



Impact of uncertainty and decentralization on activity-based costing use

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Abstract

The aim of this paper is to explore the impact of environmental and organizational factors on activity-based costing (ABC) use. These variables are studied respectively through the perceived environmental uncertainty, and the organizational structure represented by both horizontal and vertical decentralization.

Data were collected from 62 Moroccan firms, operating in different sectors, via a questionnaire survey. The findings indicated that ABC use is not associated with perceived environmental uncertainty and horizontal decentralization. However, firms with a high degree of vertical decentralization use more ABC than those with a centralized vertical structure ($p < 10\%$).

This research adds to general knowledge and offers insights into management accounting since the study is conducted in a developing country that has specific environmental and organizational characteristics. Previous research has studied perceived environmental uncertainty in other contexts of innovations. In our paper, we investigate the case of ABC and we analyse decentralization with both horizontal and vertical dimensions.

Keywords: Activity-Based Costing Use; Horizontal Decentralization; Moroccan Firms; Perceived Environmental Uncertainty; Vertical Decentralization.

1. Introduction

The objective of this research is to study the relationship between the use of activity-based costing (ABC) and organizational and environmental factors in Morocco.

ABC has been the subject of several research papers, especially in developed countries (USA, Canada, UK, etc.) (E.g. Innes and Mitchell 1995, Gosselin 1997, Anderson and Young 1999, Innes et al. 2000). Since its generation in the late eighties, research has focused on overcoming the traditional costing methods and on the development of ABC. However, empirical studies have revealed a paradox: theoretical developments have shown the superiority of ABC compared to traditional cost accounting methods, while empirical results have demonstrated low rates of use, proving that ABC could not take the place of the method of homogeneous sections (méthode des sections homogènes) in France and direct costing in the Anglo-Saxon countries (Mévellec 2003). Therefore, it seems that the success of ABC, known from its first applications in the U.S.A, by companies such as John Deere Component Works and Schrader Bellows group (Jones and Dugdale 2002), cannot be generalized. In this context, many applications demonstrated the failure of this innovation (Malmi 1997). The characteristics of these American companies and the environment in which they operate do not seem to be the same as those of other firms operating in developing countries.

Although ABC has been the subject of much research in developed countries, we have little information about its use in emerging economies. The study of the relationship between ABC use and the characteristics of the organizations and their environment

is essential. Contingency theory provides an adequate theoretical framework to guide us in explaining this relationship.

The ABC literature has largely investigated the relationship between contingency variables and ABC adoption, but has rarely studied the case of ABC use. According to Rogers (1995), adoption is related to the “decision” of innovation “use”. “Use” is an advanced step in the innovation diffusion process that means the application of the innovation. In our research, we are interested in the relationship between contingency factors and ABC use in the Moroccan context. We chose to study the influence of perceived environmental uncertainty and decentralization on ABC use.

The external environment, and specifically the environmental uncertainty, is one of the powerful contextual variables on which contingency research is based (Chenhall 2003). In Morocco, the study of perceived environmental uncertainty is interesting mainly because in recent years this developing country has opted for a policy of openness of the country to the global economy and has encouraged trade liberalization. These changes may affect the perceived environmental uncertainty by companies in Morocco, which have to respond to the new environment in order to survive. Concerning organizational structure, researchers have focused on it, perhaps because they consider structural variables to be the primary determinants of organizational innovations (Damanpour 1991). Organizational structure has different components: centralization, formalization and vertical differentiation, according to Gosselin (1997). Kalika (1985) has studied the five following components of organizational structure: vertical differentiation, horizontal differentiation, standardization, formalization and decentralization.

Decentralization (and centralization) is one of the structural parameters that has received particular attention in organizational

research (Chia 1995). In our research, we study organizational structure through the analysis of decentralization and we refer to Mintzberg (1982) to take into account its two main forms: vertical decentralization and horizontal decentralization. Our choice is explained by the characteristics of the Moroccan workforce known for its low skill level and its respect for the hierarchy.

Compared to previous research, this study examines the effect of variables studied in the framework of innovations other than ABC (uncertainty) or with other dimensions (decentralization). It should be noted that, some studies have looked at the relationship between decentralization and ABC (e.g. Gosselin 1997, Malmi 1997, AbdelKader and Luther 2008) but not in emerging economies, which is why we are interested in this variable. Our research is one of the rare studies on ABC conducted in African and Arab countries. Also, the Moroccan context is interesting because it is characterized by the importance of SMEs (Small and Medium-Scale Enterprises) that generally have few hierarchical levels and services, and because Morocco was and still influenced by French management accounting practices, although it must respond to its increasing openness toward the international market. This paper examines the extent to which perceived environmental uncertainty, vertical decentralization and horizontal decentralization influence the use of ABC. The small size of Moroccan companies and the opening of Morocco to the international market push us to investigate the influence of structure and environment on the use of ABC.

The findings of this research showed that ABC use is not associated with perceived environmental uncertainty and horizontal decentralization. However, firms with a high degree of vertical decentralization use more ABC than those with a centralized vertical structure.

This paper is divided into six sections. The next section is dedicated to the presentation of the Moroccan context. In Section 3, we develop the theoretical framework, and we formulate the hypotheses. Section 4 presents the research methodology. Section 5 presents results and the last section concludes, discussing the results and the limitations of this research, as well as highlighting areas for future research.

2. The Moroccan context and the influence of the French protectorate

Morocco is located in North Africa and has a population of 33 million. It was under both French and Spanish protectorates from 1912 until 1956 and was divided, for more than four decades, into two colonies. It is a multilingual country: Arabic is the national language in Morocco and is spoken by most of the population, Berber, or Amazigh, is also an official language and is spoken by half of the population. French is the first foreign language in Morocco. Spanish is also widely spoken, mainly in the northern regions, and English has become the second foreign language, since it is taught in all public schools and even used in business along with French.

Since independence, the presence of Spanish in the education system and consequently the Spanish language has been in constant regression (Marley 2004). However, French retains a strong presence, mainly because it was imposed in education and used in business and in the press.

The French protectorate has influenced not only language but also Moroccan business practices. In particular, accounting in Morocco is largely drawn on the French model and "the general code of accounting standardization of 1992," which governs accounting, is largely drawn on the French General Chart of Accounts (Plan Comptable Général) of 1982. Management Accounting is also based on the French method of "sections homogènes". This method is a full costing approach developed by Rimailho and described in the plan comptable of 1947, that of 1958 and the plan comptable of 1982 (Degos and Mattessich 2006). It is based on the division of the company into cost centers called "sections homogènes" and on the allocation of overhead from cost centers to products

(Degos and Mattessich 2006). This method is used for inventory valuation in Morocco.

Regarding the Moroccan economy, it is relatively open and for 20 years the government has followed a policy of privatization of public enterprises in some industries, offering some great investment opportunities to the private sector. It is the most competitive economy in North Africa, according to the African Competitiveness Report 2014-2015 of the World Economic Forum. As with other developing countries, Morocco solicits foreign investment. It is the most important destination for foreign direct investment in North Africa (Charaf and Bescos 2013).

Since 1980, Morocco has undertaken many structural reforms. According to Cherkaoui and Ben Ali (2007), these reforms have encouraged global economic integration and trade liberalization, the promotion of human development, and have made efforts to reduce poverty. These authors consider the Moroccan economy to have a high potential and low performance.

Morocco signed a free trade agreement with the European Union in order to integrate its economy into this area in 2010. Due to this opening to the international market, the degree of competitiveness in Morocco has increased significantly (Khallaf 2009). Consequently, Moroccan companies have to be more competitive in order to survive.

Morocco, after choosing liberalization, globalization and opening up to the international market, has been pushed to use international accounting and management practices. Therefore, Moroccan companies have been encouraged to use ABC for decision making, even though the Moroccan economy is based on SMEs that may not have enough resources to use it. In fact, according to the National Pact for Industrial Emergence 2009-2015, the number of companies having more than five employees is 26,833, divided as follows: 25,750 companies having between six and 200 employees and 1,133 companies having more than 200 employees. 7,100 companies operate in the industrial sector. ABC may enable firms in this developing country to respond to its new environment.

3. Theoretical framework and formulation of hypotheses

The contingency theory of accounting is the opposite of the universal theories, since it focuses on the relationship between accounting systems and the environment in which they operate (Hartmann and Moers 1999). The contingency theory of management accounting assumes that there is no best management accounting system, but particular circumstances indicate the best choice. Contingency variables are always classified as environment, organizational structure and technology (Emmanuel et al. 1990). In the area of control, Fisher (1998) classified contingency factors into four categories: The first one includes variables related to uncertainty, the second deals with the company's technology and interdependence, the third concerns the variables industry, corporate and business units, such as size, diversification and structure and the fourth type of variables include competitive strategy and mission. According to contingency theory, there is no universal accounting system that is appropriate for all businesses (Chenhall 2003).

In our research, we chose to study the relationship between ABC use and perceived environmental uncertainty on the one hand and between ABC use and decentralization on the other. Our choice is justified by the new economic context of Morocco, characterized by globalization, liberalization and opening up to the international market, and by the characteristics of the Moroccan workforce and its relationship with hierarchy.

3.1. ABC use

Hundreds of articles, papers and books have been written on ABC since the publication of "Relevance Lost" by Johnson and Kaplan in 1987, opening a wide debate on this subject and proving that ABC is one of the most important innovations in management

accounting made since the late eighties. As noted by Alcouffe (2002), there is no standard definition of the ABC system, but basic concepts can be found in the different definitions given by academics over time. Most authors have defined activity-based costing as a cost allocation based on full costs and which takes into account the concept of activity in order to provide relevant information for the company (De La Villarmois and Tondeur 1996, Alcouffe and Malleret 2004).

Regarding the concept of "use", it must be distinguished from that of "adoption" since the later is related to the decision to adopt or reject the innovation. In this context, Rogers (1995) developed the concept of "adoption process of innovations" and defined it as "the process through which an individual or other unit of decision making moves from a first knowledge of the innovation to form an attitude towards it, to an adoption or rejection, implementation and use of new ideas, and confirmation of such use" (Rogers 1995, p. 20). The analysis of this definition proves that the adoption decision process consists of five successive stages, which are: knowledge, persuasion, decision, implementation and use, and finally confirmation.

Many researchers have used "ABC adoption" when dealing with "ABC use" (e.g. Innes and Mitchell 1995, Innes et al. 2000). In our research, we are interested in "ABC use".

3.2. Perceived environmental uncertainty

Environmental uncertainty has been considered for a while as a main problem that makes planning and control more difficult because of the unpredictability of the future. Milliken (1987, p.136) defined environmental uncertainty as: "an individual's perceived inability to predict an organization's environment accurately because of a lack of information or an inability to be discriminate between relevant or irrelevant data." This definition demonstrates the importance of the process of perception in determining the uncertainty of the environment (Buchko 1994). The same definition was adopted by Gupta and Govindarajan (1984) who focused on the concept of perception. In our paper, we are interested in perceived environmental uncertainty rather than actual uncertainty.

An environment is perceived to be uncertain when administrators perceive that they are unable to predict the organizational environment or when executives are unable to predict changes in the components of the environment or have an incomplete understanding of the relationship between these components (Milliken 1987). According to Gul and Chia (1994), it is easy to make predictions when perceived environmental uncertainty is low, but when perceived environmental uncertainty is high, it is more difficult to make predictions and management may need additional information to make decisions.

Studying the case of the largest industrial companies in the UK, Abdelkader and Luther (2008) found that companies adopt more sophisticated accounting practices when the degree of perceived environmental uncertainty is high. These results confirm the affirmation of Chong and Chong (1997) who proved that a sophisticated management accounting system is a helpful tool in reducing uncertainty and in improving managerial decision-making. According to the study of Al-Omri and Drury (2007), activity-based costing can be classified as a sophisticated costing system.

As we noted in the first two paragraphs of this paper, Morocco has chosen integration in the international market, openness to the global economy, and has encouraged trade liberalization. In this situation characterized by an environmental change, the degree of uncertainty may be perceived to be higher in Morocco, and consequently, Moroccan companies must be able to react to the perceived environmental uncertainty in order to survive. The need for information, including cost data increases with the level of environmental uncertainty (Schoute 2004). A costing system that provides more accurate costs than traditional costing systems and data that is useful either for cost reduction or for profit-increasing process, improvement can help Moroccan companies to react to the new environment.

ABC is a method of providing more accurate cost-estimation compared to traditional methods (Qian and Ben-Arieh 2008). It can provide a clear picture of where resources are being spent and where value is being created and can be used for decision-making (Kee 2008). ABC allows organizations to understand the relationship of cause and effect between costs and activities. It improves processes and provides more accurate cost data, which allows companies to have complete control over overhead resources and increases long-term profit (Tsai et al. 2008). It is a useful tool in identifying value-added activities and in identifying and removing non-value added activities (Baykasoglu and Kaplanoglu 2008, Qian and Ben-Arieh 2008). The superiority of ABC compared to traditional Moroccan accounting systems based on the method of "sections homogènes" leads us to assume that Moroccan companies need ABC when the degree of perceived environmental uncertainty is high. Based on the above discussion, we formulate the following hypothesis:

H1. There is a positive relationship between perceived environmental uncertainty and the use of activity-based costing in Morocco.

3.3. Decentralization structure

Decentralization is the level of autonomy delegated to managers (Chenhall and Morris 1986). However, centralization is the concentration of the authority for decision-making at a definite hierarchical level. "Decentralization is one type of organizational structure, which refers to where decisions are taken within the organization, i.e., the level of autonomy that is delegated to managers for their decision making". (Chia 1995, p. 813). This concept was defined by Aiken and Hage (1971) as the degree of participation in decision-making. Decentralization is explained by the fact that a person or an entity is unable to make all the decisions (Mintzberg 1982).

Centralization and decentralization represent the most studied components of the structure compared to differentiation and formalization. Given the importance of decentralization, we are interested, in our research, in the concept of decision-making systems, which can be studied according to Mintzberg (1982) through decentralization with both horizontal and vertical dimensions. These two dimensions reflect the dispersion of decision-making powers. According to Mintzberg (1982), vertical decentralization is the delegation of decision, from the strategic apex to the base, within the hierarchy. It represents the dispersion of formal power down the hierarchy. In the case of vertical decentralization, the focus is on the formal side of power. This form of decentralization is characterized by the delegation of power from the upper echelon to the lower level while remaining within the same hierarchy. Horizontal decentralization is the transfer of control of decision-making to people outside the hierarchy. With this type of decentralization, the emphasis is on informal power, so the focus is on the transfer of formal power of decision makers to others outside the hierarchy.

The results of the study of Abdelkader and Luther (2008) made in the context of the largest industrial companies in the UK demonstrated that decentralized organizations need more sophisticated management accounting practices that can produce relevant information for decision-making, planning and controlling. These results confirm those of Chia (1995) who demonstrated the positive relationship between decentralization and sophisticated management accounting practices in Singapore. He proved that a more sophisticated management accounting system is required when the degree of decentralization is high in order to provide relevant information needed by different sub-units' managers to improve the quality of their decisions. These results confirm the findings of Damanpour (1991) who demonstrated a negative relationship between centralization and innovation. Also, in order to succeed, decentralized organizations have to design a management accounting system that can produce relevant information to be used by managers in decision-making, planning and controlling (Chenhall and Morris 1986). It enables managers to have more responsibility

in planning and controlling and easier access to information (Burns and Stalker 1961).

However, according to Kallunki and Silvola (2008) who studied the relationship between life cycle stages and activity-based costing in Finland, companies in the maturity and revival phases are more centralized, and in that case the use of activity-based costing should be more common among these firms.

Concerning the Moroccan context, and based on the results of interviews conducted by Benabdeljalil (2007) with high-ranking managers of industrial firms in Morocco, the majority of managers believe that Moroccan employees are unable to take decisions and; consequently, it is very difficult to delegate authority. Also, the perception of a low-skill level of Moroccan labor and the illiteracy of some of the workforce is considered to be a barrier to delegation (Benabdeljalil 2007). Although, Moroccan investment in education is significant, it remains insufficient compared to be other developing countries (Cherkaoui and Ben Ali 2007). Furthermore, a paternalistic culture that encourages submission to authority dominates in Moroccan firms (Benabdeljalil 2007). Workers respect their superiors and are afraid of making mistakes (Benabdeljalil 2007).

ABC is a complex and sophisticated innovation (Al-Omri and Drury 2007), and consequently, it needs qualified managers and employees to be used properly. Given the Moroccan context, characterized by the low qualifications of workforce and by employees' values based on discipline and the respect for hierarchy, we assume that vertical decentralization is negatively associated with ABC use and we formulate the following hypothesis:

H2. Vertical decentralization is negatively associated with the use of ABC

Concerning horizontal decentralization, ABC is an information system that can lead to the achievement of the same objectives by sub-units and coordination between them (Chenhall and Langfield-Smith 1998). It is a cross-sectional (transversal) method based on horizontal coordination (Bertrand and Mévellec 2008), and consequently, horizontal structure can lead to an easier use of this innovation. The problem of transversal structure is very important in ABC, but it is rarely formalized by the literature (Bertrand and Mévellec 2008). This characteristic of ABC leads us to assume that the use of this method requires participation of managers from outside the hierarchy and from different sections of the company.

Also, as we noted above, Morocco is characterized by a workforce with a low skill level, and thus the use of ABC, which is a sophisticated management accounting system, necessitates the participation of the managers of different sub-units of the company in decision-making since the lower levels in the hierarchy is assumed to not participate in decision-making (Hypothesis 2). Consequently, we assume that horizontal decentralization is positively associated with the use of ABC. We formulate the following hypothesis:

H3. Horizontal decentralization is positively associated with the use of ABC

4. Methodology of research

This study is based on a questionnaire survey conducted among Moroccan companies. The following sub-sections describe the study design and the methods for data collection.

4.1. Sample

Questionnaires were sent to 412 companies located in different regions of Morocco. After a telephone reminder and physical contacts, seventy-six (76) questionnaires were received. 14 questionnaires were eliminated for various reasons (incomplete questionnaires; companies not using the management control, etc.). Responses with missing values were eliminated. The total number of responses analysed was 62, making a response rate of 15%. The questionnaires were completed by 18 chief financial officers

(29%), 23 management controllers (37%), 17 accountants (27%) and four other managers (6%).

When selecting the sample of our study, we chose companies with a formal or informal costing system. We have not limited our research to industrial firms, but rather as relatively recent research has done (Innes and Mitchell 1995, Innes et al. 2000, Alcouffe 2002), we have extended our investigations to other sectors. The sample consists of 48 industrial firms (77%), six building and public works (10%), six services (10%) and two commercial firms (3%).

Regarding the companies' size, we noted that more than 95% of firms in Morocco are SMEs. These companies are effective instruments for job creation and economic development. Although, they may not have resources to implement management innovations or even management tools, we chose to include SMEs in our sample; however, we discarded companies that do not have a costing system. 48.39% of the sample consists of small and medium firms (less than 200 employees) and 52.61% of large firms (more than 200 employees). Table 1 summarizes the size of the firms composing our sample.

Table 1: The Size of the Sample's Firms

Number of employees	Number of firms	Percentage
Less than 99	4	6.45%
Between 100 and 149	10	16.13%
Between 150 and 199	16	25.81%
Total of SMEs	30	48.39%
Between 200 and 499	9	14.52%
Between 500 and 999	6	9.68%
Between 1,000 and 1,499	7	11.29%
Between 1,500 and 1,999	6	9.68%
More than 2,000	4	6.45%
Total of large companies	32	51.61%
Total	62	100%

To test the response and non-response bias, we compared the first 20 respondents and the last 20 respondents based on two criteria: "the industry" and "the number of employees". The results of the Student tests show that the difference between the two groups based on the number of employees is not significant. Also, the chi-square test for comparison between populations based on the industry is not significant. Using the same criteria (industry and number of employees), we compared a group of 20 respondents with a group of 20 non-respondents. We did not find any significant differences between the two groups.

4.2. Measurement of variables

4.2.1. ABC use (dependent variable)

In order to classify firms between users and non-users of ABC, we asked respondents to indicate the method used to calculate the cost of their products. The four following items were given: "the full cost method (homogeneous sections)", "the method of partial costs (direct/variable)", "the accounting activity (ABC)" and "others". ABC use was considered a dichotomous variable that takes the value "1" if ABC is used and "0" if another method is used.

4.2.2. Perceived environmental uncertainty

To measure environmental uncertainty, we used an instrument developed by Gordon and Narayanan (1984). However, this instrument was criticized by Chenhall (2003) because it mixed perceived environmental uncertainty with competition, while they are two different constructs. Following Ax et al. (2008), we selected the five items of Gordon and Narayan (1984), which measure the perceived environmental uncertainty. The two items dealing with competition were discarded. The five items selected concern the perceptions of dynamism and predictability. The chosen items are: "dynamism of the economic environment", "dynamism of the technological environment", "predictability of the competitors' activity in the market", "predictability of tastes and preferences of customers" and "review of marketing policies". For the first two

items selected, the respondent had a choice of five responses (from 1 "very stable" to 5 "very dynamic". For items 3 and 4, there were 5 responses (ranging from 1: "completely predictable" to 5: "completely unpredictable"). Finally, for the last item, the respondent also had 5 possible answers (ranging from 1: "very rarely" to 5: "very often"). A high score means that the environment is uncertain and dynamic and vice versa.

An exploratory factor analysis was conducted showing an Eigen value for the first factor of 2.752 which explains 55.04% of the total variance and demonstrates the unidimensionality of the measure. The items have good internal consistency with a Cronbach Alpha of 0.793.

4.2.3. Decentralization

Decentralization was studied with both horizontal and vertical dimensions (Kalika 1987). Vertical decentralization can locate the level at which decisions are made. Horizontal decentralization refers to the participation of different business managers in decision making.

To measure vertical and horizontal decentralization, we used an instrument developed by Kalika (1987) and used by Germain (2004). For vertical decentralization, we asked respondents to specify the hierarchical level at which decisions are made. The five following types of decisions were given, "recruitment/dismissal", "launch a new product," "choice of suppliers/customers", "pricing sale" and "operational reorganization operations". A score is assigned to each hierarchical level: "1: general manager and more", "2: functional managers" and "3: operational managers". A low score indicates a low vertical decentralization and a high score indicates a high vertical decentralization. Horizontal decentralization concerns the participation of a different responsible party in decision making. A five-point Likert scale is used to indicate the extent to which respondents agree with the following statements: "you are involved in making all the decisions, including minor decisions because you think that everything must be controlled", "you can take important decisions only after consulting your coworkers", "your coworkers always consult you before the implementation of their decisions" and "you let your employees take decisions alone within their area of responsibility". A high score indicates that the degree of horizontal decentralization of decision-making is high and vice versa. For the first and third affirmation, the score was reversed.

For vertical decentralization, an exploratory factor analysis was conducted showing an Eigen value for the first factor of 2.938 which explains 59% of the total variance and demonstrates the unidimensionality of the measure. The items have good internal consistency with a Cronbach Alpha of 0.822.

For horizontal decentralization, the Eigen value of the exploratory factor analysis is 2.258 explaining 56% of the total variance and demonstrating the unidimensionality of the measure. The Cronbach Alpha is of 0.726 proving good internal consistency.

4.2.4. Firm Size (control variable)

The firm size was analyzed as a control variable in the regression model. It was measured by the logarithm of the number of employees. In Morocco, companies having less than 200 employees are considered SMEs and those having more than 200 employees are considered large companies.

4.2.5. Industry (control variable)

Industry was considered a dichotomous variable that takes the value "1" if the firm operates in the industrial sector and "0" if it operates in another sector.

5. Results

This part of the study has two sub-sections. The first sub-section reports the results about the use of costing systems and the use of

ABC by firms surveyed and the second one presents the effect of perceived environmental uncertainty and decentralization on ABC use.

5.1. Main results

Table 2 summarizes the rates of use of the different costing methods in our sample. Full cost method (homogenous sections) and informal methods are widely used.

Table 2: The Costing Methods Used

Costing methods used	%
The full cost method (homogeneous sections)	38.7%
The method of partial costs (direct/variable)	14.5%
Informal methods	33.9%
ABC	12.9%
Total	100%

Dealing with ABC, 12.9% of companies have used this approach. The sample is divided into two groups: on the one hand, companies that have not used ABC and on the other, those which are already using this method. Compared to rates found in emerging economies, the rate of use is higher than the percentage of 9.3% found by Ngongang (2010) in Cameroon and lower than the rate of 23.75% found by Moalla (2007) in Tunisia. The difference is in part explained by the fact that in our research, as well as in that of Ngongang (2010), the focus is on the use of ABC, but in that of Moalla (2007) the focus is on the adoption of ABC. As we explained in the beginning of this paper "adoption" means the decision to "use" ABC and consequently the number of adopters is higher than the number of users. Also, Morocco was under the French protectorate which has affected and still affects the systems of management accounting. These systems are generally based on traditional methods drawn on the French method of "sections homogènes" which is used for inventories valuation. This may explain the low rates of ABC use in this emerging economy. Also, in Morocco companies may not have sufficient resources to implement two accounting systems (one for inventory valuation and another for management) compared to developed countries like the USA and the UK.

Results show that 87.5% of users are big firms and that 87.5% operate in the industrial sector. These results are consistent with the findings of other researchers, such as Alcouffe (2002). These percentages must be interpreted carefully because 77% of the firms in our sample operate in the industrial sector. Big firms have more resources to implement expensive innovations like ABC.

In order to have better information about the organizational and environmental characteristics of our sample, we have presented the descriptive statistics of the variables studied in Table 3.

Table 3: Descriptive Statistics of the Variables Studied

Variables	Mean	Standard deviation
Environmental uncertainty	18.323	2.455
Decentralization of the vertical structure	9.565	1.922
Decentralization of the horizontal structure	10.355	1.356
Log of firm size (control variable)	2.702	0.494

5.2. Test of hypotheses

Logistic regression analysis was used to test the research hypotheses and to examine the statistical relationship between environmental uncertainty, structure, size, industry and ABC use. The logistic regression analysis was carried out by the logistic procedure in SPSS. We applied the following model:

Logit (p) = $\text{Log} [p / (1-p)] = \alpha + \beta_1 \text{Environment} + \beta_2 \text{Decentralization of the vertical structure} + \beta_3 \text{Decentralization of the horizontal structure} + \beta_4 \text{log of number of employees} + \beta_5 \text{Industry}$

- "P" is the probability that a firm uses ABC according to its characteristics.

Before analyzing the results of regression model, we used the Pearson Correlation Matrix and the Variance Inflation Factor (VIF) in order to check for problems of multicollinearity in the model. Results show low coefficients of correlation (less than 0.4) and low VIF (less than 1.5), demonstrating that multicollinearity is not a problem.

The output of the logistic regression analysis is presented in Table 4. It indicates that the Chi-square value is 24.444 ($p < 1\%$). This value is significant, which means that the overall model is predicting display rule, understanding significantly better than it was with only the constant included. The Nagelkerke R-Squared indicates that environmental uncertainty, decentralization of vertical structure, decentralization of horizontal structure, industry and size explain 60.7% of the total variance of ABC use.

Dealing with perceived environmental uncertainty, results of logistic regression demonstrated that this variable has no significant effect on the use of ABC. Hypothesis 1 is rejected.

Contrary to Hypothesis 2, the findings of the logistic regression showed that decentralization of the vertical structure is positively associated with ABC use, with a beta of 1.043 ($p < 10\%$), but the decentralization of horizontal structure does not have a significant effect on ABC use. Consequently, Hypotheses 2 and 3 are rejected. The size of the firm is positively associated with ABC but the industry has no significant relationship with ABC use. Given the small size of the sample, the results must be interpreted with care.

Table 4: Logistic Regression for Variables Influencing ABC Use

Independent variables	B	E.S.	Wald	ddl	Sig.	Exp(B)
Constant	33.272	13.04	6.511	1	0.011	0.000
Environmental uncertainty	0.179	0.295	0.365	1	0.546	1.195
Decentralization of the vertical structure	1.043	0.602	2.999	1	0.083	2.837
Decentralization of the horizontal structure	0.508	0.520	0.956	1	0.328	1.662
Log of firm size (control variable)	3.578	1.675	4.562	1	0.033	35.787
Industry (control variable)	0.323	0.837	0.149	1	0.700	1.381
Chi-square	24.444					
Sig.	0.000					
Nagelkerke R-Squared	0.607					

6. Discussion and conclusion

Most of management accounting studies, based on contingency theory, are conducted in industrial advanced countries (Chia 1995). Few studies have been conducted in developing countries (Chia 1995). We studied the case of ABC use in Morocco, a developing country with specific environmental and organizational characteristics.

The results showed that 12.9% of the responding companies used ABC. This rate is lower than those found in developed countries. This result may be explained by the use of traditional accounting practices based on French methods, by the small size of Moroccan companies, and the particular environment of this emerging country.

In our paper, we are interested in the relationship between perceived environmental uncertainty, vertical and horizontal decentralization and the use of ABC in Morocco. As we specified in the previous section, Hypothesis 1 was not supported, demonstrating the absence of a relationship between perceived environmental uncertainty and ABC. This result confirms the findings of Schoute (2004) who demonstrated that perceived environmental uncertainty does not affect ABC use. This may be explained by the fact that Moroccan companies, having to respond to the new business environment characterized by an opening up to the international market, globalization, and trade liberalization, do not give much im-

portance to cost analysis. They may choose strategies other than those based on cost reduction in order to survive and to be profitable. Our findings confirm those of Hirst (1983), who demonstrated that reliance on accounting measures becomes less appropriate when the degree of uncertainty is high, and those of Govindarajan and Gupta (1985), who proved the use of non-accounting information under conditions of uncertainty.

The positive relationship, found by previous research, between management accounting innovations and environmental uncertainty, can be explained by the large operational definition, including intensity of competition, adopted for this construct. Environmental uncertainty and intensity of competition are two different constructs that may have different effects on innovation (Ax et al. 2008). In opposition to previous research based essentially on the measure of Gordon and Narayanan (1984), which mixed perceived environmental uncertainty and intensity of competition, the measure used in our study deals only with perceived environmental uncertainty.

In order to better explain these results, we studied the effect of the interaction between firm size and perceived environmental uncertainty on ABC use, since our sample is composed of SMEs and large companies. We conducted a regression with only these two independent variables. Findings confirm the association between ABC use and size and the absence of relationship for the perceived environmental uncertainty.

Opposite to expectations, our results prove that vertical decentralization is positively associated with ABC use ($p < 0.05$). Results also show that there is no relationship between horizontal decentralization and ABC use. Our findings must be compared carefully with previous research, mostly because studies have not discriminated between horizontal and vertical decentralization. However, the examination of the operational definitions used by each study for this construct can guide us in determining the nature of decentralization studied (horizontal or vertical). The analysis of the instrument used by Chenhall and Morris (1986) demonstrates that it measures vertical decentralization, while that used by Aiken and Hage (1971) concerns horizontal decentralization, although no explicit mention in this research indicates the nature of decentralization. Gosselin (1997), Gul and Chia (1994) and Abdelkader and Luther (2008) measured decentralization by an instrument developed by Gordon and Narayanan (1984) which really measures vertical decentralization and which is based on the continuum mechanistic-organic. Although, this ambiguity and the difference in the measure of this construct make the comparison very difficult, it is clear that most studies have dealt with the case of vertical decentralization.

Regarding vertical decentralization, our results are in line with those of Abdelkader and Luther (2008), who demonstrated a positive relationship between decentralization and sophisticated management accounting practices, proving that delegated managerial structures need sophisticated managerial accounting practices. Also, Damanpour (1991) found a negative relationship between centralization and innovation. This result may be explained, as noted by Abernethy and Bouwens (2005), by the fact that decentralization choices avoid resistance to accounting innovations. These results prove the importance of employees' involvement in the use of ABC, even though Moroccan employees' skills are perceived to be low, and highlight the different motives of actors for getting involved in an ABC project. Managers, even though they are convinced that employees respect hierarchy and that they are low skilled, delegate and decentralize decision-making in order to motivate them to use ABC. Also, in Moroccan companies, which are mostly SMEs, the number of hierarchical levels and functions is low and this may facilitate participation in decision-making.

The absence of a relationship between horizontal decentralization and the use of ABC proves that in Moroccan companies the focus is on vertical decentralization rather than horizontal decentralization.

Dealing with the variable "industry", results indicate that industry has no relationship with ABC use, demonstrating that ABC is not

specific to industrial companies. Regarding “size” the findings show a positive relationship between ABC use and the size of the company and confirm those of previous research (e.g. Kallunki and Silvola 2008). This result may be explained by the fact that larger organizations have more resources to use ABC.

In order to better understand the influence of the Moroccan context on the use of ABC, we analyzed the relationship between the traditional method of homogenous section and the variables studied in our research. We conducted a logistic regression. The output of the logistic regression analysis indicated that the Chi-square test is not significant ($p=0.284$), which means that the overall model is not predicting display rule. The Nagelkerke R-Squared demonstrated that environmental uncertainty, decentralization of vertical structure, decentralization of horizontal structure, industry and size explain only 13% of the total variance of full costing use. This means that the use of this traditional method is not related to organizational and environmental factors but to other factors that could be historical (the influence of the French protectorate).

The findings of our study extend the scope of the extant literature by investigating the reasons for ABC use in an emerging economy. This research adds to the understanding of how perceived environmental uncertainty and structure affect the use of ABC in Morocco. These two contingency variables were the subject of some studies conducted in the context of developed economies, but our research has taken into account the two dimensions of decentralization (horizontal and vertical) in an emerging economy. Our study has a number of implications. Specifically, this research adds to general knowledge and offers insights into management accounting since it is conducted in a developing country having specific environmental and organizational characteristics.

Two major methodological limits should be highlighted: the modest size of the sample and the use of a perceptual approach to collect data. This situation should lead the researcher to be careful in the analysis of our results.

Further research in other contexts not yet explored, and especially in Arab and African countries, should be conducted in order to make comparisons and to furnish a better explanation of the use of managerial accounting innovations in emerging economies. The effect of other contingency variables on ABC use could be the subject of other research. It would also be interesting to study the sophistication of management accounting systems and to analyse the effect of contingency variables on the characteristics of these systems in emerging economies.

Further research analyzing the role that can be played by actors in an organization is essential to explain the use of managerial innovations in Morocco, especially the influence of parent companies from developed countries on companies operating in an emerging economy.

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