Management accounting adoption in small businesses: interfaces with challenges and performance

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Abstract

Purpose – While companies worldwide are largely comprised of small and medium-sized enterprises (SMEs), a significant amount of management accounting (MA) research focuses on larger organisations, thus leaving MA practice in SMEs relatively under-researched. This paper aims to examine MA adoption (MAA) and its interfaces with MA challenges and business performance from a small business perspective.

Design/methodology/approach – A sample of 502 small businesses is investigated with an embedded mixed methods research design comprised of qualitative content analysis, factor analysis and analysis of variance.

Findings – Up to 78% of small businesses are facing MA challenges that stem from organisation, systems, personnel and/or resources. Based on the present findings, MA challenges do motivate small businesses to at least consider investing in MAA as small businesses facing challenges are more likely to acquire systems and services than those reporting no issues at all. Hence, small business managers seem to not only recognise where their challenges lie, but also seek ways to improve the situation through MAA. The analysis also reveals that companies with the highest MA know-how have the best average solvency, suggesting that small businesses indeed benefit from MAA. Interestingly, the performance at medium levels of know-how declines while investments increase, revealing a "decreasing solvency phenomenon". Potential explanations are, e.g.

the MA not fitting the company's exact needs, or information usability and use being limited by poor MA understanding.

Originality/value – The originality of the research lies in exploring the interfaces between MA challenges, MAA and small business performance using distinctive embedded mixed methods research design.

1. Introduction

Management accounting (MA) aims to increase the awareness of how a business is performing and thus help attain better business performance. While small and medium-sized enterprises (SMEs) comprise the majority of companies, with remarkable business potential, a significant amount of research on MA focuses on larger organisations (Armitage *et al.*, 2016; Nandan, 2010; Wijewardena *et al.*, 2004; Chenhall, 2003), and research on MA in the SME context is currently fragmented, spanning various research fields, including accounting, entrepreneurship, management and production and operations management (Lavia Lavia López and Hiebl, 2015).

SMEs account for 99.8% of enterprises in the European Union (European Commission, 2019) and 99.9% in the UK (UK Parliament, 2021), while employing approximately 67% (in EU) and 61% (in the UK) of the working population. SMEs represent a remarkable potential for employment, growth and business renewal in Europe. To successfully compete with larger organisations, and to take part in contemporary business networks, the management of SMEs' scarce resources needs to be very effective. Modern information and controlling systems could enable and aid such effective management with data, but these possibilities are largely underused among SMEs (Pedroso and Gomes, 2020). Large variation in the organisational size of SMEs significantly influences MA needs (Lavia Lavia López and Hiebl, 2015).

Altogether, MA in SMEs remains largely under-researched as a topic, as repeatedly pointed out by academics in the field (Armitage *et al.*, 2020, 2016; Shields and Shelleman, 2016; Nandan, 2010; Chenhall, 2003). The number of studies also decreases with organisational size as there is little research on how particularly small businesses adopt MA and how this adoption of various techniques, systems and services impacts small business performance (Najera Ruiz and Collazzo, 2021). Pelz (2019) has argued that research should address MA from a broader perspective, acknowledging the organisational characteristics that differentiate small businesses from their larger counterparts, and researchers should be open to what MA means for smaller firms. The literature has also recognised various challenges that might hinder MA in the SME context (see e.g. Lavia Lavia López and Hiebl, 2015; Halabi *et al.*, 2010; Garengo and Bernardi, 2007).

As a response to this need for further studies at the intersection of MA research and small business research, MA adoption (MAA) and its interfaces with both MA challenges and business performance are examined from a small business perspective. The overarching research objective fundamental to the study is:

> [. . .] to examine small businesses' MA challenges, and the interface between such challenges and management accounting adoption (MAA), and furthermore the interface between MAA and the resulting small business performance.

As can be noticed, we use the term "management accounting adoption" (MAA) in the formulation of the research objective. The reason for this is that we are aiming to

understand at large how small businesses adopt different MA-related practices, systems and services as an integral part of their decision-making and managerial processes. We are building here specifically on the definition of the base word "adoption" as "the action or an act of taking something up; choosing something for one's use or practice" (Oxford English Dictionary, 2020).

Hence, MAA as a concept and for the purposes of this study, it incorporates established MA terminology, such as management accounting practices (MAPs) and management accounting systems (MASs). As per Abdel-Kader and Luther (2008), MAPs include various planning and control, performance measurement and evaluation and cost management techniques. Davila and Foster (2005), on the other hand, define MAS as a "recurring and formalised set of institutionalised protocols, routines or information gathering mechanisms designed to assist managers make decisions or fulfil their responsibilities". Therefore, both individual MAPs and the company MAS fall under the umbrella of MAA, as does MA services. MA services do not have a clear-cut definition in the literature, but they consist of business advice related to the elements of MAPs and MAS sought out by owners and managers from service providers such as accounting firms.

The line of argumentation, and the papers' overall structure, is presented through seven sections. Section 2 introduces the elements of research design and poses the research questions. Section 3 discusses the prior literature (including challenges) on MA in SMEs. Section 4 shifts the focus to empirical findings by presenting a small business perspective on MA challenges. Section 5 elaborates on MAA and its interfaces with both challenges and performance. Section 6 provides a synthesising discussion on the results under the posed research questions, and Section 7 finally sums up the contributions, limitations, practical implications and further research avenues.
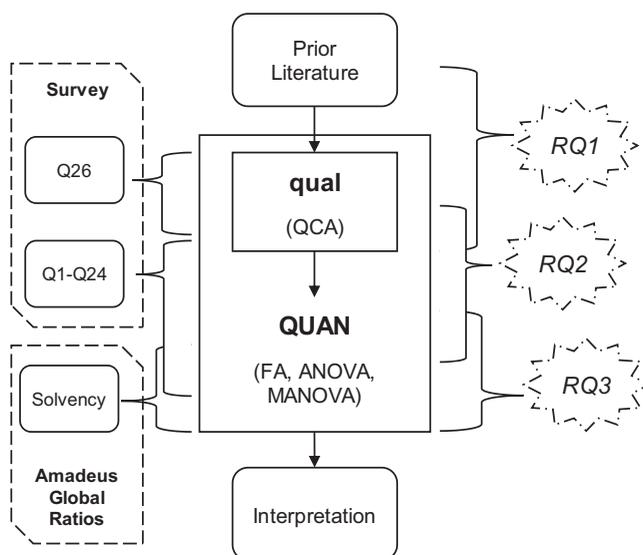
2. Research design
2.1 Mixed-methods design and research questions
Given the multifaceted nature of the research objective, we decided to approach the topic with a mixed methods design. According to Creswell and Plano Clark (2011, p. 68–104), there are six major mixed-methods designs, each of which has a different priority and timing for quantitative and qualitative research strands. In this study, we opted for embedded design where a strand of one type of research (e.g. qualitative) is incorporated, thus "embedded", within another type of research (e.g. quantitative). This approach is occasionally called a nested design because of how the supporting strand is located within the predominant strand (Creswell et al., 2003, p. 229).

In the embedded mixed methods design, the collection of secondary data may occur either before, during and/or after the implementation of the main data collection associated with the primary design (Creswell and Plano Clark, 2011, pp. 90–91). In this study, the secondary data was collected simultaneously with the primary data. This simplifies the data collection while still allowing the researcher to gain a broader perspective on the topic compared with using the predominant research type alone, as pointed out by Creswell et al. (2003, pp. 229–230). Figure 1 outlines our mixed-methods design framework, where the timing of the research strands is illustrated with the direction of the arrows and the priority is indicated using Morse's (1991) notation system (i.e. lowercase "qual" for the secondary strand and uppercase "QUAN" for the primary strand). It should also be noted that only sources of data that are analysed in the paper are included on the left-hand side of the figure; hence, both Q25 and Q27 are omitted here (see Sections 2.2 and 2.3 for details).

The selection of embedded design was guided by the research objective (see Section 1), where small businesses' MA challenges play a notable role in the formulation of the research

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Figure 1.
Embedded mixed-
methods design
framework used in
the study

problem and gap. Creswell and Plano Clark (2011, pp. 91–92), for instance, have argued that embedded design is appropriate when the researcher identifies an emergent issue in the primary design and insight into this issue can be obtained with a secondary data set. MA challenges are difficult to measure in quantitative terms because of the influence of the personal experiences of the research subjects. Thus, two perspectives can be obtained: a quantitative one drawn from closed-ended response data and a qualitative one drawn from open-ended personal data (Creswell, 2015, p. 15). This is the technique for primary and secondary data collection applied in this study.

The research objective was translated into three research questions, one for the qualitative strand, accompanied by an overview of the literature, and two for the quantitative strand fed by the embedded qualitative analysis. The paper responds to the following research questions:

RQ1. What kinds of MA challenges do small businesses face?

RQ2. How do MA challenges guide MAA in terms of systems and services?

RQ3. How does prior MAA influence small business performance in terms of solvency?

The embedded nature of the overall design is seen here in the research questions. To be able to analyse how challenges guide small businesses' MAA (RQ2), we needed to investigate the challenges faced by the companies first (RQ1). Here, the work with prior literature was also important as it gave us a valuable reference and starting point to what has been written about challenges in prior SME studies. Small business performance (RQ3) was investigated by supplementing the primary and secondary data sets with tertiary data that was collected from a database hosting comparable financial information for companies across Europe.

2.2 Data collection

The main source of data is an extensive survey with responses from a total of 1,507 Finnish organisations, ranging from SMEs to large multinationals. The target sample size was set at 1,500 responses, which were reached by contacting approximately 3,500 companies. This yields a response rate of roughly 43%. The survey sample is further defined in this study to contain only small businesses, i.e. companies employing less than 50 people. This specific subsample analysed in this paper contains 502 small businesses. For the sake of transparency, two prior papers have been published using the data (Ylä-Kujala *et al.*, 2016, 2018), both of which investigate other research questions and parts of the data set not covered by the above-mentioned subsample.

It should be noted that microenterprises, i.e. companies employing less than 10 people, were excluded from the survey's targeted population. According to Statistics Finland (2021), there are around 369,000 companies in Finland, and nearly 348,000 of these companies are classified as microenterprises. About 89% of Finnish micro enterprises employ a maximum of four people, including the entrepreneur. As sophisticated MA techniques and extensive MAS tend to be necessary in larger organisations with decentralised structures (Abdel-Kader and Luther, 2008), we limit the examination to enterprises employing more than 10 people. The initial sample of 1,507 responses represents 7% of Finnish organisations that meet this criterion.

The survey was conducted over the phone with the respondents, each of whom held a senior manager position in their respective organisations (e.g. CEO, CFO). Two individual, full-time phone callers collected the data over a two-month period in late 2014, adhering to a random call sequence and quota sampling. The quotas were determined so that the sample would be representative of the company population in terms of organisational sizes and industries. The starting point for establishing the quotas was Standard Industrial Classification TOL 2008 (Statistics Finland, 2008). The number of companies to be contacted from each industry was based on its specific share of companies in proportion to other industries in the classification.

In addition to an accurate representation of industries, the size of the company was considered by following the pan-European definitions for organisational sizes (European Commission, 2017). The data collection aimed at a distribution in which small businesses and medium-sized enterprises would both account for roughly 45% of the sample, while the remaining 10% would be comprised of large enterprises. The final sample does reflect this initially set distribution of company sizes to a certain extent, but naturally, the willingness to respond varied among the organisational sizes, thus resulting in a total of 502 responses from small businesses.

The discussions that were carried over the phone with all of the respondents were based on a structured questionnaire (see Appendix 1) that comprised 24 claims (referred to as questions; Q1, Q2, Q3, Q4, Q5, etc.) on a five-level Likert scale and three open-ended questions (Q25, Q26 and Q27), out of which only Q26 was investigated in this study, documenting the challenges small businesses have confronted in MA. The closed-ended questions, respectively, mapped the various aspects of MAA, e.g. companies' adoption of different MA techniques and practices as well as past system and service purchases and intentions of such acquisitions in the future.

The survey provided our primary and secondary data sets for the analysis, while a tertiary data source was added later to be able to study the economic realities of the responding organisations and link performance consequences to MAA. The tertiary data was fetched from the Amadeus database by manually collecting asset-based solvency ratios as a two-year average for each small business in the sample. This process was carried out by one researcher and repeated exactly 502 times. Relative profitability was also analysed by

gathering the companies' return on assets figures, but this measure had no significant relation to MA, so we opted for solvency ratios instead.

2.3 Data analysis and methods

The data analysis was started with the supporting, embedded qualitative strand. We opted for qualitative content analysis (QCA), which is a method of searching for underlying, emerging themes in one's qualitative data. The exact thought processes through which these themes are extracted are often left implicit (Bryman and Bell, 2011). The data set, including the open-ended question Q26, was collected over the phone, and each conversation was transcribed immediately afterwards by the caller. Hence, the Q26 responses were already in written format when the data analysis was initiated. The small businesses' responses were categorised using QCA once two researchers had reviewed them separately without knowing how each of them had categorised individual responses. Therefore, the categories represent a synthesis of the two researchers' subjective takes on the challenges that emerge from the responses. Q26 was selected for analysis because it is the part of the questionnaire that maps small businesses' experiences with MA challenges.

As far as the predominant, quantitative strand in the design is concerned, the data analysis was initiated with factor analysis (FA), which addresses the problem of analysing the structure of interrelationships (i.e. correlations) among multiple variables by defining a set of common underlying dimensions known as factors. FA is an interdependent statistical technique in which each variable is simultaneously considered in relation to all other variables in the data set (Ghauri and Grønhaug, 2002). In this study, the variables for which the structure of interrelationships is investigated are the closed-ended questions in the survey. The exploratory variant of the method was applied to Q1–Q24 to discover a set of factors that illustrate small businesses' MAA in our sample.

The quantitative part of the mixed methods design is completed with analysis of variance (ANOVA). ANOVA investigates whether the means of more than two independent groups differ from each other in a statistically significant manner by observing the effects of an independent, grouping variable on a dependent variable (Metsämuuronen, 2017). Both variables are derived from preceding analyses; the grouping variable (i.e. Q26 categorisation) from QCA and the dependent variable from FA (one of the factors formed by Q1-Q24). In the overall design, the purpose of ANOVA is to unravel whether there is a connection between certain challenges and small businesses' MAA (particularly a willingness to purchase systems and services).

When the variance caused by at least two grouping variables on a single dependent variable needs to be studied, multivariate analysis of variance (MANOVA) is typically the statistical technique of choice (Metsämuuronen, 2017). MANOVA is applied in this study to understand whether small businesses' MAA (particularly MA know-how and recent system and service purchases) coincides with long-term business performance, as it is very likely that profitability results in increased solvency over time. Hence, the asset-based solvency ratio is the dependent variable in this analysis, while the grouping variables are again derived from Q1–Q24 by way of FA and underlying themes describing the state of MA in the companies. As there are two grouping variables here, this approach will be later referred to as two-way ANOVA.

3. Management accounting in small and medium-sized enterprises

3.1 Small and medium-sized enterprises characteristics influencing management accounting

Company size influences a firm's accounting system, which then keeps adapting to the characteristics of the firm as it keeps evolving (Abdel-Kader and Luther, 2008). Besides the

size, SMEs have several characteristics separating them from larger companies and affecting how they operate. These SME idiosyncrasies include characteristics such as a relatively narrow ownership base and scarce resources, including available time, funding and unique competences. Entrepreneurs tend to have pronounced roles as owner-managers in SMEs (Bridge *et al.*, 2003) and often they hold the accounting information as well (Granlund and Taipaleenmäki, 2005). As the owner-manager, or a non-founder managing director, is accustomed to being close to the business, the everyday operations of the firm often reflect said manager's personal skills, values, attitudes and displays of power and influence (Halabi *et al.*, 2010; Burns, 2000).

In a review of MA practices among smaller companies, Pelz (2019) found that MA in these companies consists mostly of business planning, financial accounting and financial accounting-based management control activities. In general, smaller enterprises seem to use MA less than larger enterprises, and their MAS are consequently less developed (Armitage *et al.*, 2016; Lavia Lavia López and Hiebl, 2015; Quinn, 2011). Organisational structure matters as well. The more complex the organisational structure is in terms of departments and organisation levels, leading to a more decentralised decision-making, the more sophisticated MA information is required for making sound business decisions (Lavia Lavia López and Hiebl, 2015; Abdel-Kader and Luther, 2008).

The idiosyncrasies of SMEs are not fully acknowledged in MA development. Instead, MA techniques and MAS are often first developed for the needs of larger organisations, and only afterwards "simplified" and "downsized" to accommodate smaller companies (Lavia Lavia López and Hiebl, 2015). Halabi *et al.* (2010) point out that most of the reporting is designed to be of use to external stakeholders. As smaller companies do not have to fulfil similar external requirements as their bigger counterparts, the information produced by MAS may be irrelevant from their perspective (Becker *et al.*, 2011; Mitchell and Reid, 2000). However, Pelz (2019) notes that especially growth firms, which are dependent on receiving external funding, benefit from MA use as it diminishes the knowledge gap between the management and stakeholders, such as investors.

3.2 Underlying management accounting potential

In SMEs, MA information can be useful both in operational and strategic management featuring various planning and control activities (Randall and Horsman, 1998). MA information is used to evaluate how the expectations of profitability in activities have been reached and, even more importantly, to learn how profitability can be improved in the future (Waymire, 2009). Common MA tasks for planning purposes are budgets, cash flow projections and the setting of performance targets. For control purposes, SMEs tend to evaluate performance in relation to budgets or other targets, analyse the differences between actuals and targets, compute profitability (e.g. product, service, project or customer profitability), make variance analyses and take remedial actions if performance is unfavourable relative to targets (Shields and Shelleman, 2016; Lucas *et al.*, 2013; Lohr, 2012; Davila and Foster, 2007; Granlund and Taipaleenmäki, 2005).

Prior literature provides plenty of evidence that the use of MA and various MAS elements is associated with higher levels of performance (Wijewardena *et al.*, 2004; Davila and Foster, 2005; King *et al.*, 2010; Duréndez *et al.*, 2011; Lavia Lavia López and Hiebl, 2015; Shields and Shelleman, 2016; Pelz, 2019). For instance, Duréndez *et al.* (2011) have studied over 400 Spanish SMEs and found that using MAS increased their financial performance. Based on the studies of both King *et al.* (2010) and Wijewardena *et al.* (2004), budgeting has a positive effect on SME performance. Similarly, Shields and Shelleman (2016) studied 55 microenterprises and found that those who compute product or service profitability and

customer profitability reach a higher return on investment. Peltz (2019) noticed that MA was useful in business planning and control, supporting the systematic development and management of scarce resources in smaller organisations.

The fast-developing technology has provided broader possibilities to generate and use accounting information from a strategic point of view (Grande *et al.*, 2011). It seems, however, that only a very few SMEs actively use MA for decision-making. Instead, the collection of financial information is often driven by taxation and other external purposes (Halabi *et al.*, 2010), or such information may not be collected at all (Quinn, 2011). The development of information systems and the increased provision of accounting services enable a more diverse gathering and use of financial information. The role of technology and business intelligence increases rapidly in all kinds of organisations. Such technology can be a facilitator, a catalyst, a motivator and an enabler for the convergence of financial accounting and MA (Taipaleenmäki and Ikäheimo, 2013).

As SMEs have limited internal resources, they outsource accounting – that is, they buy services from external accountants to take care of their financial duties and statutory responsibilities. In addition to lacking resources, high information intensity and uncertainty are common drivers behind outsourcing decisions (Asatiani *et al.*, 2019). Instead of providing MA information and related advice, the most typical responsibility of external accountants is to fulfil regulatory requirements, such as preparing financial statements and taxation reports (Halabi *et al.*, 2010; Berry *et al.*, 2006). Some SMEs have acquired and benefitted from MA advice too. For instance, Berry *et al.* (2006) found that the SMEs whose owner-managers took advantage of MA services, such as business advice from their accountant, grew the fastest. Similarly, Barbera and Hasso (2013) found that the use of external accountants as advisors has a positive impact on SME performance. However, the benefits of external accounting advice seem unclear to most SME managers.

3.3 Management accounting challenges
Various reasons have been identified in the literature for the low use of MA in SMEs. A common challenge is limited resources, including time and funds (Lavia Lavia López and Hiebl, 2015; Garengo and Bernardi, 2007; Bridge *et al.*, 2003). In many cases, there can be organisational inertia originating in either resource rigidity (i.e. companies' limited financial or technological resources resulting in an inability to invest in technology) or routine rigidity, capturing behavioural patterns that constrain the ability for change. Some of these companies simply become content with their incomplete systems because of a lack of time to improve them (Rinta-Kahila *et al.*, 2016).

The usefulness of MA information can sometimes be minute, as the relatively simple decision-making in SMEs directly influences underlying MA needs (Armitage *et al.*, 2016; Lohr, 2012). Typically, there are only a few realistic decision options from which the manager must select the most feasible alternative. In these kinds of decision-making situations, pouring resources into MA may not be necessary or appropriate (Lucas *et al.*, 2013). Instead, SMEs tend to rely on the experience of their owner-managers, as demonstrated by Giovannoni and Maraghi (2013), who found that the coordinating role of the founder was essential when newly introduced management controls provided conflicting signals. Having useful MA information available does not guarantee that it will be used optimally, as there can be a significant gap between measuring performance and managing the company based on these measures (Otley, 2001).

Another challenge is that the managers of SMEs have often little to no knowledge about accounting, and this lack of financial skillset may hinder the firm's future success (Shields and Shelleman, 2016; Halabi *et al.*, 2010). Lavia Lavia López and Hiebl (2015) found that

when the owner-manager did not have any training in accountancy, MA was perceived merely as a tool for information provision to external institutions, such as banks. The presence of a non-founder manager with prior accounting and controlling expertise has been associated with higher levels of MA use in the literature (Pelz, 2019; Lavia Lavia López and Hiebl, 2015). In general, deficiencies in accounting skills decrease the use of sophisticated MA techniques (Shields and Shelleman, 2016; Lavia Lavia López and Hiebl, 2015; Halabi *et al.*, 2010). It is important to acknowledge that information systems will not automatically establish any competitive advantage, but together with knowledgeable users, they become an important resource. For MA to lead to better business performance (Barney *et al.*, 2001), there should be sufficient understanding of the subject matter.

ICT technologies such as big data, blockchain, robotic process automation and artificial intelligence are changing accounting practices and the existing roles of accountants (Moll and Yigitbasioglu, 2019; Kokina and Blanchette, 2019). However, as financial accounting is strictly statutory and thus exists even in the smallest of organisations, technology development contributions are allocated to financial accounting and interest in MA systems is lower in comparison. Even when MA systems are adopted, their potential is not necessarily fully used (Teittinen *et al.*, 2013; Ismail and King, 2005; Marriott and Marriott, 2000).

Although accountants are the most common source of business advice for SMEs (Carey and Tanewski, 2016; Berry *et al.*, 2006), their tasks seem to still comprise of providing statutory reporting for external stakeholders, whereas their abilities to act as business advisors are rarely used (Halabi *et al.*, 2010; Berry *et al.*, 2006). As MA information provision is voluntary for SMEs, it is often forgotten or ignored in outsourcing decisions. The accounting profession also demonstrates diversity in size, identity and specialisation (Ramirez *et al.*, 2015), denoting that not all accounting firms are equal in their willingness or ability to provide MA services.

4. Small business perspective to management accounting challenges
4.1 Categorisation of management accounting challenges
In Q26, the respondents were inquired about the challenges in purchasing, implementing and maintaining a functioning and effective MAS. The nature of the responses given to the question varied from having small annoyances to more profound issues. The responses were categorised using QCA under the following six category labels: C1 No Challenges, C2 Do Not Know, C3 Organisation, C4 Systems, C5 Personnel and C6 Resources, based on the root cause of the challenge faced. Some of the respondents were not able to name a specific challenge or claimed not to have any, hence categories C1 and C2 are also included in the analysis. The distribution of the challenges to the categories across the 502 companies studied is shown in Table 1.

Category	N	%
C1: No challenges	60	12
C2: Do not know	50	10
C3: Organisation	101	20
C4: Systems	85	17
C5: Personnel	90	18
C6: Resources	116	23
Total	502	100

Table 1.
Challenges in MA: the categorisation of Q26 responses

Classifying the responses to Q26 required subjective interpretation, and in many cases, it was not initially apparent to which category a response should belong to. For example, if a respondent stated that "there are no systems available on the market that capture the unique aspects of their business", the challenge might be related to either C3 organisation or C4 systems. Similarly, if a respondent mentioned that "they are lacking capable personnel and disposable resources towards improving the situation", it could denote that the challenge stems from either C5 personnel or C6 resources. Responses like the examples were categorised based on the overall description given by analysing what seemed to be the fundamental challenge underlying the stated problem. We aimed always at extracting a "root cause" of the challenge being described by the respondent to categorise each response. Regardless of the challenges in the classification process itself, the four categories established provide a relatively rich account of the MA challenges faced by small businesses and a fruitful ground for further discussion in the context of prior literature.

4.2 Discussing the categorisation
Challenges categorised as C3 organisations (20%) are related to small businesses' organisational structures and adopted business models. Surprisingly, some companies think that their business activities are so complex or unique that existing systems do not really suit their business: "Our customer-focused production in small series causes challenges". "Principally, our business differs from others, there are no suitable systems available". "Our cavalcade of products and components cause problems". On the other hand, some of the respondents wish for extremely light systems: "We only have one product, thus there is no need for heavy systems". "It seems that light and affordable enough systems suitable for our business do not exist". Small company size was therefore nominated as a reason for not using systems and not investing in sophisticated systems or external services. Ownership-related reasons were also mentioned, naming the corporate structure as an obstacle to independent decision-making: "The group dictates these subjects".

Challenges categorised as C4 systems (17%) are related to shortcomings in the information and accounting systems available to the company. In addition to a lack of a suitable system, the respondents brought up the enormous amount of work required in collecting, integrating and updating the information to support management: "Data collection and correctness of the data entered are challenges". "Complexity of the systems causes problems in our company size". "Usability may cause problems and requires continuous training". Some respondents were worried about the investment's payback time: "There is a risk that the system would be kind of a lump that causes more costs than savings". The managers seem to be of the opinion that a system would force them to complicate business processes, causing more harm than benefits. Small businesses in general seem to distrust the possibilities that the systems provide.

Challenges categorised as C5 personnel (18%) are related to not having MA skills required for developing and using systems and advisory services: "Users' learning is challenging. We should know more to fully utilise all features". "Do not have enough knowledge about available systems". Sometimes the owner-manager's own unawareness hinders MA use: "Own knowledge is inadequate, do not know what is available on the market in the first place". The motivation and commitment of the personnel were also frequently mentioned. Systems and services are not considered important enough to engage in using and developing them further: "Personnel is the biggest challenge: system usage is not seen important enough".

Challenges categorised as C6 resources (23%) are related to a lack of time, funds and competences, and as expected, resource constraints are a significant obstacle for MA:

"Resources are the challenge, that is who is going to do the work?" "Price is the biggest barrier". "Lack of time and knowledge are the biggest obstacles". MA typically requires significant investments that can be detrimental in smaller organisational sizes: "Systems need always to be customised, which leads to lack of resources". Allocating resources to more important matters because of time constraints were also highlighted. Quotations across all categories are summarised in Appendix 2.

5. Small businesses' management accounting adoption: interfaces with challenges and performance

5.1 Management accounting adoption symbolised by three factors

Once Q26 categorisation was completed with QCA, the quantitative, predominant strand of the embedded design was initiated. The first step in the quantitative analysis was to discover a collection of measures for MAA. An FA was conducted on the closed-ended questions (Q1–Q24) to search for underlying similarities (correlations) in response behaviour among the individual questions. The definitive goal of conducting FA was to reduce the heterogeneity of the phenomenon by presenting a large set of independent variables (questions) using a few common factors, as illustrated in Table 2.

FA resulted in six factor candidates that had to be further evaluated based on how they fit the objectives of the study. This evaluation process relied on two specific criteria: the quantity of a factor based on the sum of squared loadings, also known as the eigenvalue, and the quality of a factor estimated on heuristic and semantic terms. The second, fifth and sixth candidates were discarded because of quantity or quality reasons. The second and fifth candidates, which basically measure a company's orientation towards interorganisational aspects of MA, are better suited to studying larger organisations where information transparency and the use of boundary-spanning techniques are more prevalent. The sixth candidate does, technically speaking, meet the minimum requirement for a passable eigenvalue (1.00 or higher), but the quantity criterion of the candidate is still weak, consisting of only one question (Q9). The candidates passing the assessment (see Table 3) were reorganised and renamed as "Factor 1: MA Knowhow", "Factor 2: MA Bought" and "Factor 3: MA Considered". These three dimensions symbolise the MAA of small businesses.

The naming scheme of the factors follows a semantic evaluation of the individual questions belonging to each factor with the highest rotated factor loadings. MA Knowhow (F1) measures the companies' ability to calculate costs and allocate them to accounting items, such as products. The awareness of costs seems to be on a relatively good level with very little variation among the respondents ($\mu = 3.59$, $\sigma = 0.75$). MA Bought (F2) measures

	Candidate 1	Candidate 2	Candidate 3
Eigenvalue	4.14	2.86	1.66
Rotated factor loading	Q14 (0.67)	Q23 (0.97)	Q5 (0.73)
	Q18 (0.61)	Q24 (0.65)	Q6 (0.62)
	Q16 (0.58)	Q22 (0.42)	Q7 (0.45)
	Q12 (0.38)		Q8 (0.43)
	Candidate 4	Candidate 5	Candidate 6
Eigenvalue	1.40	1.27	1.10
Rotated factor loading	Q15 (0.59)	Q20 (0.82)	Q9 (0.42)
	Q13 (0.47)	Q21 (0.52)	
	Q17 (0.46)		

Table 2.
Factor candidates: eigenvalues and rotated factor loadings

the respondents' system and service purchases within the five years preceding the survey. Based on the descriptive statistics, some companies have recently invested in MA, while others have not ($\mu = 2.94$, $\sigma = 1.14$). MA Considered (F3) measures the companies' interest in purchasing systems and services in the near future. A low to moderate interest towards MA exists without too much variation ($\mu = 2.12$, $\sigma = 0.88$).

5.2 Influence of challenges on management accounting adoption: one-way analysis of variance

The next step in the quantitative analysis was to investigate how the challenges that were categorised using QCA influenced MAA. The measure that was operationalised for MAA is MA Considered (F3), assuming that challenges would motivate an organisation to remedy the situation. As the variable representing MA challenges is on a nominal scale (Q26 categorisation), the approach chosen was grounded on the ANOVA. A one-way ANOVA variant was deployed, as the research problem is represented by one grouping variable.

ANOVA is used to test whether the means of more than two groups differ from each other by studying the effect of a grouping variable on a dependent variable. ANOVA generates an F-ratio that compares the effect variance (between-group variability) against the error variance (within-group variability). By positioning MA Considered (F3) as the dependent variable and Q26 categorisation as the grouping variable, a statistical significance was found ($F = 4.43$, $p = 0.0006$ at $\alpha = 0.05$), denoting that at least one of the group means is different from the others. To determine where the differences lie, multiple comparisons need to be carried out. The results of two multiple comparison techniques, Tukey's HSD and Dunnett's control, are shown in Table 4 and the associated illustration in Figure 2.

Tukey's HSD was applied initially because of the conservative nature of the method. The comparison of means revealed that no challenges (C1) is statistically different from personnel (C5), systems (C4) and resources (C6) in this exact order of the significance of the effect. As Tukey's HSD indicated that the other categories can be compared against C1, it was then fixed as the control group in Dunnett's method. The purpose of the supplemental

	Factor 1: MA Knowhow	Factor 2: MA Bought	Factor 3: MA Considered
Questions	Q5 + Q6 + Q7 + Q8	Q13 + Q15 + Q17	Q12 + Q14 + Q16 + Q18
Mean (μ)	3.59	2.94	2.12
SD (σ)	0.75	1.14	0.88

Table 3.
Factors selected to symbolise MA adoption

Category	p-Value (Tukey's HSD)	p-Value (Dunnett's method)	Mean	N
C5 (personnel)	0.0014*	0.0005*	2.29	88
C4 (systems)	0.0023*	0.0008*	2.27	84
C6 (resources)	0.0088*	0.0030*	2.19	114
C3 (organisation)	0.0659*	0.0245*	2.11	96
C2 (do not know)	0.8424*	0.6078*	1.92	47
C1 (no challenges)	1.0000*	1.0000*	1.72	60

Note: *Statistically significant at $\alpha = 0.05$

Table 4.
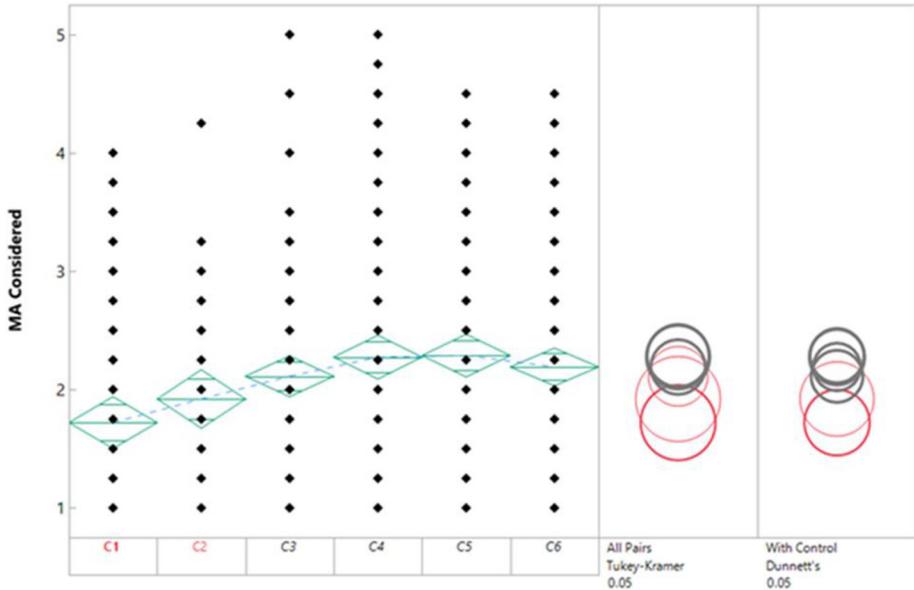Means comparison: MA Considered (F3) by Q26 categorisation

Figure 2.
Means comparison
visually: Tukey's and
Dunnett's
comparison methods

Source: Created by the authors

analysis was to see whether another, slightly less conservative comparison method would generate similar findings or suggest further differences of statistical significance. In addition to confirming the results derived from Tukey's HSD, a difference between no challenges (C1) and organisation (C3) was found.

What do these differences between the groups denote in practice? Challenges encountered with personnel (e.g. a lack of MA skills), systems (e.g. too complicated), or resources (e.g. a lack of time and funds) motivate small businesses to consider investing in MA in terms of systems and services. As demonstrated by Dunnett's, organisational reasons (e.g. the nature of business operations) can influence the purchasing willingness to a slightly lesser extent. It is encouraging to see that small business managers can identify pitfalls in their organisation's ability to use MA information and techniques and act accordingly.

5.3 Influence of management accounting adoption on performance: two-way analysis of variance

The third and final step in the quantitative analysis was to investigate how the remaining dimensions of MAA, i.e. MA Knowhow (F1) and MA Bought (F2), influence business performance. Although it is impossible to find a cause-and-effect relationship between MAA and performance with the measures available to researchers, it is still interesting to observe whether companies' MA Knowhow (F1), as reported by the respondents, and MA Bought (F2), their investments in systems and services, generate statistically significant differences in performance.

To study the influence that MA Knowhow (F1) and MA Bought (F2) might have on business performance (i.e. to use them as grouping variables in ANOVA), the Likert scales of both variables were transposed to a nominal scale by determining an interval for high

$(X \geq 3.50)$, medium $(2.50 < X < 3.50)$ and low $(2.50 \leq X)$ response levels. The performance (i.e. the dependent variable in ANOVA) was represented by the asset-based solvency ratio as a two-year average figure (shareholders' funds/total assets $\times$ 100). Because of the operationalisation of two grouping variables, a two-way ANOVA variant was deployed in the analysis.

A statistical significance was found ($F = 2.15$, $p = 0.0302$ at $\alpha = 0.05$), denoting that at least one of the group means is different from the others. As with one-way ANOVA above, we applied once again multiple comparisons to conclude which mean pairings differ to a significant extent. Three groups (high, medium and low) per each grouping variable results in nine group combinations and hence in a total of 36 pairwise comparisons, which is the reason why Tukey's HSD was used as it controls the experiment-wise error rate more conservatively than other comparison methods. The results of the multiple comparisons using Tukey's HSD are given in Table 5.

Interestingly, moderate MA know-how combined with notable MA investments (F2 = Medium, F3 = High) was associated with the worst average solvency ratio. Compared with this group of organisations, Tukey's comparison of the means found two statistically significant effects in the data. Excellent MA know-how combined with either extensive investments (F2 = High, F3 = High) or basically non-existent investments (F2 = High, F3 = Low) was associated with significantly higher solvency. Another interesting discovery, which is not necessarily evident at first sight, is that the solvency ratio plummets when an organisation makes additional MA investments in systems and services (assuming that it operates at medium-level know-how), creating "a decreasing solvency phenomenon" as illustrated in Figure 3.

Small businesses seem to benefit from MA information in terms of business performance, as the groups of companies with the highest levels of MA Knowhow (F1) have the best average solvency. MA Bought (F2) can be simultaneously a bit higher or lower depending on other organisational characteristics (e.g. MA know-how acquired through past system and service investments or the manager's own educational and professional background).

It is interesting that small businesses investing heavily in MA, but simultaneously remaining at medium levels of MA Knowhow (F1), performed the worst. There can be a multitude of explanations for the observed decreasing solvency phenomenon. One explanation is that the MA (systems and services) acquired by these companies do not suit their specific operations and individual needs. A lack of understanding among the key personnel about what MA enables and does not enable is another potential reason that limits the usability and use of MA information.

Factor 1: MA Knowhow	Factor 2: MA Bought	p-Value (Tukey's HSD)	Mean	N
High	High	0.0111*	45.40	117
Low	*High*	*0.5731*	43.89	11!
High	Low	0.0466*	42.82	109
Medium	Low	0.1287	42.56	49
High	Medium	0.0961	41.59	91
Medium	Medium	0.6281	37.06	40
Low	Low	0.7121	37.01	30
Low	*Medium*	*0.9999*	28.67	13!
Medium	High	1.0000	23.74	29

Notes: *Statistically significant at $\alpha = 0.05$; italic values refer to sample size insufficient for statistical analysis

Table 5.
Means comparison:
solvency ratio by MA
Knowhow (F1) and
MA Bought (F2)
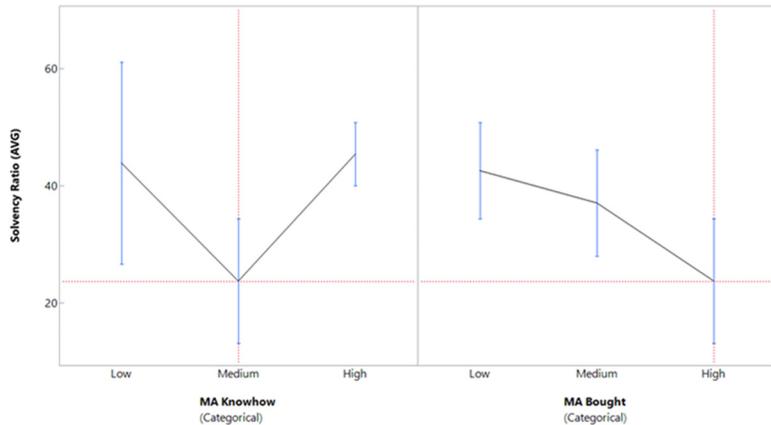
Source: Created by the authors

6. Discussion

Next, we discuss the findings and compare the results with prior literature. This discussion will take place under the research questions posed in the research design.

RQ1. What kinds of MA challenges do small businesses face?

Several challenges were brought up by the small businesses' representatives. Based on the responses to Q26, up to 78% of small businesses seem to be facing MA challenges. Depending on the origins, four categories were identified: C3 organisation (20%), C4 systems (17%), C5 personnel (18%) and C6 resources (23%). Our analysis of the responses indicated that MA challenges related to C6 resources and C5 personnel as well as C3 organisation and C4 systems are typically intertwined, denoting that the root cause can be difficult to pinpoint. To exemplify this, inadequate MA knowledge might stem from a lack of personnel (e.g. proper educational background), a lack of resources (e.g. no money to recruit) or both simultaneously. This notion calls for a more fine-grained analysis of the MA challenges that small businesses and SMEs meet when adopting or using systems, hence supporting the call of López and Hiebl (2015) to study the barriers hindering SMEs from further MA use.

6.1 C6 resources and C5 personnel

Resource constraints are common for SMEs (see e.g. Lavia Lavia López and Hiebl, 2015; Bridge *et al.*, 2003), and without an adequate resource base, small businesses become incapable of investing in systems and external services (see e.g. Halabi *et al.*, 2010; Berry *et al.*, 2006). A lack of funding is also a major barrier to technology adoption, thus supporting the idea that resource rigidity causes inertia in smaller organisations (Rinta-Kahila *et al.*, 2016). Several respondents also mentioned the lack of time as a significant barrier to MA use, which is an important notion for the future when considering small businesses' MA needs. Based on previous literature (see e.g. Lavia Lavia López and Hiebl, 2015; Garengo and Bernardi, 2007; Granlund and Taipaleenmäki, 2005), it is not that surprising that resource-related challenges emerged as the most common hurdle for small businesses MA. However,

the prevalence of other types of challenges was somewhat surprising, as was the even distribution of challenges across all identified categories.

The challenges related to personnel's MA knowledge and motivational factors are indirectly connected to resource constraints. In the SME literature (see e.g. Shields and Shelleman, 2016; Halabi *et al.*, 2010; Mitchell and Reid, 2000), the owner-managers' own role is seen as critical. Particularly, the owner-managers' understanding of accounting and related MA techniques is reverberated in the organisation's MA (see e.g. Lavia Lavia López and Hiebl, 2015; Halabi *et al.*, 2010). As the respondents of the survey were senior managers, many of them owner-managers, MA knowledge, readiness to learn and motivation mentioned in the responses refer not only to the personnel but also to the characteristics inherent to the managers themselves.

6.2 C3 organisation and C4 systems
Issues relating to available systems and the underlying organisation seem to pose significant challenges for small businesses' MA, meaning that the systems offered are not suitable for the specific business mode or organisation structure. As systems are typically developed for large enterprises and only afterwards simplified and downsized for SMEs (Lavia Lavia López and Hiebl, 2015), the needs of small businesses are not necessarily being properly considered even when a system is eventually adopted (see e.g. Teittinen *et al.*, 2013; Ismail and King, 2005). Small businesses' relatively simple decision-making influences the usefulness of MA information (Armitage *et al.*, 2016; Lohr, 2012), which renders the expenditure on systems questionable (Lucas *et al.*, 2013).

The concerns of systems being too complicated, the market lacking suitable lightweight solutions and investments having long payback times surfaced in the respondents' descriptions. Surprisingly, some respondents seem to think that they would not even benefit from systems because of the complexity of their business landscape. As the business owners' lack of understanding of the benefits and their lack of skills to use MA information seem to hinder MA (Halabi *et al.*, 2010), the first step in tackling MA challenges is educating small business decision makers and raising their awareness about the benefits of MA use. Secondly, MA information should also be further developed in a form that is easier for small businesses to understand and use.

RQ2. How do MA challenges guide MAA in terms of systems and services?

The one-way ANOVA revealed that MA challenges motivate small businesses to at least consider investing in systems and services. Statistically significant differences were found in challenge categories C3 through C6 (i.e. organisation, systems, personnel and resources) when compared with organisations reporting no challenges. C5 personnel seems to be the strongest motivator to improve MA, followed closely by C4 systems and C6 resources. C3 organisation might also, to a lesser extent, influence companies' willingness to invest in MA. The findings suggest that small businesses can identify the pitfalls in their ability to use MA, and are willing to consider acquiring systems and external services to improve their MA capabilities. We could not find any prior literature that reports on how challenges guide or limit MAA, adding novelty to the findings as they shed new light on what motivates small businesses to adopt systems and services.

The fact that small businesses have identified what hinders their MAA and that a statistically significant portion of these organisations also consider investing in systems and services is a promising result. Contrary to traditional large enterprise MAS (Lavia Lavia López and Hiebl, 2015), inexpensive, easy-to-use systems that are tailored to needs and requirements are the key to encouraging small business owners and managers to make an

investment as it is not worthwhile to allocate limited resources towards ill-fitting systems. Service innovations are becoming increasingly important, which denotes that traditional statutory accounting can be complemented in the future with advisory services that also deal with MA topics (Berry *et al.*, 2006).

The personnel's attitudes, including those of the owner-manager, form an obstacle on the path to MAA (Halabi *et al.*, 2010). Based on the one-way ANOVA, personnel challenges were the strongest motivator for the willingness to invest. A start to closing the gap between "not believing in the usefulness of MA information" and "understanding the importance of facts and figures" is to better acknowledge the small business reality in system and service development. In addition to personalised business advice, easy-to-adopt user interfaces, visual analytic tools and accessible cloud computing interfaces are some examples of approachable elements that would promote MA to small businesses in this dawning era of digital MA (Möller *et al.*, 2020).

RQ3. How does prior MAA influence small business performance in terms of solvency?

The two-way ANOVA found a statistically significant difference between the worst average solvency group (MA Knowhow, F1 = Medium and MA Bought, F2 = High) and the two best performing groups (MA Knowhow, F1 = High and MA Bought, F2 = High or Low). Small businesses seem to benefit from MA performance-wise, as the groups of companies with the best MA knowledge also had the best solvency. Additionally, it was found that when a small business operates at medium levels of MA know-how, additional investments can, in fact, decrease the solvency that remains low in spite of the company pouring more resources into systems and services. This discovery was coined as the decreasing solvency phenomenon, which warrants more investigation as the sense-making process is only initiated in this paper.

Several authors have noted that the benefits of producing MA information should be greater than the associated costs (Lohr, 2012; Halabi *et al.*, 2010; Argilés and Slof, 2003), and therefore investing blindly in systems and services can degrade business performance. As systems are often developed for large enterprises and external stakeholders' requirements (Lavia Lavia López and Hiebl, 2015), the MA information that these systems generate can be irrelevant for small businesses' decisions, contributing to inadequate MA practices (Becker *et al.*, 2011; Mitchell and Reid, 2000). When the situational picture becomes distorted for the management, MA information stops supporting decision-making processes, only leading to disappointments (Halabi *et al.*, 2010).

Another potential aspect contributing to the decreasing solvency phenomenon is the lack of knowledge. The person who uses MA information should be able to determine what kind of information is business critical and understand how this information, once retrieved, is operationalised to support organisational goals. Poor understanding decreases MAA and slows down accounting sophistication (Shields and Shelleman, 2016; Lavia Lavia López and Hiebl, 2015). External service acquisition can also be detrimental, as sound financial advice cannot be given when the management is unable to verbalise their needs to the advisor (Blackburn *et al.*, 2014; Berry *et al.*, 2006). Large amounts of resources can be assigned towards service purchases, but reports and analyses not tailored to the company are unlikely to improve its performance.

7. Conclusions

To conclude the line of argumentation presented in the paper, the research contributions, practical implications and potential limitations are now highlighted. They are also positioned under the research questions to better highlight our findings. Further avenues for research are mentioned.

RQ1. What kinds of MA challenges do small businesses face?

A systematic listing of challenges hindering small businesses' MA was established in the paper using QCA. While prior SME literature has sporadically mentioned similar issues, the categorisation systemises the understanding of the challenges faced by small businesses. The categorisation provided in this paper contributes to the existing literature by classifying small businesses' MA challenges and their root causes into four categories: organisation, systems, personnel and resources.

RQ2. How do MA challenges guide MAA in terms of systems and services?

It was found with a one-way ANOVA that challenges stemming from personnel, systems and resources motivate small businesses to invest in systems and services. The practical implication arising from this specific finding is that future system and service development should better stimulate small businesses' MAA. This can be established by tailoring system and service options that better acknowledge the SMEs operating environments and unique information needs, which would make MA not only easier to adopt but also more attractive to use for small businesses' owners and managers. In this sense, our findings hold significant practical relevance for organisations providing either systems (e.g. software companies) or services (e.g. accounting firms) in the field of MA. There is untapped business potential for whoever tackles these challenges from a small business perspective.

We acknowledge that this part of the design, where the qualitative analysis feeds the quantitative analysis, is a potential limitation to our approach. Creswell (2015) has pointed out that methodological challenges in these kinds of mixed-methods designs are often related to how an instrument that translates qualitative findings into items or scales is developed. Although special care was taken when analysing the contents of each response to Q26, the inferences made in the ANOVA are reliant on how the categorisation was established. Another potential limitation to mention is the generalisability of our findings outside the Finnish context. We can only be confident that the data set and analysis describe the small business reality in Finland.

RQ3. How does prior MAA influence small business performance in terms of solvency?

As perhaps expected, the relationship between MAA and small business performance was somewhat ambiguous. To a certain extent, small businesses seem to benefit from MAA, as the highest average solvencies were found from those companies with high MA knowledge. The more interesting observation from the perspective of theoretical contributions was the decreasing solvency phenomenon, i.e. a situation where increasing MA investments result in decreased solvency when a small business operates at a medium level of MA knowledge. The decreasing solvency phenomenon is a novel finding that without a doubt warrants further study, preferably with data that focuses strictly on potential underlying variables and small business performance.

There are also other avenues for further research. Systems that are developed for larger organisations can be difficult and expensive to adopt for small businesses. Are these investments so resource-intensive that they rarely produce a positive outcome? Another avenue for additional studies is the role of advisory services. When dealing with MAA, the systems perspective is more prevalent in the SME literature, while MA services are mentioned more sparsely. What elements would enable better service delivery for small businesses in the future?

Furthermore, there are the effects of centralisation to consider. How does the number of decision makers that decreases alongside organisational size influence MAA? Small businesses become exposed to risks associated with sourcing (e.g. price, criticality towards specific system vendor or service provider), personal qualities (e.g. the owner-manager as a gatekeeper) and information ownership questions (e.g. the person in charge of developing

MA leaves the company). These are aspects that are limited outside the scope of this study but could be investigated with a multitude of research approaches and methods in further research to better understand MAA in small businesses, not only through challenges, but other factors and idiosyncrasies that stem from the smaller size of an organisation.

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Further reading

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Appendix 1

Q1. Our products and/or services are mainly standardised by nature.

Q2. We have illustrated our business processes within the past five years.

Q3. Our information systems support our business processes well.

Q4. We enter working hours systematically into an electronic system.

Q5. We know the variable or direct costs that are allocated to a product or a service.

Q6. We know the fixed or indirect costs that are allocated to a product or a service.

Q7. We use activity-based costing principles in our company.

Q8. We are able to determine the costs of different accounting items (e.g. profit centres, product lines, customers. . .).

Q9. Pursuing cost efficiency is the most important goal in our business.

Q10. Through improved cost awareness, we would be able to develop our operations significantly.

Q11. A spreadsheet program (e.g. Excel) is an adequate tool for our management accounting needs.

Q12. We think that the markets lack a suitable software for accounting and profitability management.

Q13. We have purchased a management accounting system within the past five years.

Q14. We are considering purchasing a management accounting system in the near future.

Q15. We have purchased management accounting services (e.g. training or consulting) within the past five years.

Q16. We are considering purchasing management accounting services (e.g. training or consulting) in the near future.

Q17. We prefer a comprehensive solution for accounting and profitability management (i.e. a system combined with training and consulting) to a plain management accounting system.

Q18. We are interested in an analysis about the state of our accounting and profitability management made by external professionals.

Q19. We build long-term relationships systematically with our business partners.

Q20. Our customers appreciate especially the transparency of our cost structure and pricing.

Q21. We appreciate especially the transparency of suppliers' cost structure and pricing.

Q22. With joint management accounting, we could improve the efficiency and competitiveness of our current value network.

Q23. We are willing to deepen the collaboration of our current value network by disclosing cost structures and other management accounting information bilaterally with others.

Q24. We think that transparent disclosure of cost structures and other management accounting information is realistic, now or in the near future, in our current value network.

Q25. What are the main characteristics of the systems and the services that could improve accounting and profitability management in your company?

Q26. What are the greatest challenges and/or obstacles in purchasing, implementing and maintaining a functioning and effective management accounting system?

Q27. Does your company have any network-level management accounting tools, methods or even systems in place? If you do, what are they and their main characteristics?

Appendix 2

Category	Some examples of challenges mentioned in Q26
Organisation	"The group dictates these subjects" "Our customer-focused production in small series causes challenges" "Principally, our business differs from others, there are no suitable systems available" "We only have one product, thus there is no need for heavy systems" "It seems that light and affordable enough systems suitable for our business do not exist" "Our cavalcade of products and components cause problems" "Every project is unique, and this causes challenges"
Systems	"There is a risk that the system would be kind of a lump that causes more costs than savings" "Complexity of the systems causes problems in our company size" "IT projects are too laborious" "System should collect data from several sources, and that is a challenge" "Integration to financial accounting is a challenge" "Data collection and correctness of the data entered are challenges" "We have not found a system simple enough and suitable for our product" "We do not have knowledge needed to buy proper system, and suppliers are not able to sell us proper systems" "IT system suppliers do not know our field of business" "Usability may cause problems and requires continuous training"
Personnel	"Biggest challenges are the knowledge and commitment of the personnel" "Changes are resisted" "Own knowledge is inadequate, do not know what is available on the market in the first place" "Everything should be self-solved and own knowledge is inadequate" "Users' learning is challenging. We should know more to fully utilise all features" "Motivation problems of personnel" "Personnel is the biggest challenge: system usage and discipline in recording. These issues are not seen important enough"
Resources	"Price is the biggest barrier" "Euros, i.e., costs, are the main challenge" "Haste is the biggest challenge, time management" "Lack of time and knowledge are the biggest obstacles" "Resources are the challenge, that is who is going to do the work?" "Even usage of Excel requires learning and time" "Systems need always to be customised, which leads to lack of resources"

Source: Created by the authors

Table A1.
Some examples of
challenges mentioned
in Q26

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