation relationship. Similarly, the proposed moderating role of the outcome-oriented culture was also unsupported. To investigate this further, we tested, from an exploratory perspective, a modified model (as shown in Fig. 3) which differed from the initial one presented in Fig. 1 in two ways. First, we removed the insignificant interaction variables between the two culture variables and management accountant networking (reflecting H5a and H5b in Fig. 1). Second, the innovation-oriented and outcome-oriented culture variables were modeled so that they were presumed to have both a direct and an indirect impact on SMA implementation through management accountant networking. Inspecting the correlation matrix in Table 6, a significant positive correlation was documented between

¹⁰ The interaction terms were computed following the orthogonalizing method as described by Little et al. (2006). Under this method, the interaction term of two variables X and Z is represented by the residuals from regressing the product term $X*Z$ on X and Z, where $X*Z$ is the multiplicative term of X and Z. As such, the interaction term will have zero correlation with its composing variables which mitigates the commonly-known collinearity problem and ensure stable regression coefficients of X and Z when the interaction term is entered into the model. The orthogonalizing method has been recommended by Henseler and Chin (2010) and used in a number of accounting studies (e.g. Peteghem et al., 2018; Glaum et al., 2013; Bruynseels and Willekens, 2012). It is worth noting that the orthogonalizing method is a built-in function in SmartPLS 3, the software we used in our study.

Table 6
Correlation matrix and AVE[^].

	COMP	CULT-INNO	CULT-OUTC	DIVERS	IS-QUAL	NETWORK	SIZE	SMA
COMP	0.78							
CULT-INNO	0.16*	0.80						
CULT-OUTC	0.27***	0.34***	0.76					
DIVERS	0.24**	0.12	0.12	0.79				
IS-QUAL	0.12	0.10	0.34***	0.08	0.82			
NETWORK	0.16*	0.22***	0.21**	-0.01	0.19**	0.69		
SIZE	0.10	-0.06	0.03	0.14**	-0.06	0.18**	0.82	
SMA	0.20**	0.30***	0.49***	0.16**	0.31***	0.49***	0.20***	0.63

[^]Values on the diagonal represent the square root of AVE.

*, ** and *** represent significant correlations at 10 %, 5% and 1% respectively.

Table 7
PLS analysis of the structural model (dependent variable: SMA).

Independent construct	Standardized β				VIF
	Model 1	P value	Model 2	P value	
COMP	0.00	0.829	0.02	0.767	1.15
CULT-INNO	0.11	0.170	0.08	0.208	1.19
CULT-OUTC	0.32	0.000	0.30	0.000	1.33
DIVERS	0.10	0.182	0.06	0.424	1.10
IS-QUAL	0.13	0.072	0.11	0.077	1.17
NETWORK	0.37	0.000	0.39	0.000	1.16
SIZE	0.14	0.074	0.09	0.154	1.09
NETWORK * CULT-INNO			0.09	0.504	1.20
NETWORK * CULT-OUTC			0.13	0.369	1.16
NETWORK * IS-QUAL			0.18	0.073	1.11
R Square	0.49	0.000	0.61	0.000	

management accountant networking and both the outcome-oriented culture (0.21, $p < 0.05$) and innovation-oriented culture (0.22, $p < 0.01$). As such, our modified model tests whether the culture variables influence the management accounting networking variable itself instead of moderating its effect on SMA implementation as H5a and H5b previously suggested.

Table 8 summarizes the results and Fig. 3 visually presents them. We find that the impact of innovation-oriented culture on SMA implementation is fully mediated by management accountant networking. That is, while the direct impact of innovation-oriented culture on SMA

implementation is not significant as shown in Panel A ($\beta = 0.081$, $p = 0.232$), its indirect impact ($\beta = 0.070$, $p = 0.028$) (Panel B) through management accountant networking is. In contrast, Table 8 reveals that the outcome-oriented culture has only a direct positive impact ($\beta = 0.295$, $p = 0.000$) (Panel A) on SMA implementation. While it has a marginally significant influence ($\beta = 0.160$, $p = 0.068$) on management accountant networking, its overall indirect impact on SMA implementation through management accountant networking is statistically insignificant ($\beta = 0.061$, $p = 0.102$) (Panel B). Finally, in this modified model, the moderating impact of IS quality becomes more statistically significant ($\beta = 0.261$, $p = 0.042$) as shown in Table 8 (Panel A). The results of both the main and additional analyses will be discussed next.

5. Discussion and conclusion

This paper set out to contribute to the contingency theory literature on SMA practices, by developing and testing a more complex theoretical model than in prior studies, to explain potential factors and the mechanism through which they could influence the implementation of SMA practices. Using data from 149 UK manufacturing business units, our findings reveal the importance of networking in increasing the ability of management accountants to propose and implement SMA practices. Such results confirm the modus operandi offered in prior research for management accountants to regain their status as important information providers (Lapsley and Rekers, 2017; Cadez and Guilding, 2008). By networking with internal and external parties, management accountants

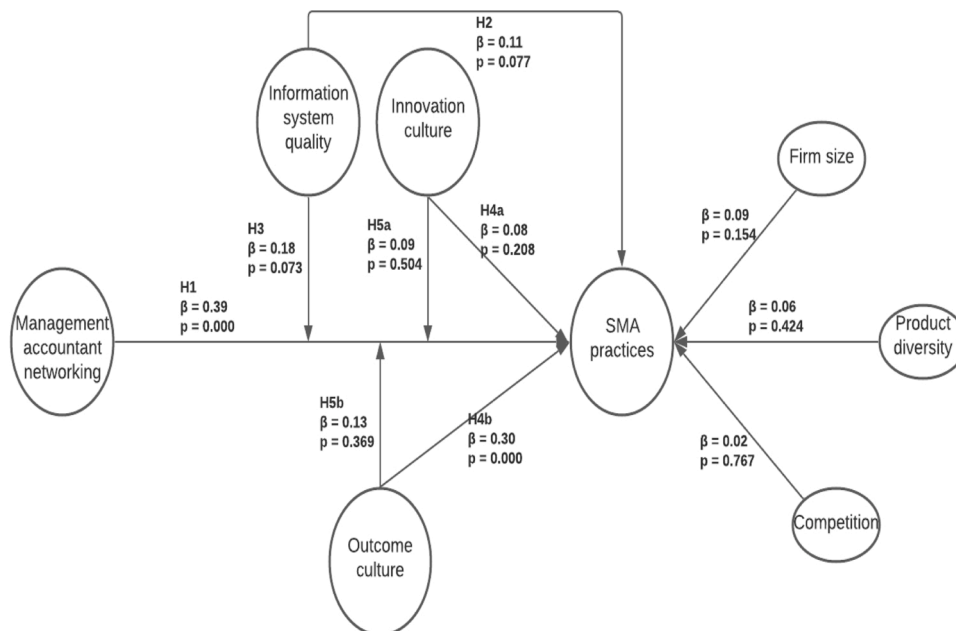


Fig. 2. The PLS results for the research model.

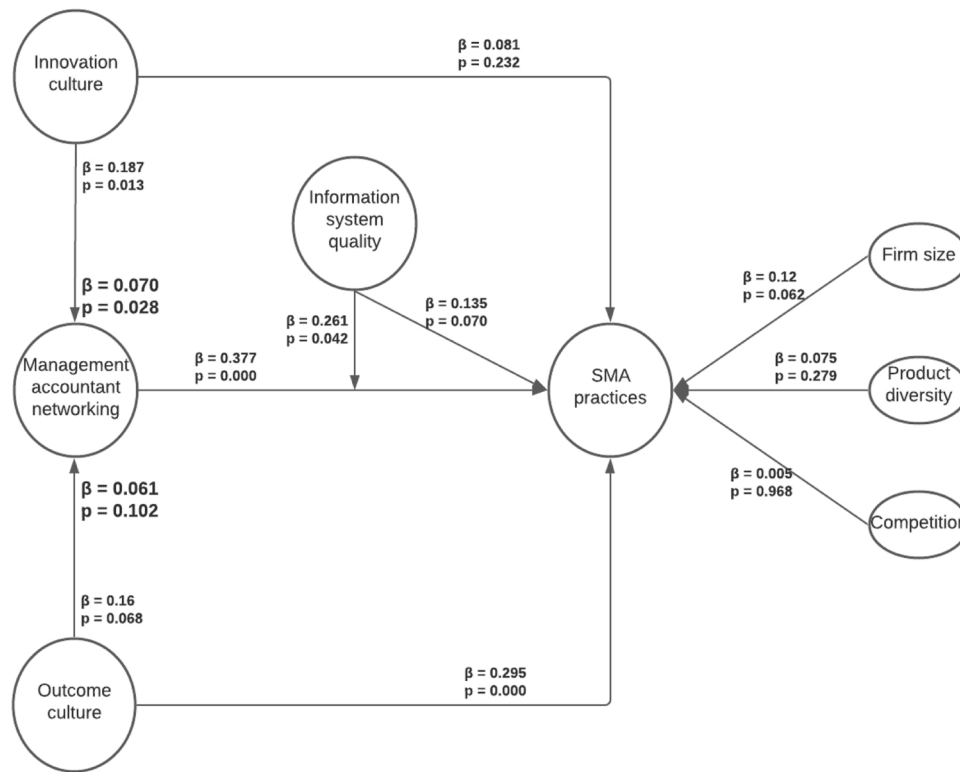


Fig. 3. The PLS results for the modified research model (results in bold are for the indirect impact of each culture variable on SMA through networking).

Table 8
PLS analysis of the modified structural model.

Independent construct	Dependent construct (Standardized β)			
	NETWORK	P value	SMA	P value
CULT-INNO	0.187	0.013		
CULT-OUTC	0.160	0.068		
COMP			0.005	0.968
CULT-INNO			0.081	0.232
CULT-OUTC			0.295	0.000
DIVERS			0.075	0.279
IS-QUAL			0.135	0.070
NETWORK			0.377	0.000
NETWORK * IS-QUAL			0.261	0.042
SIZE			0.120	0.062
Panel B: Indirect effects				
CULT-INNO -> NETWORK -> SMA			0.070	0.028
CULT-OUTC -> NETWORK -> SMA			0.061	0.102
R Square	0.092	0.100	0.543	0.000

are expected to learn about new management accounting practices, understand the information they generate, understand the information needs of decision makers in their organizations, and hence be able to propose and implement the most relevant and useful management accounting practices to help decision makers perform effectively (Tillmann and Goddard, 2008; Emsley, 2005; Pierce and O’Dea, 2003).

Furthermore, our results offer a potential explanation for the findings of Cadez and Guilding (2012) and Roslender and Hart (2003) that, even supposing management accountants interact or communicate with other managers, this may not translate into greater implementation of SMA practices. Our findings suggest that the quality of existing IS could play a significant role in this respect. We find a positive moderating impact of quality IS on the relationship between networking and SMA implementation. This implies that management accountants, who interact or communicate with other decision makers, may find it easier to propose and implement SMA practices in organizations with high-quality integrated IS. As suggested in prior research, such IS enable the collection

and storage of information from different organizational functions (Al-Omiri and Drury, 2007; Dillard, 2000), and consequently are thought to assist decision makers from different functions to access detailed and relevant information potentially useful for varying purposes (Maiga et al., 2014; Maiga, 2012; Al-Omiri and Drury, 2007; Granlund and Mouritsen, 2003). In this environment, it seems that management accountants find it easier to demonstrate the value of the information the proposed SMA practices generate (Al-Omiri and Drury, 2007; Dunk, 2004). In addition, such information could be disseminated more widely in their organization when high-quality integrated IS are already in place (Maiga et al., 2014; Maiga, 2012; Granlund and Mouritsen, 2003).

Unlike IS quality, we do not find empirical support for similar moderating effects by the two organizational culture variables (i.e. outcome-oriented and innovation-oriented) on the networking-SMA implementation relationship. However, we still find evidence that both types of culture are conducive to the implementation of SMA practices though through different mechanisms. More specifically, the innovation-oriented culture is found to have an indirect positive impact on SMA implementation through networking but not a direct one. This suggests that innovation-oriented culture offers a motivating environment for management accountants to network internally and externally. This networking activity, as explained before, enables management accountants to gain the knowledge and skills needed to identify new ideas/practices and implement the most relevant ones including SMA practices (Lapsley and Rekers, 2017; Yigitbasioglu, 2016; Emsley, 2005).

In contrast to the innovation-oriented culture, we find a direct positive impact of outcome-oriented culture on SMA implementation but not an indirect one through networking. These results confirm the similar positive impact of the outcome-oriented culture reported by Zhang et al. (2015) and Baird et al. (2004) in the case of ABC and generalize it to a larger set of SMA practices. In addition, by examining both its direct and indirect impact on SMA implementation, our findings offer additional insights on the potential role of outcome-oriented culture. Having only a direct positive impact on SMA implementation but

not an indirect one through networking indicates that in outcome-driven companies, the implementation of SMA practices does not necessarily depend on management accountant networking. Managers in outcome-driven companies are mainly driven by achievement, actions, results and high performance expectations (Baird et al., 2018, 2007; O'Reilly et al., 1991), and their performance is likely to be evaluated accordingly. To achieve their targets and effectively perform their managerial/strategic responsibilities, such managers, on average, seem to engage in collecting the information they need including through SMA practices even if their management accountants do not network and hence are unable to satisfactorily contribute (Brunns and McKinnon, 1993). This may explain the significant direct positive impact of outcome-oriented culture on SMA implementation documented in our study.

A number of scholars have documented empirical evidence of the lack of management accountants' contribution towards the implementation of SMA practices (Yazdifar et al., 2019; Carlsson-Wall et al., 2015; Lord, 1996). Others have highlighted the competing role of operations managers (e.g. production and marketing) by taking the initiative to implement and collect information through SMA practices (Fish et al., 2017; Carlsson-Wall et al., 2015; Burns and Vaivio, 2001). However, our findings on the two culture variables imply that this lack of contribution by management accountants and the competing role of operations managers may possibly be more observed in companies with an outcome-oriented culture. Because of (1) the lack of data on who actually implemented SMA practices in our sample firms and (2) the paucity of research, including case studies, on the role of organizational culture in the SMA context, some speculation in interpreting the findings on the culture variables was a necessity, and this should be addressed in future research.

Like other survey studies, this current study has some limitations. Firstly, the data was collected from one informant per business unit. While this method has shortcomings, collecting data from multiple respondents may have a negative bearing on the response rate. Secondly, while a significant effort has been made to increase the response rate, from which we managed to collect data from 149 business units, a larger sample could raise our confidence in the generalizability of results. Thirdly, despite our attempts to identify and include a higher number of potential influential factors on SMA implementation, we do not claim our list to be exhaustive. Future research could also collect data on other important variables that enhance the predictive ability of our model. Information on the extent to which SMA practice implementation has been done by non-accountants could be very useful. This is especially the case in order to further confirm or suggest an alternative interpretation to the impact of organizational culture found in our study.

Appendix A

Strategic management accounting practices

1. Using the following scale, please indicate to what extent your business unit uses the following management accounting techniques. If the technique is still in the process of being implemented, please tick in the last column.

Not at all										To a great extent
	1	2	3	4	5	6	7			

(continued on next page)

Due to data limitation, we have been unable to shed light on the exact reasons for which an outcome-oriented culture does not encourage management accountants to network as strongly as an innovation-oriented culture, resulting in its indirect impact on SMA implementation through networking in our analysis to be statistically insignificant (see Table 8). Future (especially case-based) research could be very useful to enlighten us about this point. It could also be interesting to know whether managers in innovation-driven and outcome-driven companies have different perceptions of the capability of their management accountants and the implications of these perceptions in terms of who implement SMA practices. Finally, given the nature of data collected through survey studies such as ours, we cannot make claims about causality but only relationships between the variables in our model.

Notwithstanding these limitations, we still believe our study to usefully contribute to the very limited contingency theory literature on the determinants of SMA practices and the role of management accountants in this respect (for example, Yazdifar et al., 2019; Cadez and Guilding, 2012, 2008; Emsley, 2005). First, we have included a larger number of SMA practices than in the majority of prior studies (Yazdifar et al., 2019; Naranjo-Gil et al., 2009; Hyvönen, 2003) and tested the potential role of three variables (management accountant networking, quality IS and organizational culture) which have not been examined in a single model in prior studies. Second, we theorized and tested more complex relationships than in prior studies, which helps to better understand how these three variables influence the extent of SMA implementation. By doing so, we are able to provide elucidation of the ostensibly ambiguous findings on the role of management accountants in prior studies (Yazdifar et al., 2019; Cadez and Guilding, 2012, 2008; Emsley, 2005; Roslender and Hart, 2003). The implications can be critical for organizations, especially those contemplating the successful implementation of SMA practices.

Declaration of Competing Interest

None.

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(continued)

Not at all								To a great extent
Management Accounting Innovations	In use							Implementat ion process
Strategic costing	1	2	3	4	5	6	7	
Activity-based techniques	1	2	3	4	5	6	7	
Life cycle costing	1	2	3	4	5	6	7	
Target costing	1	2	3	4	5	6	7	
Quality costing	1	2	3	4	5	6	7	
Environmental cost management	1	2	3	4	5	6	7	
Economic value added	1	2	3	4	5	6	7	
Competitive position monitoring	1	2	3	4	5	6	7	
Competitor performance appraisal	1	2	3	4	5	6	7	
Value chain analysis	1	2	3	4	5	6	7	
Balanced scorecard	1	2	3	4	5	6	7	
Customer profitability analysis	1	2	3	4	5	6	7	
Others, please specify/describe								

Firm size

- Please** specify the approximate number of employees (full-time equivalents) currently employed in your business unit.
..... employees
- Please** specify the approximate annual sales turnover for your business unit for the last financial year.
£ million

Organizational culture

4. The following statements represent a number of business values. To help us to understand the work environment in your business unit, please indicate the extent to which it is valued in your business unit.

	Not valued at all							Valued to a very great extent
1. A willingness to experiment	1	2	3	4	5	6	7	
2. Not being constrained by many rules	1	2	3	4	5	6	7	
3. Being quick to take advantage of opportunities	1	2	3	4	5	6	7	
4. Being innovative	1	2	3	4	5	6	7	
5. Risk taking	1	2	3	4	5	6	7	
6. Being competitive	1	2	3	4	5	6	7	
7. Being achievement oriented	1	2	3	4	5	6	7	
8. Having high expectations for performance	1	2	3	4	5	6	7	
9. Being results oriented	1	2	3	4	5	6	7	
10. Being action oriented	1	2	3	4	5	6	7	

Product diversity

5. The following statements help us to understand the diversity of manufacturing operations within your business unit. Please indicate the extent to which you disagree/agree with each following statements:

	Strongly disagree		Neutral		Strongly agree		
1. Product lines are diverse.	1	2	3	4	5	6	7
2. Most products require different processes to design, produce and distribute.	1	2	3	4	5	6	7
3. There are major differences in volume/output across product lines.	1	2	3	4	5	6	7
4. The consumption of support department resources (e.g., engineering, purchasing, marketing) varies substantially across product lines.	1	2	3	4	5	6	7

Information system quality

6. Regarding your business unit information technology, please indicate the extent to which you disagree/agree with each following statements:

	Strongly disagree		Neutral		Strongly agree		
1. The business unit's information systems (e.g. sales, manufacturing) are integrated with each other.	1	2	3	4	5	6	7
2. The information system offers user-friendly query capability.	1	2	3	4	5	6	7
3. Detailed sales and operating data are available in the information system for the last 12 months.	1	2	3	4	5	6	7
4. Many perspectives of cost and performance data are available.	1	2	3	4	5	6	7
5. Manufacturing and other operating data are updated in 'real time' rather than periodically.	1	2	3	4	5	6	7

Perceived environmental uncertainty

7. The following statements describe some of the factors that constantly change in the external environment. Using the scale below, for each factor, please circle the number that corresponds to the predictability or unpredictability of the rate of change within your business unit.

	Highly Predictable	Fairly Predictable	Slightly Predictable	Neutral	Slightly Unpredictable	Fairly Unpredictable	Highly Unpredictable
	1	2	3	4	5	6	7
1. Manufacturing technology	1	2	3	4	5	6	7
2. Competitors' actions	1	2	3	4	5	6	7
3. Customers' demand and taste	1	2	3	4	5	6	7
4. Product attributes/design	1	2	3	4	5	6	7
5. Raw material availability	1	2	3	4	5	6	7
6. Raw material prices	1	2	3	4	5	6	7
7. Labour union actions	1	2	3	4	5	6	7
8. Government regulation	1	2	3	4	5	6	7

Competition

8. Using the following scale, please indicate the intensity of competition for your business unit in relation to:

Low	Moderate		Moderate		Extremely high		
1. Raw materials	1	2	3	4	5	6	7
2. Technical personnel	1	2	3	4	5	6	7
3. Selling and distribution	1	2	3	4	5	6	7
4. Quality and variety of products	1	2	3	4	5	6	7
5. Price	1	2	3	4	5	6	7

Management accountant networking

9. Using the following scale, please indicate how often you use the following networks to find out about the latest ideas in the field of management accounting.

	Never		Moderately		Extensively		
1. Colleagues within your own department.	1	2	3	4	5	6	7
2. Colleagues in other departments	1	2	3	4	5	6	7
3. Colleagues in the wider company	1	2	3	4	5	6	7
4. CIMA members	1	2	3	4	5	6	7
5. Other professional accounting associations' members	1	2	3	4	5	6	7
6. Suppliers	1	2	3	4	5	6	7
7. Customers	1	2	3	4	5	6	7
8. Consultants	1	2	3	4	5	6	7
Other, please specify							

A Glossary Sheet

Activity-based Techniques (ABT): Any management accounting technique that uses business unit's activities as its base. Such techniques include: Activity Analysis (AA), Activity Cost Analysis (ACA), Activity-based Costing (ABC), Time Driven ABC, Activity-based Management (ABM) and Activity-based Budgeting (ABB).

Activity Analysis (AA): Identifying the activities and procedures carried out to convert material, labour and other resources into outputs. Activities that do not contribute to the value of those outputs may be removed, replaced or diminished. AA does not require cost analysis and does not necessarily lead to a new overhead allocation method.

Activity Cost Analysis (ACA): Based on AA, ACA aims to identify the costs of each activity and the factors that cause them to vary.

Activity-based Costing (ABC): Approach to the costing and monitoring of activities which involves tracing resource consumption and costing final outputs. Resources are assigned to activities, and activities to cost objects based on consumption estimates. The latter utilise cost drivers to attach activity costs to outputs.

Time-Driven ABC:

(continued on next page)

(continued)

Activity-based Techniques (ABT): Any management accounting technique that uses business unit's activities as its base. Such techniques include: Activity Analysis (AA), Activity Cost Analysis (ACA), Activity-based Costing (ABC), Time Driven ABC, Activity-based Management (ABM) and Activity-based Budgeting (ABB).	
Activity-based Management (ABM):	Approach to ABC based on the time required for each unit activity. The method avoids the use of interviews with operating managers in order to estimate percentage of time spent on different areas of work. It is claimed that "time-driven ABC" based on "time per transactional activity" is simpler to install and update and can highlight unused capacity.
Activity-based Budgeting (ABB):	Refers to the entire set of actions that can be taken, on basis of activity-based information that aim to increase efficiency, lower costs, improve asset utilisation and improve profitability.
Balanced scorecard (BSC):	Method of budgeting based on activity framework and utilising cost driver data in the budget setting and variance feedback process. Approach to the provision of information to management to assist strategic policy formulation and achievement. It emphasises the need to provide the user with a set of information which addresses all relevant areas of performance in an objective and unbiased fashion. The information provided may include both financial and non-financial elements, and cover areas such as profitability, customer satisfaction, internal efficiency and innovation.
Competitive position monitoring (CPM):	The analysis of competitor positions within the industry by assessing and monitoring trends in competitor sales, market share, volume, unit costs, and return on sales. This information can provide a basis for the assessment of a competitor's market strategy.
Competitor performance appraisal (CPA):	The numerical analysis of a competitor's published statements as a part of an assessment of their key sources of competitive advantage.
Customer profitability analysis (CPAN):	This involves calculating profit earned from a specific customer. The profit calculation is based on costs and sales that can be traced to a particular customer. This technique is sometimes referred to as "customer account profitability".
Economic Value Added (EVA™):	Profit less a charge for capital employed in the period. Accounting profit may be adjusted, for example, for the treatment of goodwill and research and development expenditure, before economic value added is calculated.
Environmental cost management (ECM):	Identification, collection, analysis and use of two types of information for internal decision making: physical information on the use, flows and rates of energy, water and materials (including wastes); and monetary information on environment related costs, earnings and savings.
Life cycle costing (LCC):	The appraisal of costs based on the length of stages of product or service's life. Namely: design, introduction, growth, decline and eventually abandonment (marketing perspective).
Quality costing (QC):	Those costs associated with the creation, identification, repair and prevention of defects. These fall into three categories: prevention, appraisal and internal and external failure costs. Cost of quality reports are produced for the purpose of directing management attention to prioritize quality problems.
Strategic costing (SC):	Using cost data, strategic and marketing information to develop and identify strategies that will sustain a competitive advantage.
Target costing (TC):	Estimating a cost calculated by subtracting a desired profit margin from an estimated or market-based price to arrive at a desired production, engineering or marketing cost, and to design a product which meets that cost.
Value chain analysis (VCA):	Use of the value chain model to identify the value adding activities of an entity. (Also Value chain costing : An activity-based approach where costs are allocated to activities required to design, procure, produce, market, distribute and service a product or service.)

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