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Use of strategic management accounting techniques by companies in the Czech Republic

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ABSTRACT

The purpose of this paper is to investigate the degree of use of strategic management accounting (SMA) techniques and the main factors affecting this in the Czech Republic. In order to achieve such an understanding, we apply a quantitative approach, rooted in contingency theory, including descriptive statistics, correlation analysis and regression analysis. The most intensively-used SMA techniques are strategic planning and budgeting, customer accounting, and target costing. The least-used are integrated performance measurement systems, strategic pricing and activity-based costing. Our respondents indicated that they expect an increase in the use of all SMA techniques over the next 3 years. Regression analysis confirms that the implementation of differentiation strategy (as opposed to cost leadership strategy) has a statistically significant and positive influence on SMA use. The findings of this study contribute to the better theoretical understanding of the contingent factors influencing the use of SMA techniques.

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1. Introduction

The term *Strategic Management Accounting* (SMA) was established by Simmonds (1981, p. 26), who defined SMA as 'the provision and analysis of management accounting data about a business and its competitors for use in developing and monitoring the business strategy'.

Simmonds forecast the rapid diffusion of SMA in practice, but this did not happen. The lack of interest has also been manifested in research. In the Scopus database, the oldest article mentioning the term SMA is a paper by Simmonds (1982), but it is impossible to find a single article on SMA indexed in Scopus or Web of Science from 1982 to 1990. Nixon and Burns (2012, p. 229) claim that the term SMA was not accepted by practitioners and that 'SMA literature seems to have languished'.

This is rather surprising because there are several reasons why the implementation of SMA techniques is very important for company success. It is even possible to

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postulate that the importance of SMA techniques is growing in the contemporary, highly-competitive business environment. The impossibility of managing companies solely with financial measures and the need for more strategically-oriented tools such as non-financial measures, externally-oriented information systems, and comprehensive systems supporting the implementation of strategy, requires the implementation of strategic management accounting techniques. The deployment of SMA can contribute to general strategic management maturity (a concept discussed, among others, by Witek-Crabb, 2016) and thus contribute to the sustainable development of a company.

We therefore argue that neither of the extreme positions, i.e. those taken by Simmonds (1982) and Nixon and Burns (2012), is accurate. On the one hand, the explosion of interest in SMA predicted by Simmonds did not arise; on the other hand, from 1990 onwards interest in SMA revived and has slowly been growing, or at least holding steady. Our review of articles on SMA indexed in Scopus proves that SMA has been abandoned neither in practice nor in academia and that research in this area is meaningful.

In order to identify a narrower research gap, we conducted a literature review in high-quality journals (indexed in Scopus or Web of Science) and we found that there are significantly under-researched areas. First, in SMA literature there are relatively few empirical articles using survey methodology (in total, we found approximately 20 survey-based articles on SMA in the Scopus database). Second, the existing articles have often addressed only a limited range of SMA techniques and thus failed to provide a complete picture of SMA technique implementation. Third, these articles are often descriptive and atheoretical. Regarding theory-based empirical survey research, the most-used is the contingency approach. Finally, we are not aware of any article dealing with the presentation and analysis of detailed information on SMA techniques in the Czech Republic (see also Wagner, 2018) other than one conference paper (Boučková & Šiška, 2017), which dealt with a sample of Czech and Slovak companies. Šiška (2016; 2018) analysed Czech companies, but addressed a broader topic and therefore did not provide detailed information on SMA.

It is possible to summarise that knowledge on worldwide implementation of SMA techniques is incomplete and also knowledge on the impact of various contingent variables on the degree of SMA use is scarce and inconclusive. It is therefore important to investigate these issues more profoundly and contribute to the development of a more robust and practically usable theory.

This article therefore strives to answer the following research questions:

1. Which SMA techniques are used the most and which the least?
2. Do companies intend to employ SMA to a greater or lesser extent in future?
3. What are the key contingent variables which influence the degree of use of SMA techniques?

These research questions are answered using 90 responses from a survey conducted in 2018 among 1,000 medium and large companies in the Czech Republic. In order to answer the questions, the obtained data are analysed using standard scientific

research methods such as descriptive statistics, correlation analysis, multiple linear regression analysis and ordered logistic regression. The results are relevant both for academia and in practice because they inform on the dissemination of SMA techniques, including their anticipated dynamic, and indicate the conditions in which the implementation of SMA is especially important.

The first two questions are not developed into hypotheses and provide information on the status quo and the anticipated development of SMA use. The third question sets our research in the stream of literature denoted as contingency-based. On the basis of the third research question, four hypotheses are formulated. Granlund and Lukka (2017, p. 63) state: 'We define contingency-based management accounting as an approach to management accounting research that seeks to understand how the operation and effects of management accounting are not universal, but depend on the contexts within which it operates'. Contingency theory, in contrast to best-practice approaches, proposes that the effectiveness of companies stems from adjusting their management control systems to the specific circumstances (contingencies) in which the companies operate. For contingency theory, it is therefore important to identify the key contingent variables that affect the properties of management control systems. Consequently, theory can inform the practice regarding which contingencies should be taken into account during the implementation and use of various management control tools. The contingency-based approach is an important and well-established tool.

Specifically, in SMA research, it is possible to identify several prior studies using the contingency approach and contingent variables used in these studies are summarised in the 'Selection and operationalisation of contingent variables' section. Consideration was limited to studies applying advanced statistical methods such as regression analysis or structural modelling because simpler methods (e.g. various comparisons of means) are not suitable tools for the investigation of causal relationships.

This article makes several key contributions. By providing a detailed comparison of the previous operationalisation of SMA techniques (Table 1) and of contingent variables (Table 2), our paper offers an up-to-date overview of the possible approaches. Moreover, in contrast to previous studies, a new SMA technique is introduced (strategic planning and budgeting) and our article thus contributes to the discussion regarding those techniques which constitute SMA.

By investigating contingent variables, the article contributes to understanding those circumstances under which SMA is used. Our results provide support for the importance of the 'strategy type' contingent factor: companies implementing differentiation strategy SMA use more than companies implementing cost leadership strategy. This is a most noteworthy result because together with prior studies it provides a strong case for considering strategy to be an important contingent variable influencing SMA use. From the practical viewpoint, these finding urges managers to use SMA intensively if their company pursues a strategy of differentiation. Contrary to several prior studies, our results suggest that hypotheses regarding the positive impact of size, perceived environmental uncertainty and industry on the use of SMA techniques should be rejected. As far as we know, the impact of industry on SMA use has not been investigated via advanced statistical methods in any previous study.

Table 1. SMA techniques used in empirical research.

Technique	Cadez and Guilding (2007; 2008)	Cescon et al. (2019)	Cinquini and Tenucci (2010)	Dmitrović-Šaponja and Suljović (2017)	Guilding et al. (2000)	This study
Activity-based costing	no	no	yes	yes	no	yes
Attribute Costing	yes	yes	no	yes	yes	no
Balanced scorecard	no	yes	no	no	no	no
Benchmarking	yes	no	yes	yes	no	yes
Brand valuation	yes	yes	no	no	no	no
Brand value budgeting	no	no	no	yes	yes	no
Brand value monitoring	no	no	no	yes	yes	no
Competitive position monitoring	yes	yes	yes	yes	yes	no
Competitor accounting	no	no	no	no	no	yes
Competitor appraisal based on FS	yes	yes	yes	yes	yes	no
Competitor cost assessment	yes	yes	yes	yes	yes	no
Customer accounting	no	no	yes	no	no	yes
Customer profitability analysis	yes	no	no	yes	no	no
Environmental management accounting	no	no	no	yes	no	no
Integrated performance measurement (PMS)	yes	no	yes	yes	no	yes
Life-cycle costing	yes	yes	yes	yes	yes	yes
Lifetime customer profitability analysis	yes	no	no	no	no	no
Quality costing	yes	yes	yes	yes	yes	yes
Risk analysis	no	yes	no	no	no	no
Strategic costing (strategic cost management)	yes	no	no	yes	yes	yes
Strategic management accounting	no	no	no	no	yes	no
Strategic planning and budgeting	no	no	no	no	no	yes
Strategic pricing	yes	yes	no	yes	yes	yes
Target costing	yes	yes	yes	yes	yes	yes
Valuation of customers as assets	yes	no	no	no	no	no
Value chain costing	yes	yes	yes	yes	no	no
Number of techniques	16	12	11	17	12	11

Source: Authors.

The remainder of this study is divided into four main parts. The first part (literature review and hypotheses development) provides the operationalisation of SMA techniques as a variable, and the selection and operationalisation of the studied contingent variables. Hypotheses are formulated regarding the relationship of the key contingent variables and the degree of use of SMA techniques. The second part (research methodology) explains the procedure of data gathering and sample characteristics. The third part (results and discussion) provides a concise description of the structure of our sample and descriptive statistics related to the use of individual SMA techniques, including anticipated development and an international comparison of results. Ultimately, the correlation and regression analysis of relationships between contingent variables and the degree of use of SMA techniques is presented and hypotheses are evaluated. The fourth part (conclusions) incorporates a summary of the key contributions of this study both to the literature and to practice, as well as a discussion of the limitations and ideas for further research.

2. Literature review and hypotheses development

There are several reasons for the tepid acceptance of SMA both in practice and in academia, one of which is the non-existence of a generally-accepted definition of the

Table 2. Contingent variables in empirical research using regression analysis or structural modelling.

Contingent variable	Arunruangsirilert and Chonglerttham (2017)	Cadez and Guilding (2008)	Cescon et al. (2019)	Cinquini and Tenucci (2010)	Costantini and Zanin (2017)	Pavlatos (2015)	Pavlatos and Kostakis (2018)	Šiška (2016)	This study
Accountant participation in strategic processes	no	yes	no	no	no	no	no	no	no
Competitive forces	no	no	yes	no	no	no	no	yes	no
Competitive effortlessness	no	no	no	no	no	no	no	yes	no
Deliberate strategy formulation	no	yes	no	no	no	no	no	no	no
Diagnostic use	no	no	no	no	no	no	no	yes	no
Dynamic tension	no	no	no	no	no	no	no	yes	no
Governance (various characteristics)	yes	no	no	no	no	no	no	no	no
Historical performance	no	no	no	no	no	yes	yes	no	no
Industry	no	no	no	no	no	no	no	no	yes
Interactive use	no	no	no	no	no	no	no	yes	no
Life cycle stage	no	no	no	no	no	yes	no	no	no
Market orientation	no	yes	no	no	no	no	no	no	no
Membership in group	no	no	no	no	no	no	no	yes	no
Perceived environmental uncertainty	no	no	yes	no	yes	yes	yes	no	yes
Perception about the intensity of economic crisis	no	no	no	no	no	no	no	no	no
Proportion of services on total sales	no	no	no	no	no	no	yes	yes	no
Quality of information system	no	no	no	no	no	yes	no	no	no
Size	no	yes	no	yes	no	yes	yes	yes	yes
Strategy type	no	yes	no	yes	no	yes	yes	no	yes
Structure (centralization/decentralization)	no	no	no	no	no	yes	no	no	no
Subsidiary	no	no	no	no	no	no	no	yes	no
Top management team characteristics (various items)	no	no	no	no	no	no	yes	no	no

Source: Authors.

term SMA. The contradictions and similarities in various definitions of SMA have been discussed in numerous seminal conceptual papers (Bromwich, 1990; Gond, Grubnic, Herzig, & Moon, 2012; Roslender & Hart, 2003; Bhimani & Langfield-Smith, 2007; Langfield-Smith, 2008; Lord, 1996; Ma & Tayles, 2009).

It is beyond the scope of this paper to discuss all these definitions, but it is possible to summarise that scholars differ in their definition of SMA both in terms of its scope and its structure, which influences the operationalisation of SMA. In our research a relatively broad understanding of SMA was adopted, which in our opinion best matches the nature of the information required for contemporary strategic management.

2.1. Operationalisation of SMA techniques as a variable

It can be argued that empirical research often uses the conceptualization of SMA developed in the influential articles by Guilding, Cravens, and Tayles (2000) and Cadez and Guilding (2007; 2008). Table 1 depicts SMA techniques used in several important articles and these techniques are compared with an approach taken in this study.

Table 1 shows that the techniques considered as constituting SMA differ across the articles. As far as we know, Table 1 includes all the relevant journal articles comprehensively investigating SMA techniques. There are core techniques, which are used in each piece of research, but also techniques which are not universally used or are collapsed into one category. In our research, a group of 11 SMA techniques was adopted to investigate the extent of SMA use. Study by Cescon, Costantini, and Grassetti (2019) was published after our research had been designed.

In comparison with Cadez and Guilding (2007; 2008) we added activity-based costing because we argue that this technique is not only a tool for the more exact allocation of costs but also an important strategic technique, often accompanied by the implementation of activity-based management. In this regard, we are in accordance with Cinquini and Tenucci (2010) and Dmitrović-Šaponja and Suljović (2017), who also included this technique. Furthermore, we added strategic planning and budgeting because we consider this technique to be strategic and therefore relevant to the measurement of SMA use.

On the other hand, in contrast with Cadez and Guilding (2007; 2008), we excluded several SMA techniques and several techniques were collapsed into one. Specifically, we excluded attribute costing, a group of techniques related to brand valuation and value chain costing. Collapsed into one were techniques related to customer accounting (an approach used in Cinquini & Tenucci, 2010) and techniques related to competitor accounting.

In contrast with Dmitrović-Šaponja and Suljović (2017), we decided to not include environmental management accounting because we consider this tool to be part of other SMA techniques.

Attribute costing was excluded because, according to our preliminary findings, practitioners and even academics do not know this technique well and asking about it may thus have been a source of confusion. Techniques related to brand valuation

were excluded from our questionnaire because the majority of Czech companies are private and not public entities. Brand valuation is therefore irrelevant to these companies. Value chain techniques were omitted because, similar to attribute costing, these techniques are often misunderstood and we argue that their measurement via questionnaire surveys may be misleading.

Regarding an SMA-use measurement scale, in our research we used a five-point Likert-type scale. For each of the selected 11 SMA techniques, the respondents were asked to indicate on a scale - 1 (not at all), 2 (not much), 3 (partially), 4 (yes, intensively) and 5 (yes, very intensively) - to what degree their organization employs a given technique at present, plus the expected degree of use in three years' time. A short explanation of each technique was included directly into the text of the question because we suspect that respondents do not pay enough attention to supplementary materials such as glossaries, etc.

For each respondent we also constructed an SMA-use index, which is calculated as an arithmetical mean of the values of all 11 SMA techniques.

2.2. Selection and operationalisation of contingent variables

According to the previous research, there are numerous contingent variables which impact the use of SMA techniques. Table 2 provides a detailed overview of contingent variables used in prior studies. To our best knowledge, Table 2 includes all relevant journal articles using advanced statistical methods (regression analysis, structural modelling) for investigation of the causal relationships in the area of SMA.

It is possible to summarise that numerous contingent variables were investigated, many of them in only one study. Obviously, it was impossible to investigate all these variables in our article and selection is always a combination of subjectivity and of theoretical and empirical support for a given contingent variable. The most frequently investigated contingent factors in the SMA field are company size, strategy type, and perceived environmental uncertainty. The influential study of Cadez and Guilding (2008) in its qualitative part (the interviews) highlighted the importance of industry. Our article therefore investigates the following contingent factors: company size, perceived environmental uncertainty, strategy and industry.

Company size is considered an important contingent variable in numerous studies. Within SMA research, size is usually measured as a unidimensional construct. For example, total revenues as a proxy for company size are used by Cadez and Guilding (2008) and by Cinquini and Tenucci (2010). In other studies, total assets and the number of full-time employees are often used for size measurement. Considering the very strong, statistically significant positive correlation between measures of size, total turnover in 2017 was chosen as a proxy for company size in our research. The values of total turnover were found in the annual financial reports of the respondents.

Numerous researchers (e.g. Šiška, 2016; Cadez & Guilding, 2008) have found a positive relationship between the size of a company and the utilisation of various management accounting techniques. We therefore formulate this hypothesis:

H1: Company size positively impacts the use of SMA techniques.

Otley (2016) noted that of all the contingent variables, environmental uncertainty gained by far the widest attention in the field of management accounting. In our research this construct was measured as *perceived environmental uncertainty (PEU)*, which is a standard approach in the contingency-based literature. There are numerous operationalisations of perceived environmental uncertainty; we based the measurement of PEU on the approach taken by King, Clarkson, and Wallace (2010), who distinguished two types of uncertainty – dynamism and hostility. Dynamism is associated with a need for more externally-focused, broad and timely information; and hostility (competition) is connected with a higher emphasis on budgets. PEU was measured using these questions:

1. How stable or dynamic is your company's external environment? This question is comprised of two sub-questions: (a) economic environment, (b) technological environment.
2. How would you characterise the market activities of your competitors?
3. How intense is each of the following in your industry? This question is comprised of three sub-questions: (a) competition in the market for materials and services, (b) competition for workforce, (c) competition in the outputs market.

Regarding the measurement scale for PEU, in our research we used a five-point Likert-type scale. For the two questions related to the stability of the external environment (1a, 1 b) we used a scale from 1 (stable) to 5 (dynamic); for question (2) we used a scale from 1 (very predictable) to 5 (very difficult to predict); and for the three questions related to the intensity of competition (3a, 3 b, 3c) we used a scale from 1 (not at all intense) to 5 (very intense). For each respondent we have also constructed a *PEU index*, which is calculated as an arithmetical mean of values of all answers to the six questions related to PEU.

The relevance of SMA information should increase with perceived environmental uncertainty and we therefore formulate the following hypothesis:

H2: Perceived environmental uncertainty positively impacts the use of SMA techniques.

Strategy is often used as a contingent variable in management accounting research, but Otley (2016) pointed out that there are numerous categorisations of strategy (Miles, Snow, Meyer, & Coleman, 1978; Porter, 1980; Gupta & Govindarajan, 1984). In this article, we employ Porter's (1980) categorisation, specifically its operationalisation by King et al. (2010), who distinguished two types of strategy (differentiation and cost leadership), and we asked respondents the following question:

> How would you best describe your practice's strategic emphasis (between cost leadership and differentiation)? This question included three sub-questions on (a) the quality of products and services, (b) customer support and (c) the unique properties of products/services.

Regarding the measurement scale for strategy type, in our research we used a five-point Likert-type scale. All three sub-questions were answered on a scale from 1 (not important, low cost and price are crucial) to 5 (important). For each respondent we also construct a *Strategy index*, which is calculated as the arithmetical mean of the values of all answers to the three questions related to strategy.

We hypothesise that companies pursuing a strategy of differentiation need more SMA information in all areas (including costs, because knowledge on costs is important even if low costs are not the primary objective of the company). Our hypothesis is thus framed as follows:

H3: Companies pursuing a strategy of differentiation use SMA techniques more than companies pursuing a cost leadership strategy.

As far as we know, *industry* has not been examined as an important contingent variable in the field of strategic management accounting. This is confirmed by the studies listed in Table 2, in which industry was not examined as a contingent variable. On the other hand, Cadez and Guilding (2008, p. 853) stressed that all their interviewees advocated that the applicability of SMA is industry-specific. Unfortunately, limited consensus was accomplished regarding which particular industrial sector characteristics were conducive to SMA application.

We asked our respondents to indicate the industry in which their company operates, according to the NACE classification, revision 2. We also cross-checked their answers with information on their websites and the business register. Consequently, we defined a dummy variable 'industry' with a value of 1 for manufacturing industry and 0 for all other industries.

We hypothesise that companies from manufacturing industry often operate in more complex conditions than companies from other industries and therefore need SMA information more intensively. Our hypothesis is:

H4: Companies from manufacturing industry use SMA techniques more than companies from other industries.

3. Research methodology

3.1. Data gathering

The data were collected via a questionnaire survey. The questionnaire was developed in the first half of 2018 after a comprehensive literature review which served for the identification and operationalisation of key theoretical constructs (latent variables, which include multiple indicators) related to SMA and relationships between these constructs.

The researchers intensively discussed the questionnaire over several months. Ultimately, we pilot-tested the survey on three executives (financial controllers and managerial accountants) and three academics and the relevant feedback was incorporated into the questionnaire in the form of minor changes. The final version of the questionnaire was finished in July 2018.

The data gathering took place from September 2018 through to the end of December 2018; in total 90 complete and usable questionnaires were collected.

3.2. Sample description

The sample of companies for our research was sourced from the Albertina CZ Gold Edition database. The database was used to identify companies headquartered in the

Czech Republic with more than 50 employees and a turnover above 256 million CZK. The selected companies spanned all industry groups except O – Public administration and defence, P – Education, Q – Human health and social work activities, S – Other service activities, T – Activities of households as employers, and U – Activities of extraterritorial organisations and bodies, consistent with NACE Rev. 2. The authors decided to investigate only medium and large companies in order to focus on organisations of sufficient size and breadth of activities because SMA techniques tend not to be used by small companies. The database search provided us with approximately 3900 companies meeting the above criteria and from these companies we randomly selected a sample of 1000 companies.

The selected sample of 1000 companies was contacted by phone and if they agreed to participate in our research, we sent them an e-mail with a link to the web-based questionnaire. We asked for answers from respondents in senior finance positions, for example Chief Financial Officer, Financial Director, Economic Director, Head of Controlling Department, etc. This requirement was imposed in order to ensure that the contacted executives would possess considerable experience of SMA techniques. Some companies refused to take part in our inquiry. The most-cited reasons for refusal were lack of time and corporate policy. These reasons for non-participation are the same as the reasons mentioned in Cadez and Guilding (2007).

4. Results and discussion

The results are presented in several steps. First, we provide a concise description of our respondents. Second, we provide descriptive statistics related to the degree of use of individual SMA techniques and an international comparison of results (Tables 3 and 4). Finally, we apply correlation and regression analysis and evaluate our hypotheses (Tables 5–7).

Our respondents consist only of medium and large companies. There are two companies with less than 50 employees and three companies with a turnover below 250 million CZK, the rest of the respondents fully meeting the initial selection criteria. Presumably the reason why these companies were selected from the database is that the data on these companies were not entirely exact or fully up-to-date. Despite the fact that these values do not meet our initial selection criteria, we decided not to exclude these companies because they were very close to the threshold values.

From the viewpoint of the industrial structure of our respondents, the majority of companies are from manufacturing industry (55.6% of respondents, i.e. 50 companies) followed by the wholesale and retail trade industry (20.0% of respondents, i.e. 18 companies), and construction industry (7.8% of respondents, i.e. 7 companies). The other industries are represented by three or fewer companies.

Descriptive statistics related to the use of individual SMA techniques use can be found in Table 3.

Table 3 shows that the mean values of SMA use vary from 2.40 (integrated PMS) to 3.46 (strategic planning and budgeting). The median value of SMA use ranges from 2, i.e. weak utilisation of a given technique (strategic pricing and integrated PMS) to 4, i.e. intensive utilisation of a given technique (strategic planning and

Table 3. Descriptive characteristics of SMA techniques use ($n = 90$).

Technique		Life-cycle costing	Target costing	Activity-based costing	Quality costing	Strategic costing	Strategic pricing	Strategic planning and budgeting	Benchmarking	Integrated PMS	Customer accounting	Competitor accounting
Abbreviation		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11
Mean		2.90	3.09	2.80	2.87	2.94	2.47	3.46	2.83	2.40	3.31	2.94
Median		3.00	3.00	3.00	3.00	3.00	2.00	4.00	3.00	2.00	3.00	3.00
Std. Deviation		1.122	1.077	1.073	1.083	1.293	1.134	1.051	1.124	1.100	1.158	1.032
Skewness		−0.287	−0.346	−0.203	−0.109	−0.086	0.274	−0.533	−0.245	0.286	−0.282	−0.013
Kurtosis		−0.587	−0.494	−0.672	−0.549	−1.044	−0.838	−0.101	−0.908	−0.839	−0.633	−0.335
Minimum		1	1	1	1	1	1	1	1	1	1	1
Maximum		5	5	5	5	5	5	5	5	5	5	5
Percentiles	25	2.00	2.00	2.00	2.00	2.00	1.75	3.00	2.00	1.00	3.00	2.00
	50	3.00	3.00	3.00	3.00	3.00	2.00	4.00	3.00	2.00	3.00	3.00
	75	4.00	4.00	4.00	4.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00

Source: Authors.

Table 4. International comparison of use of SMA techniques.

	Rank								
	Boučková and Šiška (2017)	Cadez and Guilding (2007)		Cescon et al. (2019)	Cinquini and Tenucci (2010)	Guilding et al. (2000)			This study
SMA technique	CR & SR	SLO	AUS	Italy	Italy	NZ	UK	USA	CR
Strategic planning and budgeting	NA	NA	NA	NA	NA	NA	NA	NA	1
Customer accounting	2	7	4	NA	1	NA	NA	NA	2
Target costing	4	9	9	4	4	5	5	4	3
Strategic costing	NA	3	5	NA	NA	4	3	3	4–5
Competitor accounting	1	1	1	2	2	1	1	1	4–5
Life-cycle costing	4	5	7	6	8	6	6	6	6
Quality costing	3	8	8	5	3	3	4	5	7
Benchmarking	NA	5	2	NA	5	NA	NA	NA	8
Activity-based costing	NA	NA	NA	NA	6	NA	NA	NA	9
Strategic pricing	NA	2	3	1	NA	2	2	2	10
Integrated PMS	5	4	6	3	7	NA	NA	NA	11

Source: Authors.

Table 5. Pearson correlations between variables representing use of SMA techniques and contingent variables ($n = 90$).

Variable	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	SMA-Use	Turnover	PEU	Strategy	Industry
T1	1	0.296***	0.394***	0.266**	0.182*	0.381***	0.039	0.174	0.224**	0.180*	0.315***	0.514***	−0.117	−0.099	0.151	0.060
T2		1	0.511***	0.540***	0.415***	0.407***	0.391***	0.328***	0.302***	0.293***	0.227**	0.701***	0.051	0.112	0.178*	0.053
T3			1	0.538***	0.365***	0.410***	0.281***	0.242**	0.278***	0.168	0.183*	0.649***	−0.134	−0.076	0.249**	−0.063
T4				1	0.404***	0.390***	0.340***	0.286***	0.338***	0.231**	0.154	0.668***	−0.017	0.051	0.221**	0.159
T5					1	0.386***	0.383***	0.311***	0.150	0.289***	0.191*	0.625***	−0.125	−0.146	0.161	0.014
T6						1	0.178*	0.450***	0.416***	0.273***	0.368***	0.698***	−0.044	−0.227**	0.293***	−0.126
T7							1	0.293***	0.220**	0.159	0.179*	0.513***	−0.021	−0.042	0.345***	−0.102
T8								1	0.645***	0.394***	0.370***	0.672***	−0.059	−0.026	0.314***	0.007
T9									1	0.219**	0.267**	0.602***	−0.018	−0.103	0.262**	0.000
T10										1	0.287***	0.528***	0.042	0.112	0.169	0.242**
T11											1	0.521***	0.060	−0.060	0.260**	0.017
SMA-Use												1	−0.060	−0.078	0.385***	0.041
Turnover													1	0.152	−0.065	−0.045
PEU														1	−0.205*	−0.011
Strategy															1	0.054
Industry																1

***Correlation is significant at the 0.01 level (2-tailed).
**Correlation is significant at the 0.05 level (2-tailed).
*Correlation is significant at the 0.10 level (2-tailed).
Source: Authors.

Table 6. Results of ordered logit regression for individual SMA techniques ($n = 90$).

Variable	T1	T2	T3	T4	T5	T6
Turnover	−4.65e-08	1.40e-08	−5.88e-08	−3.61e-09	−6.55e-08	−1.36e-08
Industry	1.79e-01	2.04e-01	−3.30e-01	6.43e-01	6.45e-02	−5.55e-01
PEU	−2.65e-01	5.08e-01	−4.87e-02	5.27e-01	−3.74e-01	−5.92e-01
Strategy	3.10e-01	5.84e-01*	6.47e-01**	7.37e-01**	2.77e-01	7.68e-01**

Variable	T7	T8	T9	T10	T11
Turnover	8.89e-09	−2.00e-08	4.69e-09	2.14e-08	4.86e-08
Industry	−4.19e-01	3.80e-02	−2.96e-02	8.60e-01**	−9.72e-02
PEU	1.90e-02	1.66e-01	−1.43e-01	5.57e-01	−1.36e-01
Strategy	9.43e-01***	9.61e-01***	7.12e-01**	5.80e-01*	7.98e-01**

Source: Authors.

Table 7. Results of multiple linear regression for dependent variable SMA-use ($n = 90$).

	Statistic			
Variable	Coefficient	std. error	*t*-value	*p*-value
(intercept)	1.283e + 00	6.772e-01	1.895e + 00	6.1505e-02
Turnover	−6.487e-09	1.878e-08	−3.45e-01	7.30716e-01
Industry	2.483e-02	1.360e-01	1.83e-01	8.55550e-01
PEU	7.607e-03	1.359e-01	5.6e-02	9.55481e-01
Strategy	3.832e-01	1.023e-01	3.745e + 00	3.27e-04

Source: Authors.

budgeting). The median value of the other techniques is three, which indicates partial use of a given technique. The minimal value for all techniques is one (no use of a given technique) and the maximal value five (very intensive use of a given technique). The negative values of the skewness of variables representing use of the individual SMA techniques suggest that the frequent amounts of use of these techniques are clustered at the higher end.

Table 4 displays an international comparison of our results (the table including only techniques investigated in our study) with the studies of Boučková and Šiška (2017), Cadez and Guilding (2007), Cescon et al. (2019), Cinquini and Tenucci (2010), and Guilding et al. (2000). Table 4 omits a study by Dmitrović-Šaponja and Suljović (2017) because they measured the utilisation of SMA techniques as a binary variable and not on a Likert-type scale.

International comparison is not straightforward because in the mentioned studies different SMA techniques were investigated and different measurement scales were used (e.g. we used five-point Likert-type scale while other researchers used seven-point or even eleven-point scales). For comparison we therefore use rankings and not mean values. Moreover, for some techniques (e.g. competitor accounting) we measured them as one technique while other researchers measured them as more than one (e.g. competitor performance appraisal and competitor cost assessment). In such cases we clustered all the techniques into one (so that it matches our list of techniques) and assigned the best ranking (for example, if competitor performance appraisal is ranked 2 and competitor cost assessment is ranked 3, then the clustered technique of competitor accounting receives rank 2). Moreover, Boučková and Šiška (2017) also investigated small companies (whose strategic behaviour is largely based on intuition and the recognition and utilisation of opportunities). We therefore have to compare the results with caution.

First of all, from Table 4 it is obvious that the results of the compared studies differ significantly. According to our results, the most-used technique is strategic planning and budgeting, which was not investigated in any of the other studies. The omission of this technique is surprising to us because we consider strategic planning and budgeting to be one of the cornerstones of strategic management accounting. The reason could be that most SMA techniques are based on strategic planning and budgeting and therefore strategic planning and budgeting are not considered to be standalone SMA methods. Moreover, we suspect that other researchers consider this technique to be more traditional than strategic but we argue that it is an important component of SMA. In the Czech Republic, strategic planning and budgeting is a very important tool for communication between managers and shareholders. Compared with Cinquini and Tenucci (2010), the rest of the results are more similar than different. In our study, the second place goes to customer accounting and the third to target costing. Very close to the midpoint of the measurement scale we find strategic costing and competitor accounting. In our study, the least-used SMA techniques include integrated PMS (e.g. the balanced scorecard), strategic pricing and activity-based costing. Cinquini and Tenucci (2010) identified life-cycle costing as the least-used SMA technique but integrated PMS also rated very low in their study. We were surprised by the relatively high use of life-cycle costing, which in other studies has often ranked as the least-used technique. Currently in the Czech Republic, business operates on long-term contracts, so long-term planning and evaluation are important. What is surprising is the fact that while in our study competitor accounting ranked as the fifth-most used technique, in all other studies this technique ranked as the most or second-most used.

As previously stated, our respondents were asked not only about the present use of the selected SMA techniques, but also about the expected use of these techniques three years ahead. It is possible to summarise some interesting results. First, the mean value of the expected use of all techniques increased. This can be interpreted to the effect that companies consider SMA techniques useful and want to implement them more. Second, the expected minimal median value of all techniques equals three. Two techniques changed their median from three (i.e. partial use of a given technique) to four (i.e. intensive use of a given technique). It confirms that companies consider the SMA technique important because they at least target a more intensive application.

Last but not least, we decided to investigate the important contingent variables influencing the use of SMA techniques. As stated, we concentrated on the following contingent variables: company size (measured by turnover), perceived environmental uncertainty (PEU), strategy, and industry. The contingent variables PEU and strategy were measured as indices. Industry was measured as dummy variable with a value of one for manufacturing industry and zero for all other industries. For details see the 'Selection and operationalisation of contingent variables' section.

Correlations were calculated between variables representing the use of SMA techniques and contingent variables of company size, perceived environmental uncertainty, strategy, and industry. The results can be found in Table 5.

It is possible to summarise that the correlations between the individual SMA techniques are positive, but not all are statistically significant. The SMA-use index is

calculated as an arithmetical mean of all 11 SMA techniques and we can see that the index is positively and statistically significantly correlated with all SMA techniques.

Correlations between turnover and the individual SMA techniques are not statistically significant and moreover are usually negative. This result may seem surprising because Šiška (2016), for example, found that size was the most influential control variable. The correlation between turnover and the SMA-use index is negative, but not statistically significant.

The correlation between perceived environmental uncertainty and individual SMA techniques is positive (but not statistically significant) only for target costing, quality costing and customer accounting. For all other SMA techniques, the correlation is negative, and in the case of strategic pricing is negative and statistically significant. The correlation between perceived environmental uncertainty and the SMA-use index is negative, but not statistically significant.

The correlation between strategy and the individual SMA techniques is positive and, in many cases, statistically significant. The correlation between strategy and the SMA-use index is positive and statistically significant. It is possible to conclude that the use of SMA techniques increases together with the implementation of differentiation strategy (as opposed to a strategy of cost leadership).

The correlation between industry (manufacturing) and the individual SMA techniques is statistically significant and positive only for customer accounting. For other SMA techniques the correlation is not statistically significant.

Correlation does not imply causation and we therefore applied regression analysis. We analysed the dependence of the relative dependent variables (11 SMA techniques) on company size, perceived environmental uncertainty (PEU), strategy (cost leadership vs differentiation) and industry. We used the following regression model:

$$\mathrm{SMAT} = \beta_0 + \beta_1 \times \mathrm{Turnover_i} + \beta_2 \times \mathrm{Industry_i} + \beta_3 \times \mathrm{PEU_i} + \beta_4 \times \mathrm{Strategy_i} + \varepsilon_i \quad (1)$$

where SMAT are the individual SMA techniques; β_0 is a constant; $\beta_1 \ldots \beta_4$ are regression coefficients; Turnover is the turnover of a company (in thousands of CZK); Industry is a dummy variable whose value is 1 if the company belongs to a manufacturing industry and 0 for other industries; PEU is an index measuring perceived environmental uncertainty; and Strategy is an index measuring the inclination of a company towards differentiation strategy as opposed to cost leadership strategy.

Because SMAT is measured on a 5-point Likert Scale, we used ordered logit regression. Consequently, equations are estimated for all SMA techniques, i.e., in total we estimate 11 equations, the results of which are found in Table 6.

Statistical significance (p-values) is expressed by the number of stars, '*' meaning a p-value between 0.10 and 0.05, '**'a p-value between 0.05 and 0.01, and '***' a p-value of less than 0.01.

To summarise, we found a statistically significant dependence only between Strategy and the majority of SMA techniques (only life-cycle costing and strategic costing – T1 and T5 – not being statistically significant). Other contingent variables do not have a statistically significant influence on the use of SMA techniques except

manufacturing industry, which has a statistically significant and positive influence on customer accounting.

Ultimately, we tested the dependence of the SMA-use index (the arithmetical mean of all 11 SMA techniques) on the selected contingent variables and the following multiple linear regression model was used:

$$\begin{aligned} \text{SMA}-\text{use} &= \beta_0 + \beta_1 \times \text{Turnover}_i + \beta_2 \times \text{Industry}_i \\ &+ \beta_3 \times \text{PEU}_i + \beta_4 \times \text{Strategy}_i + \varepsilon_i, \end{aligned} \tag{2}$$

where SMA-use is an index measuring the degree of use of an SMA technique; for a description of other variables see equation (1). We tested the statistical assumptions of the model (normality of residuals, heteroskedasticity, and multicollinearity) and found that the assumptions are satisfied.

Table 7 shows that only the dependence of the SMA-use index on differentiation strategy is statistically significant. We can therefore reject hypotheses H1, H2 and H4. Hypothesis H3 is accepted. The result regarding the positive influence of differentiation strategy on the use of SMA techniques is in accordance with theoretical expectation, and this influence exists not only between differentiation strategy and the SMA-use index, but also between differentiation strategy and a majority of the individual SMA techniques. What is surprising is the fact that we did not find a statistically significant influence of PEU on SMA use (neither on SMA use measured as an index nor on the individual SMA techniques). On the one hand, there is strong theoretical support for the existence of a positive influence of PEU on the use of SMA techniques (e.g. companies under higher environmental uncertainty need not only financial information but also information on the external environment and its developments). On the other hand, the results of empirical studies on this are inconclusive; we discuss these studies in the final section.

5. Conclusion

This paper contributes to the empirical literature on SMA, its main purpose being to investigate the degree of use of strategic management accounting techniques and the main contingent factors. Our study contributes to the theoretical understanding of SMA utilisation in several ways.

The first research question addressed the status quo of SMA use. We investigated 11 SMA techniques and measured their degree of use on a 5-point Likert-type scale with midpoint three (partial use of a given technique). The paper provides descriptive statistics pertaining to these results and details the ranking of the individual SMA techniques. We found that the three most-used SMA techniques are (in descending order): strategic planning and budgeting, customer accounting, and target costing. The least-used SMA techniques are (in ascending order): integrated PMS (e.g. balanced scorecard), strategic pricing, and activity-based costing. In comparison with other studies, our results regarding the first three most-used techniques confirm the importance of customer accounting, but the high utilisation of target costing is surprising because this technique usually does not rank so highly. It is noteworthy that

other studies have not investigated strategic planning and budgeting, but we argue that this technique is an element of SMA and we therefore included it in our research. Regarding the least-used techniques, our results are in accordance with, among others, Cinquini and Tenucci (2010), who also find activity-based costing and integrated PMS ranked lowly. Surprisingly, our research showed life-cycle costing ranked sixth, while in numerous other studies it has ranked as the least-used technique.

The second research question addressed the expected development of SMA use. Our results show that our respondents expect to increase their use of all SMA techniques, the mean value of expected use of all SMA techniques being higher than the present mean value of use of these techniques. Possibly this result can be interpreted such that companies consider SMA techniques useful and want to implement them more.

The third research question was aimed at the key contingent factors and four hypotheses were formulated on the basis of previous empirical and theoretical literature. Specifically, four contingent variables (company size, perceived environmental uncertainty, strategy and industry) were investigated. We tested the influence of all these contingent variables both for all individual SMA techniques and a composite SMA-use index. In the following paragraphs we compare our results with studies from Table 2.

The results of regression analysis showed that there is no statistically significant positive influence of size, perceived environmental uncertainty or manufacturing industry on the SMA-use index (rejection of hypotheses H1, H2 and H4). Nevertheless, our results provide support for H3 (implementation of differentiation strategy has a statistically significant and positive influence on SMA).

Regarding size, the results of the various studies differ. Our result is in accordance with Pavlatos and Kostakis (2018) and Cinquini and Tenucci (2010), who did not find size to be a statistically significant contingent variable; but it differs from the results of studies by Cadez and Guilding (2008), Pavlatos (2015) and Šiška (2016). It is possible to suggest that the differences stem from the structure of respondents, because Šiška (2016), for example, investigated small, medium and large companies while in our study medium and large companies are investigated. This would support the hypothesis that SMA techniques are relevant to all companies from a certain size upwards. On the other hand, the studies of Cadez and Guilding (2008) and Pavlatos (2015) address only medium and large companies and yet their results support the hypothesis of the positive influence of size on SMA use. Further research is therefore needed.

Regarding PEU, our results (rejection of hypothesis) are in accordance with Pavlatos (2015), but differ from Pavlatos and Kostakis (2018), who concluded that management respond to increased perceived environmental uncertainty by increasing SMA use; Cadez and Guilding (2008) did not investigate PEU as a contingent variable and Costantini and Zanin (2017) concluded that their hypothesis regarding the relationship between PEU and the use of SMA techniques was only partially supported (positive and statistically significant coefficients being found for the strategic pricing and balanced scorecard techniques, but not for other SMA techniques). Similarly, Cescon et al. (2019) found only partial support for this hypothesis. It is possible to

summarise that despite the fact that theoretical considerations support the view that PEU increases SMA use (because external, non-financial and leading indicators provided by SMA can reduce uncertainty), the empirical results are inconclusive. Unfortunately, our results suggest that the hypothesis regarding the positive influence of PEU on SMA use should be rejected.

Regarding industry, our study is the first to use advanced statistical methods to investigate the relationship of this contingent variable with SMA use. Thus far, studies have addressed this topic only tangentially, for example Cadez and Guilding (2008) highlighting that their interviewees advocated that industry is relevant to the extent of SMA use. Specifically, they hypothesised that in a manufacturing industry with complicated technological processes, companies should implement SMA more than in other industries. We operationalised industry as a dummy variable with a value of 1 for manufacturing industry and 0 for all other industries. Our study indicates that there is no statistically significant positive influence of manufacturing industry on SMA use. Again, further research is needed, both in the form of quantitative studies and in the form of comparative qualitative studies, which could provide deeper insights into reasons why and when industry influences the extent of SMA use.

Regarding strategy, the implementation of differentiation strategy (as opposed to cost leadership strategy) has a statistically significant and positive influence on the SMA-use index (hypothesis H3 is accepted). This result supports theoretical views that companies implementing differentiation strategy need non-financial and external information more than companies implementing cost leadership strategy. Moreover, we found a positive statistically significant influence of differentiation strategy on all individual SMA techniques (except the techniques of life-cycle costing and strategic costing, where the influence was positive but not statistically significant). These results are in accordance with the majority of prior studies and together provide strong support for the view that strategy is an important contingent variable for SMA. For example, Cadez and Guilding (2008) concluded that SMA use is positively and statistically significantly associated with a prospector strategy; Pavlatos (2015) and Pavlatos and Kostakis (2018) found that SMA use is positively and statistically significantly associated with a differentiation strategy.

Results regarding the positive influence of differentiation strategy on the use of SMA techniques have both theoretical and practical implications. From the theoretical viewpoint, our results contribute to a better understanding of the relevance of contingent factors. From the practical viewpoint, this finding is a strong message for managers: if your company pursues a strategy of differentiation (or a prospector strategy), you should intensively use SMA techniques.

This study has several limitations. Next to the generally accepted limitations of survey research (e.g. subjectivity of answers and greenwashing/giving politically correct answers), there are also other issues. Foremost, there is no definitive list of all possible SMA techniques. Second, the individual techniques are defined slightly differently in the various studies, which complicates the comparison of results and the incremental growth of knowledge. Third, the response rate is usually quite low and this requires researchers to contact very large samples of companies, which is extremely time-consuming. Fourth, our study does not investigate all possible

contingent variables. Fifth, the operationalisation of contingent variables is not unified across studies. Finally, data were collected from Czech companies and thus generalisations need to be made with caution.

The above-mentioned results and limitations can serve as starting points for further research. First, we found that the importance of various SMA techniques differs in the individual studies (and therefore countries) significantly. It would be interesting to investigate why there are such differences, possibly using multiple case-study methodology. Similarly, the 'how' question regarding the use of SMA techniques could provide useful insights (we studied only the degree of use of these techniques). Second, replication of the research in other countries (especially in the Slovak Republic, Hungary and Poland) would be interesting and it would enlarge sample size and more sophisticated, data-hungry methods of analysis could be used. Third, the careful selection of additional contingent factors could increase the theoretical and practical implications of the research (e.g. capital structure to control for foreign capital, which may be connected with additional know-how regarding SMA techniques).

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