

MATURITY IN MANAGEMENT ACCOUNTING: EXPLORATORY STUDY IN PORTUGUESE SME

RAUL MANUEL DA SILVA LAUREANO¹ – MARIA JOÃO CARDOSO VIEIRA
MACHADO² – LUÍS MIGUEL DA SILVA LAUREANO³

¹*Assistant Professor, Department of Quantitative Methods for Management and Economics,
Instituto Universitário de Lisboa (ISCTE-IUL), Researcher for UNIDE-IUL, Lisbon, Portugal
E-mail: raul.laureano@iscte.pt*

²*Assistant Professor, Accounting Department, Instituto Universitário de Lisboa (ISCTE-IUL),
Researcher for UNIDE-IUL, Lisbon, Portugal
E-mail: maria.joao.machado@iscte.pt*

³*Assistant Professor, Finance Department, Instituto Universitário de Lisboa (ISCTE-IUL)
Researcher for UNIDE-IUL, Lisbon, Portugal
E-mail: luis.laureano@iscte.pt*

The purpose of this paper is to characterize the level of maturity of management accounting in Portuguese industrial SMEs. Specifically, the study classifies firms using Kaplan's Four-Stage model; and introduces a new model to classify them better. The research design is exploratory. The data were collected through interviews with those responsible for management accounting in 58 Portuguese industrial SMEs. The analysis used descriptive and inferential statistics and a cluster analysis was performed to classify firms according to their management accounting characteristics. The results showed that all the SMEs belong to stage 2 of Kaplan's model and that it is possible to classify them in one of the four stages of the proposed new model. Moreover, the type of firm and the source of capital have no influence on the level of maturity, although larger firms tend to have greater maturity. The study offers evidence that there is a clear difference between management accounting knowledge and practices, which should motivate top management to focus on the continuous training of firm employees on the latest developments in management accounting methods.

Keywords: management accounting practices, Kaplan's model, SME, maturity stages

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1. INTRODUCTION

This paper aims to produce additional knowledge regarding the management accounting methods used by small and medium-sized industrial enterprises (SME). Several authors have studied whether the most adequate management accounting methods according to the existing theory are being implemented, namely regarding performance evaluation (Sundin et al. 2010; Tayler 2010; Vila et al. 2010; Herath et al. 2010; Kraus – Lind 2010; Cokins 2010; Albright et al. 2010; Neumann et al. 2010; Cardinaels – Veen-Dirks 2010; Northcott – Smith 2011; Butler et al. 2011) and product valuation (Hoozée – Bruggeman 2010; Nassar et al. 2011; Pike et al. 2011; Stout – Propri 2011; Schoute 2011).

Previous studies have identified a positive association between a firm's value and the use of more advanced methods of product valuation (Kennedy – Affleck-Graves 2001; Cagwin – Bouwman 2002) and performance evaluation (Hoque – James 2000; Crabtree – Debusk 2008). Dearman and Shields (2001) and Machado (2013) state that correct management decisions can be taken as long as managers know about the most adequate methods, even when using less adequate methods according to theory. The results presented lead to the conclusion that it is not enough to study the implementation level of the most adequate accounting management methods, but also the level of knowledge regarding these methods among the decision makers.

Management accounting practices have weak penetration in Portuguese SMEs due to this type of accounting being optional. This justifies carrying out empirical studies in this country as a contribution to the contingency theory, since the latter recognizes that cultural differences among countries represent a differentiating factor in the management accounting methods used (Yang et al. 2006; Macarthur 2006).

Research on SMEs is of great importance in countries where these firms are the major contributors to the domestic economy, namely in terms of employment (González – Rodríguez 2008). The accounting methods used by SMEs is a common research topic among several recent empirical studies performed on different geographical areas, such as in France (Demerens et al. 2013), China (Liu 2012), Italy (Chiarini 2012), Romania (Fekete et al. 2010) and Canada (Briciu et al. 2009). A recent study developed in Portugal by IAPMEI, the Portuguese Agency for Competitiveness and Innovation (IAPMEI 2008), reports that 99.6% of the total of domestic firms are either small or medium-sized, which gives relevance to the study of this type of firm when characterizing the country's economic environment.

The main goal of this research is to contribute to a better understanding of the characterization of the maturity level of management accounting in Portuguese SMEs.

In searching for the best management practices in SMEs, we delimit our study to the 163 firms classified for three consecutive years as excellence-industry according to IAPMEI (2002) criteria (firms that stand out for their financial and economic performance).

Briciu et al. (2009) perform a comparative study between SMEs from Canada and Romania, two countries located in different continents. The authors conclude that the needs for management accounting information are identical for all SMEs, independent of their geographical area. The conclusions from Briciu et al. (2009) suggest the possibility of generalization of the results of the present study, performed on Portuguese SMEs, to other countries with similar business community.

In the next section we describe Kaplan's Four-Stage model and find support for the research questions; the methodology applied in sampling and data treatment is presented in section 3 while the results obtained from data analysis are reported in section 4; we conclude in section 5 and present the final arguments.

2. KAPLAN'S FOUR-STAGE MODEL AND RESEARCH QUESTIONS

Robert Kaplan developed a model where firms are classified according to the level of development of their management accounting practices (Kaplan 1990). According to the model, each firm is positioned in one of the four stages, each stage representing different accounting management methods: stage 1 is characterized by the use of inadequate methods for financial reporting needs; stage 2 is characterized by the implementation of methods oriented towards financial reporting; stage 3 is characterized by innovation and relevance to management; and stage 4 is characterized by integration.

According to Kaplan (1990), firms that use low-quality accounting information, with significant logging and transaction processing errors, with the sole purpose of meeting financial accounting needs, are integrated in stage 1.

The accounting methods of firms in stage 2 are mainly driven towards external reports (Kaplan 1990). The necessary information used to produce the reports is duly processed and analyzed and has no significant errors. Companies present accounting management systems oriented towards the fulfillment of financial accounting needs, namely through product valuation in which the main purpose is simply inventory valuation. The allocation of products' costs is inadequate for decision-making, since the indirect costs are split using criteria sensitive to the quantities produced or sold, such as man-hour and machine-hour (Kaplan 1990).

Horngren (2004) considers that the search for the most adequate allocation bases to relate indirect costs to products has led to using a single base instead of multiple bases, in a systematic attempt to improve the relation between the

chosen bases and the factors that lead to the existence of the cost. Although considered better, multiple base allocation still receives much criticism. Though Cooper (1987a; 1987b) recognizes that while using other allocation bases such as machine-hour or the cost of materials, in addition to direct labor, has improved the allocation of indirect costs, they are still inadequate, because all of them are influenced by the quantity produced of each product, which leads to the over-valuation of goods produced in high quantities, and under-valuation of goods produced in small quantities.

Despite the limitations suggested by existing theory regarding product valuation, through one or more allocation bases influenced by the production volume, several empirical studies report on the use of these methods in different countries (Clarke 1997; Joshi 2001; Haldma – Lääts 2002).

Stage 3 includes firms with advanced, but not integrated, information methods. These firms use Activity Based Costing (ABC) as a new solution to allocate indirect costs, which overcomes the limitations of the previous methods mentioned. This advantage does not come from the way that costs unrelated to production volume are treated, but from other factors, such as the number of production orders or the number of products (Cooper 1988).

The other product valuation methods allocate indirect costs through allocation bases influenced by production volume, which may not reflect the true consumption of organizational resources required by the products (Swenson 1995). Kennedy and Affleck-Graves (2001) and Cagwin and Bouwman (2002) find a positive impact on the firm when using ABC and conclude in their empirical studies that using ABC leads, on average, to higher earnings. On the other hand, despite the theoretical supremacy of ABC, several empirical studies report a low usage rate of this method. In most countries we can find usage rates of 20% or lower (Blake et al. 2000; Innes et al. 2000; Joshi 2001; Cotton – Jackman 2002; Haldma – Lääts 2002).

This paradox between theory and corporate practice, reported by existing empirical studies, provides researchers with a continuing challenge to study whether firms are using the most suitable product valuation methods according to theory, namely ABC (Hoozée – Bruggeman 2010; Nassar et al. 2011; Pike et al. 2011; Stout – Propri 2011; Schoute 2011).

The management accounting of firms in stage 3 also provides quantitative and qualitative information for performance evaluation, namely through using the Balanced Scorecard (BSC). Development of the BSC resulted from the need to improve traditional financial models, which rely on measurement of past financial performance in a short-term perspective, to a model that includes non-financial measures and allows for future performance evaluation with a medium-term and long-term focus (Kaplan – Norton 1996b).

Kaplan and Norton (1992) define the BSC as a set of measures that give top management a quick, overall view of the business, integrating financial measures that reflect the actions taken in the past and non-financial or operational measures that will be used as guidelines for future financial performance. The BSC shows up in this phase as a model that enforces strategy and vision as being crucial and decisive in the organization, instead of control (Kaplan – Norton 1992).

However, corporate experience led to evolution of the concept, with authors stating that the BSC is much more than a set of measures. It is a management system that can lead to progress in critical organizational areas, for example, products, processes, clients and market development. Thus, the BSC evolved from a measurement system to a management system.

Kaplan and Norton (1996a), through observation, found that organizations are transforming their BSC in a new strategic management system, far removed from the initial concept. In the last decade many researchers have still found the BSC to be a relevant research topic (Sundin et al. 2010; Tayler 2010; Vila et al. 2010; Herath et al. 2010; Kraus – Lind 2010; Cokins 2010; Albright et al. 2010; Neumann et al. 2010; Cardinaels – Veen-Dirks 2010; Northcott – Smith 2011; Butler et al. 2011). Hoque and James (2000) and Crabtree and Debusk (2008) find a positive impact on the firm when using the BSC, the authors concluding in their empirical studies that its use leads on average to higher earnings.

Firms in stage 4 use the management accounting instruments that characterize stage 3, although they are executed through integrated computer systems, that is, they rely on Enterprise Resource Planning (ERP) systems. Firms in this stage prepare their external reports using information from the management account itself, which constitutes an inverse philosophy when compared to the second stage where accounting management systems are developed from other systems created to satisfy financial accounting needs (Kaplan 1990).

Several studies previously mentioned allow us to identify the most commonly used management accounting methods, although none of them classifies firms according to the development stage of those same methods. Thus, the main objectives of this research are related to classification of Portuguese industrial SMEs regarding the level of management accounting using Kaplan's Four-Stage model; and introduction of a new model to better classify these types of firms.

According to those objectives we identify the following research questions:

- Question A – How are industrial SMEs classified according to Kaplan's (1990) Four-Stage model?
- Question B – Is it possible to introduce a new model to differentiate industrial SMEs?
- Question C – In the case of a positive answer to the previous question, which characteristics can be identified in the SME at each stage of the new model?

3. METHODOLOGY

To answer the proposed research questions we gathered a sample of 58 firms from a universe of 163 Portuguese industrial SMEs consistently classified (for three or more consecutive years) as excellence-industry by the IAPMEI (2002; 2008).

The 58 firms that agreed to participate in this study represent a response rate of 36%, which is comparable to other research studies, namely Haldma and Lääts (2002), with a response rate of 34%, Innes et al. (2000) and Joshi (2001), with response rates of only 25%, and 23%, respectively.

The necessary data for the study were gathered through interviews held with the managers responsible for management accounting, since we assume they have the information about which we want to collect evidence. We obtained data regarding firm characteristics (location of headquarters, industry, number of workers, amount of capital, capital ownership, corporate legal form and sales volume) and management accounting characteristics (methods of corporate allocation of indirect costs towards product valuation, usage of ABC, usage of BSC, knowledge of ABC, and knowledge of BSC). Kaplan's Four-Stage model (Kaplan 1990) considers that firms with more advanced accounting methods are those using the ABC and the BSC. However, the current empirical study shows evidence of extremely low adoption rates of both methods among SMEs, which led us to the inclusion of knowledge variables (Dearman – Shields 2001; Machado 2013).

Non-respondents can lead to biased results, namely if these non-participating firms have homogeneous characteristics different from the respondents. According to Van der Stede et al. (2005), firm size can be relevant in the existence of bias. We compare the size of respondent and non-respondent firms using the average number of workers as a proxy, as suggested by Van der Stede et al. (2005). We find no significant differences between the groups of firms ($t_{(161)}=1.165$; $p\text{-value}=0.246$). This allows us to conclude that our results, although not applicable to all Portuguese industrial SMEs, may characterize a sub-group of those firms, those consistently classified as showing excellence in the current century.

Abernethy et al. (1999) concluded that regardless of the research method used, a generalization based solely on a single research paper is necessarily limited and therefore untrustworthy. These authors believe that generalization in managerial accounting has to be achieved through a series of consecutive studies with new samples, in different places and different periods.

To answer the first question (Question A) we rely on descriptive analyses of the main management accounting practices (the methods of allocating indirect costs in product valuation, use of ABC, and use of the BSC) in the participating firms.

Dearman and Shields (2001) concluded that, even using management accounting methods considered by the existing theory as inadequate, managers can still make correct management decisions, as long as they have knowledge of the adequate alternative methods. This knowledge allows them to know that the information gathered by the firm's implemented methods is skewed (Dearman – Shields 2001). From the authors' conclusions, we find it is important not only to study the use of ABC and BSC, but also the amount of knowledge held by the management accounting manager regarding these methods.

For Question B we use cluster analysis, which is a multivariate data analysis technique classifying firms according to a set of characteristics, identifying clusters with high internal homogeneity, that is, among firms of the same group, and with high external heterogeneity, that is, between groups (Hair et al. 2010). Since the characteristics related to management accounting practices (the methods of allocating indirect costs in product valuation, knowledge of ABC, and knowledge of BSC) are all nominal, we use the hierarchical clustering method.

After several experiments with different clustering methods, we chose the solution that uses the chi-squared distance measurement and the Average Linkage (within groups) clustering method. According to Hair (2010), this method combines the clusters so that the average distance between all possible pairs of firms in each resulting group is the minimum. Internal validation of the clusters was performed through contingency tables between the identified cluster and each of the management accounting practices used to classify firms, and also through chi-squared independence tests which showed evidence of the relation between the cluster and the characteristics used in the clustering process. Characterizing these relations allowed us to match each cluster to the maturity stage included in the proposed new model to classify firms' level of management accounting.

Lastly, the answer to Question C (which corresponds to external validation of the homogeneous clusters) relies on a bivariate descriptive analysis to characterize the relation between the maturity stage and each firm characteristic (capital ownership, corporate legal form, capital, sales, and number of workers). The results obtained showed robustness when using the chi-squared independence test and the Spearman test of the coefficient significance of the ordinal correlation.

4. RESULTS AND DISCUSSION

4.1. Sample description

Table 1 allows us to characterize the 58 participating SMEs. These are mostly joint stock companies (56.9%) and with 100% of domestic capital (94.83%). On average, the amount of capital is 1.4 million euros, with a standard deviation (SD) of 1.4 million euros, but half the firms have, at the most, capital of 998.8 thousand euros. Sales are, on average, 8.5 million euros (SD=9.4 million euros) and half the firms have sales of 5.5 million euros or more. The number of workers ranges from 10 to 416 and, on average, firms have 95 employees (SD=67 workers).

Table 1. Characteristics of participating firms

Characteristics	Firms	%	
Capital ownership	100% domestic	55	94.83
	Minority foreign stake	1	1.72
	Majority foreign stake	2	3.45
	Total	58	100.00
Corporate legal form	Private limited	25	43.10
	Joint stock	33	56.90
	Total	58	100.00

Characteristics	Firms	Average	SD	Min.	P.25	P.50	P.75	Max.
Capital (x1,000€)	58	1,362.8	1,411.4	7.0	303.0	998.8	1,735.0	6,500.0
Sales (x1,000€)	58	8,469.4	9,358.7	1,716.8	4,063.6	5,531.4	9,538.9	64,000.0
N° of workers	58	94.6	67.4	10	51	82	119	416

Source: authors

4.2. Industrial SME classification according to Kaplan's Four-Stage model

Regarding the first research question, the data collected allow us to conclude that all firms are classified in stage 2 of Kaplan's (1990) Four-Stage model. From the results in *Table 2*, we find that all firms have implemented management accounting methods for product valuation, methods considered in the model as inadequate for the decision-making process: 24.14% of firms only value their products through direct costs; the remaining firms (75.86%) value their products through allocation bases influenced by the production level, with the most commonly used being machine-hour; none of the firms use ABC. Only 5.17% of firms rely

on evaluation performance instruments, with the BSC being used in all these cases. We conclude that the maturity level of these firms regarding management accounting methods is low, which leads us to Question B.

Table 2. Management accounting methods used

Methods		Firms	%
Methods of Allocating Indirect Costs	Without allocation	14	24.14
	Single base	28	48.28
	Multiple bases	16	27.59
	Total	58	100.00
Usage of Activity Based Costing	Yes	0	0.00
	No	58	100.00
	Total	58	100.00
Usage of Balanced Scorecard	Yes	3	5.17
	No	55	94.83
	Total	58	100.00

Source: authors

4.3. Introducing a new model to classify SMEs

In the second research question we aim to introduce a new model that allows for SME classification according to the level of management accounting. Since none of the firms uses ABC and only three use the BSC, this model is sustained on the method used in product valuation and on knowledge of ABC and BSC. The studies of Dearman and Shields (2001) and Machado (2013) give support to the inclusion of the variables on knowledge.

Table 3 shows that the majority of managers do not know ABC (58.62%) or BSC (62.07%).

Table 3. Knowledge of management accounting methods

Methods		Firms	%
Knowledge of Activity Based Costing	Yes	24	41.38
	No	34	58.62
	Total	58	100.00
Knowledge of Balanced Scorecard	Yes	22	37.93
	No	36	62.07
	Total	58	100.00

Source: authors

We apply cluster analysis to cluster firms in homogeneous groups according to the following characteristics: method of allocating indirect costs; knowledge of ABC; and knowledge of BSC. After looking into different solutions, we opted for a four-group solution sustained by the dendrogram analysis (*Figure 1*) and the fusion coefficients (not reported) resulting from the Average Linkage (within groups) cluster method and the chi-squared association measure (measure of characteristics' similarity).

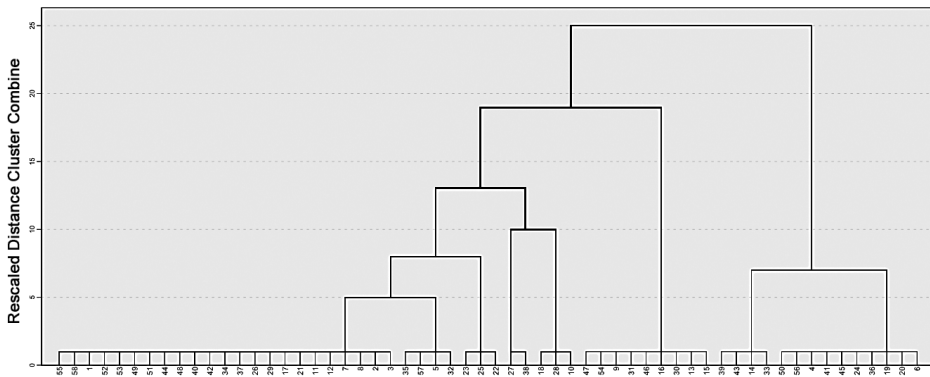


Figure 1. Dendrogram of firm clustering using the Average Linkage method

Source: authors

The resulting clusters have significantly different sizes: 30, 5, 9 and 14 firms from cluster 1 to 4, respectively. *Table 4* allows us to characterize the clusters according to the characteristics used to identify them. From these results we are able to introduce a new model, called Maturity Stages of Management Accounting.

Firms are characterized by the following four stages of maturity: maturity stage 1 includes all firms that do not allocate indirect costs and where managers do not know the ABC and BSC methods; maturity stage 2 includes firms where the majority (70%) use a single allocation base of indirect costs, but where managers do not know ABC (83.33%) or BSC (73.33%); maturity stage 3 includes firms that allocate indirect costs, either with a single base (60%) or using multiple bases (40%), all managers have knowledge of ABC, but none regarding BSC; maturity stage 4, the most advanced, is characterized by firms that mostly use multiple allocation bases of indirect costs (71.43%) and where all managers have knowledge of both the ABC and BSC methods.

Table 4. Different management accounting methods by maturity stage

Management accounting methods	Maturity								
	Stage 1		Stage 2		Stage 3		Stage 4		
	Firms	%	Firms	%	Firms	%	Firms	%	
Methods of Allocating Indirect Costs	Without allocation	9	100.00	5	16.67	0	0.00	0	0.00
	Single base	0	0.00	21	70.00	3	60.00	4	28.57
	Multiple bases	0	0.00	4	13.33	2	40.00	10	71.43
	Total	9	100.00	30	100.00	5	100.00	14	100.00
Knowledge of Activity Based Costing	Yes	0	0.00	5	16.67	5	100.00	14	100.00
	No	9	100.00	25	83.33	0	0.00	0	0.00
	Total	9	100.00	30	100.00	5	100.00	14	100.00
Knowledge of Balanced Scorecard	Yes	0	0.00	8	26.67	0	0.00	14	100.00
	No	9	100.00	22	73.33	5	100.00	0	0.00
	Total	9	100.00	30	100.00	5	100.00	14	100.00

Source: authors

The analysis reveals a clear differentiation between the different stages of maturity, allowing us to state that firms in each stage are homogeneous and different from the other stages regarding management accounting methods, that is, we can consider that the stages resulting from the cluster analysis are internally validated. This validation is also confirmed by the result of the chi-squared independence test and by the level of association between each of the management accounting practices and the stage of maturity. In fact, all the results (see Table 5) show the existence of strong associations, measured by the Cramer's V, and they

Table 5. Relation between stage of maturity and the different management accounting methods (results of the chi-squared independence test)

Management Accounting Methods	Chi-squared	df	p-value exact	Cramer's V
Methods of Allocating indirect costs	50.010	6	<0.001	0.657
Knowledge of Activity Based Costing	40.823	3	<0.001	0.839
Knowledge of Balanced Scorecard	33.081	3	<0.001	0.755

n = 58 firms

Source: authors

are also significant (all significance probabilities associated with the results of the chi-squared test are almost null, that is, under 0.001, thus rejecting the null hypothesis that both characteristics are independent).

The results show that, in fact, it is possible to classify SMEs according to their level of management accounting. Maturity stage 4 is where management accounting practices are most developed.

4.4. Firm characteristics in each maturity stage of the new model

After introducing the new model to classify SMEs in four stages of maturity according to the level of management accounting, it is important to identify the firm characteristics used to discriminate between the different stages.

Looking at *Table 6*, we have a clear understanding that the type of corporate legal form and capital ownership are not predictors of management accounting characteristics. In fact, in the first three maturity stages, all firms have exclusively domestic capital and in maturity stage 4 a great majority of firms (78.57%) also have 100% domestic capital. Likewise, in all maturity stages we find a similar percentage of firms, between 55.56% for maturity stage 1 and 60% for maturity stage 3, that are joint stock companies

When analyzing the influence of the quantitative characteristics that proxy for firm size (amount of capital and number of workers) and for the level of activity (sales volume), we find, going from maturity stage 1 to maturity stages 3 or 4, a slight trend of firms being bigger and reporting a higher sales volume, both on average and in terms of the median (see *Table 7*).

Table 6. Influence of capital ownership and corporate legal form on stage of maturity

Characteristics	Maturity								
	Stage 1		Stage 2		Stage 3		Stage 4		
	Firms	%	Firms	%	Firms	%	Firms	%	
Capital ownership	100% domestic	9	100.00	30	100.00	5	100.00	11	78.57
	Minority foreign stake	0	0.00	0	0.00	0	0.00	1	7.14
	Majority foreign stake	0	0.00	0	0.00	0	0.00	2	14.29
	Total ($\chi^2_{(9)}=9.943$; <i>p-value exact</i> =0.164)	9	100.00	30	100.00	5	100.00	14	100.00
Corporate legal form	Private limited	4	44.44	13	43.33	2	40.00	6	42.86
	Joint stock	5	55.56	17	56.67	3	60.00	8	57.14
	Total ($\chi^2_{(3)}=0.027$; <i>p-value exact</i> =1.000)	9	100.00	30	100.00	5	100.00	14	100.00

Source: authors

Table 7. Influence of firm size and level of activity on the stage of maturity

	CHARACTERISTICS											
	Capital (in 1,000 €)				N° of workers				Sales volume (in 1,000 €)			
	Maturity				Maturity				Maturity			
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 1	Stage 2	Stage 3	Stage 4	Stage 1	Stage 2	Stage 3	Stage 4
Mean	801.5	1,300.5	1,335.9	1,866.5	67.2	84.0	118.4	126.5	5,801.9	6,663.8	8,290.4	14,117.2
SD	1,174.1	1,245.4	1,208.6	1,864.6	52.9	46.3	52.2	102.5	4,011.8	4,569.1	5,722.1	16,451.9
Min.	199.5	7.0	79.8	175.0	10	18	60	30	1,855.4	1,716.8	2,722.0	3,905.3
P.25	255.0	735.0	99.8	500.0	20	41	65	52	2,696.3	4,063.6	2,810.6	4,759.9
P.50	303.0	998.8	1,500.0	1,248.5	65	78	140	96	4,707.8	4,978.4	9,538.9	7,419.2
P.75	600.0	1,561.4	2,500.0	2,500.0	82	114	157	144	7,932.4	7,903.5	10,000.0	14,655.9
Max.	3,856.5	6,000.0	2,500.0	6,500.0	180	196	170	416	13,773.1	18,518.0	16,380.6	64,000.0

Source: authors

In maturity stage 1, firms have, on average, capital of 801.5 thousand euros (SD=1,174.1 thousand euros), a sales volume of 5,801.9 thousand euros (SD=4,011.8 thousand euros) and 67 workers (SD=53 workers). In maturity stage 4, two of these three factors double in value, with averages of 1,866.5 thousand euros (SD=1,864.6 thousand euros) for capital, 14,117.2 thousand euros (SD=16,451.9 thousand euros) for sales volume, and 127 workers (SD=103 workers) for the number employed.

Despite the dispersion around the mean, we find similar results using the median value. First, in maturity stage 1, half the firms have a maximum capital of 303.0 thousand euros, a maximum sales volume of 4,707.8 thousand euros and a maximum number of 65 workers. On the other hand, in maturity stage 4, and for the same percentage of firms, we find maximum values of 1,248.5 thousand euros for capital, 7,419.2 thousand euros for sales volume and 96 for the number of workers.

We find a positive and weak relation (Spearman coefficients between 0.2 and 0.3) between capital, number of workers and sales volume, and the maturity stages of management accounting (see *Table 8*). We should point out, however, that the relations are only statistically significant at a 0.05 significance level, for sales volume and number of workers, and at a significance level of 0.1, for capital. Since we find differences between the maturity stages in respect of characteristics not directly related to management accounting, we can consider that the homogeneous groups identified using cluster analysis are externally validated.

Table 8. Spearman correlation coefficients between firm size and level of activity and maturity stage

		Capital	N° of workers	Sales volume
Maturity stages	<i>Spearman</i>	0.240	0.278	0.278
	p-value	0.069	0.035	0.035

n = 58 firms

Source: authors

5. CONCLUSIONS

This paper aims to contribute to knowledge of the management accounting methods implemented by industrial SMEs. Regarding the first research question, Kaplan's (1990) Four-Stage model was used to classify the management accounting level of Portuguese industrial SMEs. The information gathered lets

us conclude that all firms are included in stage 2, which does not allow for their differentiation.

With the previously mentioned limitation, we raised the second research question which led to the inclusion of other management accounting characteristics to differentiate these types of firms. Consequently, we proposed a new model, named Management Accounting Maturity Stage, which classifies firms in four stages of maturity. Its pillars rely on knowledge of the management accounting methods (ABC and BSC) and on methods of allocating indirect costs in product valuation.

Maturity stage 1 is characterized by the difficulty of carrying out product valuation due to the inexistence of methods of allocating indirect costs, and by the fact that those responsible for management accounting do not know the ABC and BSC methods. In maturity stage 2, most firms already carry out product valuation with indirect costs, but use a single allocation base, which is considered inadequate by the referenced theory; the majority of managers do not know ABC and BSC. In the most advanced stages, maturity stage 3 includes firms that already evaluate their products including indirect costs, although the majority still use only one allocation base; all managers know ABC, which according to the relevant theory can improve decision making; none of those in charge of management accounting knows the BSC. Maturity stage 4 is where management accounting characteristics are most developed: all firms evaluate their products including indirect costs and the majority already use multiple allocation bases; all managers have knowledge of the ABC and BSC methods.

The third research question was defined with the main objective of analyzing which characteristics of SMEs are present in each new maturity stage. The results show that corporate legal form and capital ownership are not determinants for identification of the stage of maturity. However, other characteristics can be associated with the stage of maturity: firm size, proxied by the amount of capital and number of workers; and level of activity, proxied by sales volume. Smaller firms with lower sales volume are associated with maturity stage 1; larger firms with higher sales volume are associated with maturity stage 4.

The main limitation of this research is the small number of participating firms. However, it contributes clearly to knowledge of management accounting in two ways. First, using Kaplan's (1990) Four-Stage model, all Portuguese industrial SME are classified in the same stage of maturity, not allowing for their differentiation; using the proposed new model we are able to differentiate these firms in four stages of maturity. Secondly, it uses knowledge of management accounting methods as a differentiating factor, something which motivates top management to focus on the continuous training of employees on the latest developments in management accounting methods. Other studies have reported that the needs for

management accounting information are identical to all SMEs, independent of their geographical area, which suggests that the present findings on Portuguese SMEs can be generalized to other countries with a similar business community.

Despite this important contribution for countries with a large number of SMEs, the evidence suggests the need for future research as a way to validate implementation of this new model in other industrial and non-industrial SMEs.

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