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CONTINGENT FACTORS THAT INFLUENCE THE USE OF MANAGEMENT ACCOUNTING PRACTICES IN THE PORTUGUESE TEXTILE AND CLOTHING SECTOR

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ABSTRACT:

This scientific research aims to verify relationships in the use of management accounting practices and several contingent factors. Contingency theory was used in the analysis model. The study focused on 512 textile and clothing companies of the *Associação Têxtil e Vestuário de Portugal* (Portuguese Textile and Clothing Association). Data was collected in the middle of 2014 by means of a questionnaire. The results of the quantitative study showed that traditional management accounting practices are more commonly used than modern ones. In addition to the interdependence found between some of the variables in the analysis model, the results obtained by using the multiple linear regression model showed that advanced production technology influences, in a positive and direct way, the use of management accounting practices.

KEYWORDS: Contingency Theory, Advanced production technology, Management accounting practices, Portuguese textile and clothing sector.

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1. INTRODUCTION

In a study carried out in Indonesia, Sunarni (2013) considered several factors that can lead to changes in the business environment. Among these factors, the author highlighted technology and the demand for a better quality of product. Similarly, Matt and Smith (2014) researched, in Malaysia, the impact of changes in the business environment and Management Accounting (MA) practices and the effect of these changes on organizational performance. The authors considered that a changing environment brings more competition between markets. Consequently, these markets, in order to gain competitive advantages, invest in advanced production technologies that, in turn, help to organize the production process and increase the level of product quality, reducing costs and achieving maximum efficiency. According to the authors, these changes may influence the choice of MA practices in an organization. This argument was reinforced by Shields (1998) which showed that companies from various countries have implemented the recent MA practices as a result of changes in the business environment. Thus, it is understood that changes in the environment cause changes in the organization that, in turn, cause changes in MA practices.

A study applied in Ethiopian industrial companies, Bogale (2013) considered that in response to changes in the surrounding environment, companies should use the practices recently developed by MA. According to Faria et al. (2012), after a period of high controversy over the so-called traditional practices, there have arisen several new and advanced MA practices. Major (2009) argued that since the late 1980s there has been a development of practices and modern instruments of MA to support the decision making process in organizations. Among these practices, Faria et al. (2012) highlighted the Activity Based Costing (ABC), Activity Based Management (ABM), Target Costing, Balanced Scorecard (BSC), Life Cycle Analysis and Strategic Management Accounting. Gerdin (2005) argued that an environment of change and technological innovation encourages companies to adopt new technologies and new ways of managing. According to the author, there are several studies that have explored the influence of modern technology, such as JIT (Just in time) and TQM (Total Quality Management), in MA systems. However, there seems not to exist, in practice, a consensus between technological innovations and MA innovations. Adler et al. (2000) compared the MA in several countries and concluded that companies adopt contemporary MA practices, but only gradually and slowly. According to Klein (2014), if companies operate in an environment of change and technological innovation, adopting modern technology and modern management processes, certainly these companies should adopt the most advanced MA practices. In this sense, Guerra (2007) suggested that the best way of managing organizations is to analyze thoroughly business characteristics and contextual factors.

Several authors (e.g., Chenhall & Langfield-Smith, 1998; Joshi, 2001) analyzed the MA practices and the change in accounting and management control systems in several countries. Gomes (2007) referred to the lack of specific studies in Portugal on the MA practices used. In turn, Machado (2013) added that the MA practices in Portuguese organizations have been little disclosure. Of course, this lack of disclosure of elements of implemented MA makes it difficult to carry out academic studies. Thus, despite the difficulties, it is opportune to investigate the specific situation of Portuguese MA practices to see if Portuguese companies are following, or not, the new trends. Furthermore, given the fact that there is nothing absolute or immutable in companies and that there are numerous contextual factors with power to influence, the study of these factors in relation to the adoption of different MA practices, becomes relevant. Thus the main objective of this research is to explore the influence of some contextual factors in the use of MA practices.

This study, unlike others (e.g., Thomas et al, 2008; Coelho, 2011; Machado, 2013) also applies to Portuguese companies, is not limited to classifying MA practices as either traditional or contemporary. Instead, a broader perspective is used similar to the study by Drury and Tayles (2005) and Machado (2007), where there is a plurality of MA practices. These studies (Drury & Tayles, 2005; Machado, 2007) constitute the theoretical basis for this research, particularly in relation to some factors which influence the use of MA practices. It is concerned with quantitative research of data collected through an online survey questionnaire of companies registered in 2014 in the Portuguese Textile and Clothing Association (*Associação Têxtil e Vestuário de Portugal*, hereafter ATP). According to Ittner and Larcker (2002), this type of research may be the only way to understand the variables and the relationships between them.

Apart from the introduction, conclusion and references, this study is divided into three parts. In part two, a literature review on Contingency Theory and the use of MA practices will be undertaken. This theoretical framework will be the basis for the formulation of the research hypothesis. Part three describes the methodology used and the

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characteristics of the sample identified. The study results are presented in part four. These results will be interpreted in the light of the literature review, including Drury and Tayles (2005) and Machado (2007).

2. 2. LITERATURE REVIEW

This section begins with a systematization of the origins and foundations of Contingency Theory. The use of this theory in MA research, and the main criticisms of the theory, is also covered. The literature review continues with the analysis of several studies on MA practices and the influence of certain contextual factors in its use. Although studies of Drury and Tayles (2005) and Machado (2007) constitute a theoretical basis for this work, we analyzed other studies with the aim of expanding theoretical perspectives on the concepts and variables studied.

2.1. Contingency Theory versus Management Accounting Research

In the face of criticism of the Scientific Management School, the Classical Theory and the Bureaucratic Theory, namely the contempt for the human individual (humanistic approach), and especially the fact that these theoretical perspectives ignore the external environment (systemic approach), the contingency approach (Contingency Theory) emerged in organizations (Guerra, 2007). Burns and Stalker (1961), quoted by Fargnoli et al. (2012), were the first authors to carry out a study using the contingency approach. These authors conducted research through interviews in twenty British industries to study if there were relationships between the administrative practices and the external environment of these industries. The results showed wide variety of administrative procedures that were related to certain environmental features. Thus, the authors concluded that there was an adequate organizational structure for each type of environment in which the company was operating. The research of these authors was based on the view that the environment determines the structure and functioning of organizations. The Contingency Theory states that there is nothing absolute in the principles of management.

Woodward (1965), cited by Fargnoli et al. (2012) in a study of 100 British companies of various types of business, examined the relationship between technology and the organizational structure adopted. The study showed that companies are organized as a function of the technology used. In other words, technology affects the structure and organizational behavior, and the association between both of them leads to a better organizational performance. According to Otley (1980), the Contingency Theory emerged in MA literature in the mid-1970s. The premise of the contingency approach used in MA research was based on the argument that there is no universally appropriate MA system used by all organizations and in all circumstances. So, the implementation of a MA system depends on specific circumstances where an organization is placed. Chenhall (2003) conducted a study on the management control system design within the organizational context, reviewing a variety of literature based on the Contingency Theory since 1980. This author reported the contingency factors that may explain the effectiveness of accounting and management control systems in organizations, such as the environment, technology, size, organizational structure, strategy and organizational culture. Such contingencies are extremely important for the current context of management control systems. The Contingency Theory may be based on the following assumption: "the efficiency of the structure or procedures of an organization, depends on the specific circumstances in which this organization operates" (Major & Vieira, 2009, p. 70).

According to Guerra (2007), although the use of Contingency Theory in MA research is recent, an interrelationship with organizational factors was recognised some time ago. Several MA research (e.g., Haldma & Lääts, 2002; Baines & Langfield-Smith, 2003; Chenhall, 2003; Ahmad, 2012) has been studied the relationships between contingency factors and the use of MA systems, management control systems and other terms that, one way or another, are related to MA practices. These contingency factors most commonly studied are: organization size, intensity of competition, technology, environment, organizational structure, strategy, culture, organizational performance and decentralization. It occurs that, according to Chenhall (2003), often the terms MA, MA systems and management control systems are treated as similar phenomena.

In accordance with Guerra (2007), an important drawback of Contingency Theory is the disregard for the human component. The author explained that this theory does not address the human aspect because this is not part of its

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organizational scope. However, as flexibility is one feature of the theory, nothing prevents the insertion of some human aspects. Therefore, Guerra (2007) added that much of the criticism does not concern the concepts in the strict sense, but the specific methodological problems of some empirical research that used a contingency theoretical approach. One of the problems mentioned was the lack of precision in the definition of variables. Similarly, Otley (1980) argued that many studies have used a wide range of independent and dependent variables, but diverge on the definition and measurement of these variables.

Guerra (2007) admitted that the defined variables can be analyzed from different methodological perspectives, reflecting different views on the same problem. However, this diversity in the definition and measurement of variables is a criticism of Contingency Theory use for the purpose of supporting research. Another methodological critique, according to Chenhall (2003), is related to the sample size. This author stated that a small sample size, in studies based on Contingency Theory, limits the statistical power of the results. In order to increase the reliability of the results, Ittner and Larcker (2001) suggested the use of multiple sources of data (questionnaires, interviews, documents, etc.). Another aspect that has also limited the research based on the Contingency Theory, according to some authors (e.g., Otley, 1980; Guerra, 2007), is the exclusion of variable performance of organizations. These limitations weaken the results of MA research backed by Contingency Theory. Not infrequently, the identified correlations are not statistically significant, if not contradictory between different studies, and the efforts of theoretical reconciliation of the results are rarely successful (Major & Vieira, 2009). Given the limitations indicated, Langfield-Smith (1997) considered that the results of research based on the Contingency Theory are more fragmented and heterogeneous than homogeneous and integrated.

In accordance with Guerra (2007, p. 57) "the only certainty that has been consistent among researchers who base their studies on Contingency Theory is the lack of consistency of the empirical results". This author emphasized that the Contingency Theory, with the premise that "it all depends" and "everything is relative", is extremely flexible, making it difficult to obtain accurate and consistent results as desired by critics. The study of the relationship between the contingencies and MA systems is, in fact, considered to be a challenge, given the difficulties of observing all the factors involved, of properly measuring variables, of adopting the appropriate research methods and of correctly interpreting the relationship between variables. Nevertheless, Otley (1980) stressed that, despite the considerable amount of empirical research based on the Contingency Theory, this is still insufficient with regard to the process of linking specific contingencies with MA systems.

2.2. Use of Management Accounting Practices

According to Erserim (2012), there are several MA definitions in the literature. The author defines MA as the sum of various practices developed to help management. In accordance with Souza et al. (2003), the MA has evolved as a result of academic research with the purpose of presenting specific practices considered appropriate and necessary to support, empower and encourage managers in the decision making process. For Klein (2014), the adoption, use and development of MA is a process associated with contextual factors and management practices on their own. In this regard, managers have at their disposal a variety of MA practices and each one provides one or more types of MA information. These practices are defined, according to Ittner and Larcker (2002), as a variety of methods used by organizations in order to support the process of determining useful information for management purposes.

Junqueira (2010) argued that the use of contemporary and traditional practices, at the same time, work together to direct managers to various aspects of the organization. In this sense, the author highlighted that contemporary MA practices should be used not to replace but rather to complement traditional practices. There were several studies (e.g., Yalcin, 2012) that examined the adoption/use of MA practices (traditional and contemporary) and which compared the benefits derived from these practices. The conclusions drawn from these studies were largely similar in establishing that traditional MA practices are more commonly implemented than the recently developed MA practices. Similarly, other literature (e.g., Adler et al., 2000; Sunarni, 2013) showed the limited use of the latest MA practices. Chenhall and Langfield-Smith (1998) conducted a study in Australian industries in order to explore the use of MA practices and its benefits. The results, consistent with previous literature, indicated that the adoption rates of traditional practices were superior to the newly developed practices. Frezatti (2007) researched the use of MA practices in major Brazilian industries. The result of the study showed that the adoption rate was lower for recent practices, such as ABC, BSC, Economic Value Added (EVA), than for more traditional practices such as budgeting. This reflects a low degree of adoption and implementation of recent practices.

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Joshi (2001) also examined MA practices in Indian industries, in terms of its adoption and its benefits. The study revealed that the Indian companies studied are largely dependent on traditional practices and the adoption of newly developed practices were relatively low. However, according to the author, there were signs of increasing changes in the direction of adopting some contemporary practices such as ABC and target costing. Leftesi (2008) added that the results of studies of Chenhall and Langfield-Smith (1998) and Joshi (2001) were similar regarding the conclusions of traditional practices, but different in terms of the adoption rate and benefits considered. Hyvönen (2005), in a study of the MA practices in manufacturing companies in Finland, concluded that most of the practices used was traditional, but some newer practices were also adopted. Sulaiman et al. (2004) analyzed the MA practices in four Asian countries (Singapore, Malaysia, China and India) and concluded that the use of more recent MA practices was weak, while the use of traditional practices remained strong, despite the different cultural and national values. Askarany (2012) also examined the introduction of new MA practices in Australia, over a period of four years, and concluded that these practices were not widely implemented.

2.3. Research Hypothesis

As mentioned before, the studies of Drury and Tayles (2005) and Machado (2007) constitute the basic theoretical framework for this research, supporting the first four research hypothesis in terms of independent variables. Regarding the dependent variable of those studies – sophistication of costing systems – this study chose the use of MA practices, according to the Ahmad (2012) study. Thus, it was intended to extend the study to the planning, control and decision making practices, in addition to costing practices and its sophistication. It was deemed pertinent to study all these MA practices in a specific sector of activity (the Portuguese textile and clothing sector). The independent variable, advanced production technology, was not considered in the studies of Drury and Tayles (2005) and Machado (2007). However, given that other authors (e.g., Otley, 1980; Chenhall, 2003; Ahmad, 2012) considered it an important contingent factor for the development of MA practices, it was decided to add this independent variable in the last research hypothesis of this study.

Ahmad (2012) and Alkizza and Akbar (2005) indicated that companies facing an intensely competitive environment tend to implement MA practices. This view is consistent with the studies of Al-Omiri and Drury (2007) that, in turn, identified competition as an important external factor to encourage managers to implement costing systems. According to Abernethy et al. (2001), during the last 15 years, there has been a greater commitment to develop more sophisticated costing systems due to several changes in the environment, in particular to increasing competition. For Lee (2004), the effective and efficient management of product costs is pointed to as a critical success factor. These activities of cost management and control are regarded as essential for obtaining results that allow companies to compete in the market. This discussion suggests that greater competition increases the likelihood that organizations adopt the MA practices.

Hypothesis 1 (H1):
The greater the level of competition faced by the organization, the greater the use of MA practices.

According to the research of Al-Omiri and Drury (2007), product diversity is divided into supporting diversity, process diversity and volume diversity. Supporting diversity refers to the different support given to every product provided by multiple auxiliary internal departments (e.g., engineering, purchasing, and marketing). Process diversity refers to differences in resource consumption of all activities involved. Volume diversity occurs when products are manufactured in different sizes, thus affecting the level of batches to be distributed. According to these authors, product diversity determines the complexity of the production process, resulting in greater production activity. Thus, to measure the resource consumption of different products in a complex environment, the use of MA practice is required.

Hypothesis 2 (H2):
The greater the level of product diversity, the greater the use of MA practices.

The organization size is considered a vital contingent factor that influences the use of MA practices (e.g., Haldma & Lääts, 2002; Al-Omiri & Drury, 2007; Abdel-Kader & Luther, 2008). Albu and Albu (2012), in order to justify this influence, argued that the larger the organization size, the greater the control over the environment, the greater the

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amount of resources employed and the greater the use of MA practices. One possible reason for this, in accordance with Drury and Tayles (2005), is the fact that the larger organizations usually have a more complex and diverse activities' environment that requires more sophisticated MA practices to measure resource consumption by different cost objects.

Hypothesis 3 (H3):
The greater the level of organization size, the greater the use of MA practices.

In accordance with Ismail and Mahmoud (2012), an important role of product costing systems is to provide relevant cost information for decision making. Costing systems play a crucial role in information construction for the periodic return analysis, that is, to distinguish between profitable activities and non-profitable activities. If the costing system does not capture, with sufficient precision, the information on resource consumption, costs will be distorted, and there will be a danger if managers underestimate the profits of products in their decisions. According to Ngingo (2012), costs must be highly reliable to assume an important factor in decision making.

Hypothesis 4 (H4):
The greater the importance of cost information for decision making, the greater the use of MA practices.

In recent decades, according to Soutinho (2006), there has been a technological breakthrough in the textile industry. This progress was reflected in the introduction of modern technology at every stage of the manufacturing process, such as information technology, electronics, automation and materials. For this author, the use of advanced production technology helps companies to differentiate products and thus to maintain and consolidate competitive advantages. According to Ahmad (2012), industrial enterprises employ technology to support, in some way, production activity. The author argued that technology has evolved very quickly and has been widely disseminated. It is therefore essential to test this variable as one of the potential contingent factors that explain the use of MA practices. Ajibolade (2013) argued that the use of MA practices is adjusted as a function of technological complexity of the manufacturing process. This author, like Chenhall (2003), considered that the variable technology is related to how the work processes of organizations transform the resources, including the production technology implemented. Any company that wants to remain competitive depends on advanced production technology to be able to continue the activity, operating and achieving goals. Thus, advanced production technology has been highlighted as an important contingent factor, and which is expected to have an impact on the MA systems design.

Hypothesis 5 (H5):
The greater the use of advanced production technology, the greater the use of MA practices.

Subsequently, given these five research hypothesis, it is necessary first to specify, synthetically, the methodology to test and achieve concrete results.

3. RESEARCH METHODOLOGY

This study examines the relationship between contextual factors and the use of MA practices. It is intended, on the one hand, to assess the extent to which Portuguese textile and clothing companies select and implement MA practices. On the other hand, it seeks to investigate whether different contextual factors (competition, products diversity, organization size, importance of cost information for decision making and advanced production technology) influence the use of MA practices. Portuguese textile and clothing companies are the object of the study. Following the literature review, Contingency Theory, both in terms of contingencies as independent variables (e.g., Otley, 1980; Guerra, 2007) and in terms of the use of MA practices as dependent variables (e.g., Chenhall & Langfield-Smith, 1998; Hyvönen, 2005), is used as a theoretical support for this study. Considering the concepts of the variables covered earlier, the research hypothesis are presented in the analysis model (see Figure 1).

Figure 1. Analysis model

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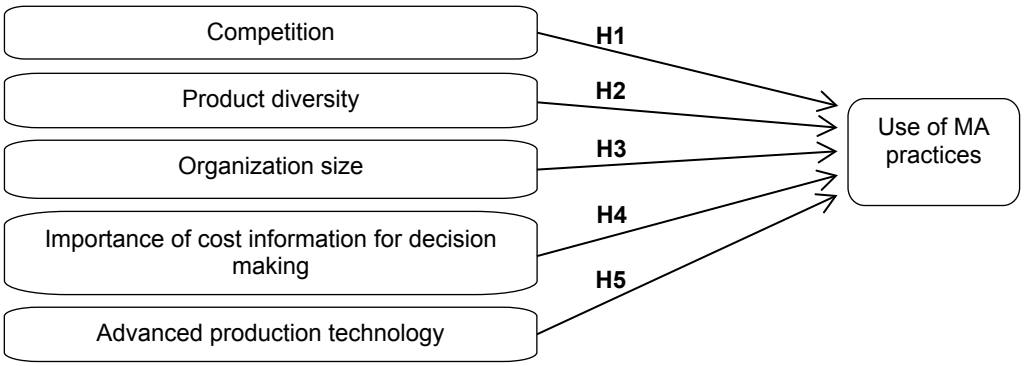

The five research hypothesis in the figure above were previously supported in the literature review. Given the quantitative nature of the study, the instrument chosen for data collection was an online survey. The main reason for this choice is that several empirical studies mentioned above (e.g., Al-Omiri & Drury 2007; Ahmadzadeh et al., 2008) used this instrument. The survey was designed to collect data on the use of MA practices, competition, organization size, product diversity, importance of cost information for decision making and advanced production technology, in line with the aforementioned goals.

The questionnaire was sent to Portuguese textile and clothing companies who were members of the ATP. ATP is a Portuguese association which, in 2014, included companies responsible for about 35,000 jobs and with a turnover of almost 3,000 million euros. The choice was made due to ATP being considered the most representative organization of the sector in Portugal and one of the most important in Europe. Soares (2012) analyzed how the industries of this sector have played a relevant role in Portuguese industry. According to this author, since 1960, the textile industry has become established and expanded in Portugal, becoming one of the largest exporters of textiles and clothing, due to the value-for-money of its products. The sector has taken on a great importance in Portugal, as it represents about 25% of manufacturing output and is considered one of the main export sectors. In these circumstances, it is pertinent to study the use of MA practices in these industries at the present moment (year 2014).

The questionnaire was divided into two parts. In the first part, in relation to the measurement of context variables, similar measures were used as in the studies of Drury and Tayles (2005) and Machado (2007), but adjusted to Portuguese conditions. In this paper, it was decided to analyze the level of production technology used by the surveyed companies, using the same criteria as Ahmad (2012) and Tayles and Drury (1994). The second part concerns the use of MA practices which were measured according to the Ahmad (2012) study. The survey responses allowed collection of data on the level of competition, products diversity, organization size, importance of cost information for decision making, advanced production technology and use of MA practices, through Likert scales. The extent of this issue for the Portuguese reality was considered relevant by the researchers (e.g., Gomes, 2007; Machado, 2013), given that such studies are considered scarce.

As with the studies of Drury and Tayles (2005) and Machado (2007), the research hypothesis should be tested by applying a multiple linear regression model. It should be noted that the variable advanced production technology was not considered in those studies. This variable has been introduced in this paper because it is one of the contingent variables most commonly identified in the literature of Contingency Theory (Otley, 1980; Chenhall, 2003; Ahmad 2012). It is believed that this variable can influence the use of MA practices in the companies under study. Thus, the inclusion of this variable was aimed encourage at testing the use of advanced production technology. Data collected from the questionnaires was treated using the software SPSS (Statistical Package for Social Sciences) - Version 20.0.

Since it was not possible to obtain a representative sample of the population, the whole study was exploratory, allowing the achievement of good estimates of population characteristics. But this does not evaluate the accuracy of the sampling data and thus the estimates obtained are not statistically generalized for the population. The data collection period was May 13, 2014 until July 24, 2014. The questionnaires that were filled out improperly were rejected. As previously mentioned, the data collection instrument had been similarly applied by Drury and Tayles (2005) and Machado (2007) so that it was not necessary to validate it. However, some questions were adapted to the context of this study, to prevent misunderstanding, and adjusted to minimize the ambiguity. Given that no significant

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changes were made to some measurements of the latent variables, an evaluation of the internal consistency of the data collection instrument was undertaken. Such a measure was evaluated by the Cronbach Alpha coefficient that, according to Pestana and Gageiro (2005, p. 525), "is one of the measures more commonly used to verify the internal consistency of a group of variables and can be defined as the expected correlation between the scale used and other hypothetical scales of the same universe, with an equal number of items that measure the same feature". Table 1 shows the values:

Table 1. Internal consistency of the variables

Latent variables	Items	*Alpha de Cronbach*	Internal consistency
Advanced production technology	3	0.768	Reasonable
Use of MA practices	36	0.906	Very good
Competition	2	0.834	Good

By the analysis of the values presented in the above table (Table 1), it can be concluded that high values for advanced production technology (0.768) and for use of MA practices (0.906) have a reasonable and very good, respectively, internal consistency (Pestana & Gageiro, 2005). For competition, Cronbach's alpha coefficient is high (0.834), suggesting good internal consistency (the value is greater than 0.80). For the variables product diversity, organization size and importance of cost information for decision making, also considered in the study of Machado (2007), these coefficients were not calculated because they were measured by one item and the value of Cronbach's Alpha coefficient is influenced by the number of items.

In a first phase, in order to describe and characterize the sample, an exploratory descriptive analysis of data was carried out, given the nature of the variables under study, using the following statistical measures: absolute and relative frequency, location (mean), dispersion (standard deviation), minimum value and maximum value. This descriptive approach helps in the perception of the use of MA practices. To analyze the variability of the data, the coefficient of variation (CV) was applied, in addition to standard deviation. Lima et al. (2004) defined this coefficient as a measure of dispersion most commonly used to assess the relative instability of a characteristic or variable, reflecting the relationship between the standard deviation and the mean. In a second phase, in order to respond to research hypothesis, an inferential analysis was conducted to examine the association between the contextual (contingent) variables. To this end, the Spearman correlation coefficient (Spearman's Rho) was applied, given the nature of the variables measured on an ordinal scale. In the dichotomous variables, the Phi correlation coefficient was used. According to Lira (2004), the purpose of this coefficient is to determine whether there is an association between two nominal variables and should be used when correlated variables are dichotomous (2x2 tables). Note that there was a need to transform polychotomous contingent variables on dichotomous variables to analyze its association with the dependent variable (use of MA practices).

In order to respond to each research hypothesis set out above, that is, to carry out an analysis of the influence of the independent variables (contextual or contingent) on the dependent variable (use of MA practices), a multiple linear regression model was used. For the analysis of this model, similar to the studies of Drury and Tayles (2005) and Machado (2007), it was considered that the dependent variable should be classified in a continuous line rather than two discrete alternatives. In this case, it was necessary to transform the dependent variable (use of MA practices) into a continuous quantitative variable. Therefore, in this model, the adjustment quality of the variables (analyzing the significance of each variable by Student's t test), the overall contribution of the variables (F test - ANOVA), the adjusted coefficient of determination as well as the assumptions of the estimated model, were analyzed. In the entire analysis presented, a 5% significance level was assumed to make decisions about the research hypothesis.

3. 4. ANALYSIS AND DISCUSSION OF RESULTS

For analysis and discussion of results, one begins by characterizing the sample and analyzing the variables. Then there is presented an exploratory descriptive and inferential analysis, followed by the process of validating research hypotheses by applying the multiple linear regression model.

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4.1. Sample Characterization

In this section we present all the analysis and discussion of results that allow the answering of the objectives of the study. Of the 58 companies that constituted the study sample, although one of the received questionnaires did not provide data about its geographical distribution, it was observed that the largest number of companies (89.5%) belongs to the Northern region of Portugal (Braga, Porto, Guarda, Aveiro, Viseu). The remaining 10.6% belong to the Central region (Santarém and Leiria). From the collected sample it could be observed that 34.5% of respondent companies have an average annual turnover of less than 1 million euros sales. The same percentage was recorded for the range of 1,000.001 and 4,300.000 euros. The remaining companies (31%) had an average annual volume sale of more than 4,300.001 euros.

4.2. Use of Management Accounting Practices

The frequency of the use of subsystems of Management Accounting (MA) is presented in the following table.

Table 2. Frequency of use of subsystems of Management Accounting

	Yes		No		Total
Costing systems	22	40.0%	33	60.0%	55
Performance appraisal system	22	39.3%	34	60.7%	56
Budget system	32	59.3%	22	40.7%	54
Decision making support system	27	51.9%	25	48.1%	52

The results in Table 2 indicate that most respondent companies use the four MA subsystems identified. The use of the budget system (59.3%) and the decision making support system (51.9%) is significantly higher than the use of the costing system (40%) and the use of performance appraisal systems (39.3%). Most respondents (59.3%) adopt the budget systems. The larger use of the budget system is consistent with the studies (e.g., Chenhall & Langfield-Smith, 1998; Faria et al., 2012. Sunarni, 2013), where it was concluded that these systems are also widely used in organizations. According to Ahmad (2012), who studied the use of MA practices in small and medium enterprises, a justification for this condition may be linked to the size of the organization. This author found that larger organizations have more complex tasks and require an appropriate MA system to help them coordinate their activities.

4.3. Contingency Variables Analysis

Table 3 summarizes the descriptive statistics for the contingency variables considered in the study.

Table 3. Descriptive analysis for contingency variables

	Minimum	Maximum	Theoretical average	Empirical average	Standard Deviation
Competitive environment (n=58)	2	5	3	4.21	0.833
Competitive intensity via price (n=58)	2	5	3	4.41	0.795
Product Diversity (n=58)	1	5	3	4.00	1.124
Importance of information cost for decision making (n=58)	3	5	3	4.50	0.656

The variable “competition” results from the combination of two other variables: “competitive environment” and “competitive intensity via price”. Analyzing the statistical data of these variables, which are expressed in Table 3, it is concluded that these two variables have very similar averages, of 4.21 (standard deviation of 0.833) and 4.41

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(standard deviation of 0.795), respectively, and have minimum and maximum coincidental values. For a maximum of 5 points, the competition is seen by the majority of business respondents as high. Still, it can be concluded that the CV for this variable is considered to be medium (19.7% and 18 %, respectively). In relation to the variable "product diversity", for a maximum of 5 points, it is concluded that the diversification of products is high (greater than or equal to 25), presenting a CV considered medium (28 %). The contingency variable considered most used is the "importance of information cost for decision making" with a mean of 4.5 (standard deviation of 0.656), and a maximum of 5 points. Its CV is 14.6 %, meaning that the data is homogeneous. Thus, it is concluded that the information on the cost of the products is very important to the decision making. It should be noted, also, that all the contingency variables presented satisfactory empirical averages, when the averages are higher than the theoretical averages.

For the use of the advanced production technology, it was observed in 58 valid cases, that 46.3% of the companies use the "flexible manufacturing system", which corresponds to an average of 3.3 points, exceeding the theoretical average of 3 points, and a standard deviation of 1.298. Its CV is 39 %, which means that the data is heterogeneous. However, the low use of "system of electronic exchange of data (*Eletronic Data Interchance* - EDI)" or "seamless technology" can be related to the fact that the respondents are not familiar with these terms.

It was also proposed to explore in detail the data collected in order to check the correlation between the contingency variables, using the Spearman correlation coefficient. The results reveal that there is a direct and positive relationship, statistically significant, between the contingency variables product diversity and importance of information cost for decision making, and between the variables advanced production technology and organization size, assuming a significance level of 5 %. In these circumstances, it can be concluded that the interdependence between the product diversity and the importance of information cost for decision making is considered normal and expected. It is thought that, the more companies produce a range of diversified products, the greater the necessity to know the information costs for these products, to assist the decision making of managers. Ahmadzadeh et al. (2011) also concluded that the product diversity has the potential to change the structure of costs, taking into account that the products consume resources and activities in different proportions. The interdependence between the technology and the size of the organization is also considered normal and expected, because, it is considered that the larger organizations have more resources and act in a wider and more diverse environment in terms of technological innovation (Machado, 2007).

4.4. Validation of Research Hypotheses

At this point will be done the test of correlation coefficient of Phi between the independent variables (contextual) and the dependent variable (use of MA practices), to study the behavior of these variables. To that end, we performed a test of hypotheses, where there is considered the following null hypothesis: there is no association between the variables and the following alternative hypothesis: there is an association between the variables, assuming a significance level of 5 %. When the value of evidence is less than the significance level of 5% it is concluded that there is statistical evidence sufficient to reject the null hypothesis, and, if the opposite happens, that is, the value of evidence is greater than the significance level of 5 %, it is concluded that there is no statistical evidence sufficient to reject the null hypothesis.

To respond to the five hypotheses of research, presented in section 3, it will be applied the multiple linear regression model. Therefore, it is intended to examine whether the independent variables exert a positive influence and a direct influence on the dependent variable Use of MA Practices.

4. 4.4.1. Competition versus Use of Management Accounting Practices

To evaluate the relation between the variables competition faced by the organization and the use of MA practices, the degree of association was examined between the two variables on the basis of the coefficient of *Phi* association. The competition faced by the organization was classified into high and low competition. To analyze the results of the Phi coefficient we were able to verify that the correlation *Phi* coefficient obtained was 0.338 with a proof value of 0.023. So, we can conclude that there is a positive and direct association between the variables competition faced

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by the organization and the use of MA practices, although weak. This association is statistically significant (probative value lower than the 0.05 significance level), so the null hypothesis is rejected. Therefore, the intensity of competition faced by the organization is positively associated with the use of MA practices. This result is in line with a vast literature (e.g., Alkizza & Akbar, 2005; Al-Omiri & Drury, 2007; Ahmad, 2012; Bogale, 2013) that has found the existence of a positive association, direct and statistically significant, between the intensity of competition faced by the organizations and the use of MA practices.

5. 4.4.2. Product Diversity versus Use of Management Accounting Practices

With the objective of analyzing the relation between the variables product diversity and use of MA practices, the degree of association between these two variables was analyzed. The variable range of products measures the diversity in relation to the number of manufactured products, and was classified as very low diversification (up to 5 products) and very high diversification (greater than or equal to 25 products). The coefficient of Phi correlation obtained was 0.114 (value evidence of 0.445). We can conclude that the product diversity is not associated with the use of MA practices, because we obtained a value of proof higher than the level of significance assumed. The authors Al-Omiri and Drury (2007), Ismail and Mahmoud (2012) also did not observe, in their studies, any association between these two variables. In contrast, Ahmadzadeh et al. (2011) proved, to a level of significance of 5 %, that the variable product diversity is associated with the use of MA. Thus, the studies differ and have contradictory results. The present study, despite having measured the product diversity unlike the authors mentioned above, did not produce conclusive results.

6. 4.4.3. Organization size versus Use of Management Accounting Practices

With the objective of testing the relationship between the variables, organization size and the use of MA practices, the degree of association between the two variables was analyzed. The variable organization size measures the average volume of annual sales (in euros) which was classified as large and small. The coefficient of correlation of Phi obtained was 0.029 with a probative value of 0.848. The association is not statistically significant (higher evidentiary value at a significance level of 0.05). Therefore, there is no statistical evidence, in the present study, showing that the size of the organization is associated with the use of MA practices. This result is not consistent with, for example, the studies of Joshi (2001), Haldma and Lääts (2002), Al-Omiri and Drury (2007) that demonstrated consistently that the size of the company had a significant relationship with the use of MA practices.

7. 4.4.4. Importance of Information Cost for Decision Making versus Use of Management Accounting Practices

To evaluate the relationship between the variables importance of information cost for decision making and the use of MA practices, the degree of association between the two variables was analyzed. The variable importance of cost information for decision making was classified into ‘without importance’ and ‘vital importance’. The coefficient of correlation of *Phi* obtained was -0.031 with a value of proof of 0.833 (higher than the level of significance assumed). In this way, there is no association between the variables importance of information cost for decision making and the use of MA practices. However, the authors Al-Omiri and Drury (2007), Ahmadzadeh et al. (2011), Ismail and Mahmoud (2012) showed that this variable is associated with the use of MA practices.

8. 4.4.5. Advanced Production Technology versus Use of Management Accounting Practices

Finally, to test the relationship between the advanced production technology and the use of MA practices, the degree of association between the variables was examined. The variable advanced production technology was classified as ‘used’ and ‘not used’ and the following association results were obtained. The Phi correlation coefficient obtained was 0.637 with a probative value of less than 0.001. In this case, we can conclude that there is a strong, positive and direct association between the variables advanced production technology and the use of MA practices. Given that, this association is statistically significant (p-value lower than the level of significance), and the null hypothesis is

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rejected. Therefore, these two variables showed a strong and statistically significant association. Bogale (2013) also concluded, in his studies, that the advanced production technology has a strong relation (0.6) with the use of the advanced MA practices and, consequently, this variable can influence the use of these practices. This result is consistent with several studies (e.g., Tayles & Drury, 1994; Baines & Langfield-Smith, 2003; Chenhall, 2003; Ahmad, 2012) that also concluded that the advanced production technologies influence the use of MA practices.

4.5. Multiple Linear Regression Model

For the application of the multiple linear regression model, the dependent variable was transformed (the use of MA practices) into a continuous quantitative variable, by calculating the average of responses in relation to the use of each of the 36 MA practices for each correspondent company. Drury and Tayles (2005) justified the use of this model, based on the premise that several MA researchers used this method to test hypotheses in their studies. In this multiple linear regression model, we wanted to check if the behavior of the independent variable *X* involves the behavior of the dependent variable *Y*, i.e. the simultaneous effect of contextual variables in the use of MA practices.

In this way, on the basis of the information obtained from the sample, the following were used as independent variables (*X*): product diversity; competition; importance of information cost for decision making; organization size and the advanced production technology. On the other hand, the dependent variable (*Y*) used was the use of MA practices. To this end, were estimated the regression coefficients that are in Table 4, using the method of least squares. Lira (2004) added that these coefficients do not show an absolutely linear trend. This means that positive coefficients lead to increases in value X and corresponds to increases in the same direction in the Y value, and for negative coefficients the opposite occurs.

In the present study, it was found that the not standardized coefficient which was statistically different from zero was the one associated with the variable advanced production technology and presents a positive value (see Table 4). This result supports the hypothesis that the greater the use of the advanced production technology, the greater will be the use of MA practices, i.e. the advanced production technology influences directly and positively the use of MA practices, thus allowing the corroboration of the hypothesis 5. You can also check in the column of standardized coefficients, and see that the variables competition and advanced production technology have the greatest contributions allowing the explanation of dependent variable behavior. Also Fargnoli et al. (2012, p. 7) argued that "there is a close relationship of dependence between the organization and the technology adopted, because the organization does not depend on its own, but on environmental circumstances and the technology used at the time". Although the variable competition was not shown to be statistically significant in this model, many studies (e.g., Mat & Smith, 2014; Bogale, 2013; Scarpin et al., 2012) concluded that this variable, just as the advanced production technology, influenced the use of MA practices that, in turn, had a positive impact on the performance of the organization.

Table 4. Estimation of coefficients and respective t-Student test

Constant and independent variables	Not standardized coefficients		Standardized coefficients	*t-Student*	
	B	Standard error	**Beta**	Test Value	**p-value**
(Constant)	1.423	1.000		1.423	0.163
Product diversity	0.046	0.111	0.054	0.411	0.683
Competition	0.190	0.161	0.157	1.182	0.244
Importance of information costs for decision making	-0.127	0.176	-0.095	-0.724	0.473
Organization size	0.103	0.144	0.093	0.714	0.480
Advanced production technology	0.432	0.093	0.586	4.661	< 0.001

Note: Dependent variable: Use of MA practices.

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For the remaining variables, none of them proved statistically significant, although in the study by Machado (2007) and Drury and Tayles (2005), the variables product diversity and organization size exert a significant influence on the use of MA practices, in particular in terms of sophistication of the costing system. In the study by Al-Omiri and Drury (2007) it is concluded that the variable importance of information cost for decision making influences it. Therefore, it can be concluded that there is no significant and enough statistical evidence to say that the independent variables, competition, product diversity, organization size, and importance of cost information for decision making influence the use of MA practices. In short, it should be noted that only the fifth research hypothesis was corroborated.

It should be noted that in relation to the variables that were not statistically significant, the value obtained for some of these variables does not always coincide with what was expected. For example, the value obtained for the variable importance of cost information for decision making was contrary to that expected, indicating that the use of MA practices decreases, on average, to the extent that the importance of information cost for decision making increases. This result is not only inconsistent with the result obtained in the study by Machado (2007) but is also opposite to the other studies discussed earlier (e.g., Drury & Tayles, 2005). However, the use of MA practices increases, on average, to the extent that the variables competition, product diversity, organization size and the advanced production technology increase.

9. 4.5.1. Quality of the Fit

The measurements relating to the quality of the fit show the calculation results of multiple linear regression, showing the value of the coefficient of correlation (r), the coefficient of determination (r^2) and the coefficient of determination (adjusted r^2). These measures, according to Ahmad (2012), analyze the success of the linear regression model to explain the simultaneous effects between variables. In the present study, it can be seen that the dependent variable Use of MA practices has been explained in 42% of cases by independent variables (explanatory variables) and the adjusted coefficient of correlation (more commonly used when models have more than one independent variable) indicates that 34.3% of the total variability in the use of MA practices is explained by independent variables present in the adjusted model of linear regression.

Furthermore, it is worth examining whether the adjusted model is significant. According to Machado (2007), through the tests of statistical inference, F-test and t-Student's test, it is possible to confirm the quality of the fit of the model. These tests determine the results of the sample to the universe and the F test evaluates the model in global terms. The t-Student's test evaluates each of the coefficients individually as already presented and analyzed previously (see Table 4). In agreement with the values obtained for the F test, showing a value evidence of 0.001 (lower than the level of significance set to 0.05), we are able to conclude that the linear relationship between the variable use of MA and the variables advanced production technology, product diversity, the importance of information cost for decision making, organization size, competition, is statistically significant. You can then say that the template found is significant. Thus, the adjusted model is given by the following equation:

$$\begin{aligned} Use\ of\ Management\ Accounting\ practices = {} & 1.423 + 0.046\ Product\ diversity + 0.190\ Competition - \\ & - 0.127\ Importance\ of\ information\ cost\ for\ decision - making + 0.103\ Organization\ size + \\ & + 0.432\ Advanced\ production\ technology \end{aligned} \quad [1]$$

10. 4.5.2. Validating Model Assumptions

The validation of the multiple linear regression model requires the verification of some assumptions, in particular, the analysis of statistical residuals (homoscedasticity - the errors have a constant variance; the normality - errors have a normal distribution of mean zero; and the autocorrelation - errors are independent of each other) and the multicollinearity (correlation between the independent variables).

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Homoscedasticity:
In accordance with Pestana and Gageiro (2005), the constant variance of random variables statistical residuals is called homoscedasticity. According to the authors, when there is violation of this assumption, the model is considered to be inefficient. From the results, it was concluded that there is a linear relationship between the "use of MA practices" and the independent variables, since the statistical residuals keeps amplitude approximately constant in relation to the horizontal axis zero, allowing us to take the assumption of homoscedasticity. That is, the statistical residuals, when represented as a function of the estimated values of the dependent variable, is distributed in a random way around zero, showing a constant variance.

Normality:
For Pestana and Gageiro (2005), the assumption of normality of the errors can be tested graphically or using the test K-S (Kolmogorov-Smirnov) since the number of observations is greater than 30. The normality of statistical residuals does not mean that all respondents use the same MA practices, but that there is a normal distribution of use of these practices for each subsystem of MA. Thus, through the value of evidence obtained for the test (K-S, equal to 0.968, the hypothesis is not rejected that the variable errors follow normal distribution, assuming a level of significance of 5 %). In this sense, the assumption of normality is confirmed.

Autocorrelation:
To test the assumption of independence of statistical residuals, that is, the autocorrelation of the errors, it is usual to use the statistic proposed by the Durbin-Watson statistic (Johnston & Dinardo, 2000). It is intended to analyze if the random variables are independent of each other, i.e., if their covariance is zero. In accordance with Pestana and Gageiro (2005), the results of this test have the following interpretation: values close to 2 - there is no autocorrelation of statistical residuals; values close to 0 - there is a positive autocorrelation and values close to 4 - there is negative autocorrelation. Since, according to the results obtained for the statistics on the Durbin-Watson statistic, we obtained a value of 1.971 it is concluded that there is no autocorrelation. So, it can be said that the residues are independent of each other and the covariance between them is zero, confirming the null hypothesis (no autocorrelation).

Multicollinearity:
Pestana and Gageiro (2005), refer to the tolerance, the value considered as a threshold below which there is multicollinearity is 0.1. Therefore, from the analysis of the values presented in the previous table, it can be seen that the tolerance (measures the proportion of variation that is not explained by the other independent variables) does not have any value less than 0.1. The lower threshold is 0.851, corresponding to the variable competition. It can be concluded that 85.1% of the variability in competition is not explained by the other independent variables. For the VIF (Variance Inflation Factor), the threshold value above which there is multicollinearity is 10. As soon as it can be observed that there is no VIF greater than 10, we can conclude, that there is no multicollinearity. According to the authors, the intensity of multicollinearity is high when the condition index is greater than 30, and when a component contributes more than 90% to the variance of two or more variables. It was found that the highest condition index was 25.841, i.e. less than 30, so we can conclude that there is no multicollinearity. In addition, it is observed that there is only one variable (constant) that contributes to more than 90% to the variance of two or more variables.

After each one of the assumptions of the multiple linear regression model has been checked, it can be concluded that the estimated model is appropriate to describe the relationship between the independent and dependent variables.
11.

12. CONCLUSION

The present work of scientific research sought to check hypotheses of relationship between five contingencies (competition, the product diversity, the size of the organization, the importance of information cost for decision making and the advanced production technology) and the use of MA. The hypotheses of the research model of analysis were supported by the theory of organizational contingency. The study focused on a population of 512 companies in the textile industry and clothing that are part of the Textile and Clothing Association of Portugal (ATP), according to the data provided in 2014 by means of a questionnaire. The participation was limited to 58 companies of the established population, it therefore being significant to note that the findings relate to the sample in question, and may not be generalized.

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The results of the quantitative study showed that the traditional MA practices are more commonly used than the MA practices considered as contemporary. This result is consistent with other studies (e.g., Frezatti, 2007; Askarany, 2012; Sunarni, 2013), to the extent that they reflect a low degree of use of contemporary practices. In fact, the use of traditional practices prevails in companies (Souza et al., 2003), but they also use contemporary practices (ABC, non-financial measures). Adler et al. (2000) and Hyvonen (2005) had also found that companies use contemporary practices, but in a gradual and slow way, because managers have more confidence in traditional practices. This makes relevant the observation by Junqueira (2010), according to whom contemporary practices should be used not to replace but complementarily with traditional practices.

In addition to the interdependence between some of the variables of the analysis model, the results obtained through the multiple linear regression model allowed us to conclude that the advanced production technology influences, in a positive and direct way, the use of MA. This result is consistent with the authors (e.g., Ajibolade, 2013; Bogale, 2013; Mat & Smith, 2014) who concluded that the use of MA practices is influenced by advanced production technology. The fact that the technology is one of the factors that leads to changes in the business environment (e.g., Sunarni, 2013) may allow us to extrapolate that technology influences the use of MA. In fact, if the companies operate in an environment of technological innovations, using modern technology and modern management processes, then, of course, they may be propelled into the implementation of MA practices (Klein, 2014). Thus, the argument is confirmed that the use of new production technology causes changes in MA systems, in particular in terms of use of MA practices (Shields, 1998; Ahmad, 2012). In turn, such use is adjusted as a function of technological complexity (Ajibolade, 2013).

In relation to the major contributions of this research, in academic terms, it should be noted that the contextual factor that influences most the use of MA practices in Portuguese companies in the textile and clothing sector, is the advanced production technology. In addition, in giving the concrete reality of a set of firms in the textile and clothing, the study also confirmed that the use of MA practices in these companies does not differ much from the practices in other countries, presenting a breakthrough in perceiving the use of MA practices from a sample of this sector in particular. The literature (e.g., Shields, 1998; Gerdin, 2005; Faria et al., 2012) has indicated that there is a discrepancy between the latest theoretical developments and the use of MA. The present study allows us to conclude that this also occurs in companies in the analyzed textile and clothing industry. In line with studies in other countries (e.g., Thomas et al., 2008; Coelho, 2011; Machado, 2013), this research has shown that, also in Portugal, the use of traditional MA practices prevails over the use of the contemporary MA practices.

As regards the practical contributions of this research, it can be noted that the management accountants, in companies similar to those studied, have greater reason to consider the influence of advanced production technology. Thus technological innovation faced by managers will have to be considered in their options (decision making) for implementation and use of planning, evaluation and control systems. In addition, this study also alerts managers and management accountants to the possible need for introduction of new practices, since it has been shown that the more traditional practices may prevail, or serve for the implementation of more innovative practices.

In spite of the merits of this research, the study has limitations that should be considered when analyzing the results. Firstly, the sample size is relatively low. The sample is not representative of the entire Portuguese textile and clothing industry, and the conclusions cannot be taken as a broad representation of the same universe because it is an exploratory study. In this sense, the study is limited to a range of industries in the textile and clothing sector located in continental Portugal, and therefore its generalization to other sectors is not possible, because it could lead to different results. The set of contingent variables considered is relatively small, reflecting the slightly complex environment of these companies. We have opted for a limited number of variables to avoid too long a questionnaire, which would certainly decrease the rate of responses. Having regard to the nature and the circumstances in which the surveys were answered, the results may not be completely reliable.

The presented limitations may be the starting point for other hypotheses for future research. In this way, to overcome some of the limitations mentioned above, it would be interesting to analyze, in the future, the use of MA practices for other subpopulations of the textile and clothing industry, or other sectors in Portugal, in order to ascertain if there are differences from the results found. Another alternative would be to carry out a study that took into account other contingency variables that were not considered in this study, and may have an influence on the use of MA practices, in particular the organizational structure, strategy, environmental uncertainty and

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organizational culture referred to in the literature (e.g., Chenhall, 2003; Wang & Huynh, 2013). Given that this research is quantitative, it is suggested, in future, the use of case studies using interviews or documents, with theoretical support in institutional theory or other, to study all or some of the variables, forming a consistent basis of evidence that increases the confidence of the results. Considering that the literature (e.g., Langfield-Smith, 1997; Otley, 1980) has referred to efficiency as a dependent variable necessary to determine an appropriate fit between management control systems and contingency variables, the inclusion of this variable in future studies is suggested.

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