

# The Relationship between Activity Based Costing, Perceived Environmental Uncertainty and Global Performance

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## Abstract

The aim of this paper is to present the main results of an empirical study done in Morocco and attempts to highlight the impact of the perceived environmental uncertainty on the activity based costing implementation and its performance according to the perceived environmental uncertainty. Data were collected from 62 Moroccan firms, operating in different sectors, via a questionnaire survey. Descriptive statistics, logistic regression and Student's t-test for a difference in means were used to analyse data. The results showed that 12.9% of the responding companies used ABC. The results using logistic regression indicate that the PEU influences significantly and positively the use of the ABC. Also, we found that the management accounting system based on ABC method results in a better performance for enterprises that have adopted it. Finally, we demonstrated that the firms operating in an uncertain and dynamic environment have an interest to adopt this new method of the management accounting, but the firms operating in a certain and stable environment are indifferent between adopting and not adopting this method. This research adds to the understanding of the factors explaining the adoption of management accounting innovations such as ABC, basically in a new context like Morocco. The context of the study and the characteristics of the innovation are important factors in explaining its adoption. These two factors must be taken into account when choosing a costing system. This type of work is almost absent in African countries. Previous research has studied perceived environmental uncertainty in the context of innovations other than ABC. The outcomes of the study are relevant to the literature on both ABC implementation and performance of ABC, since they determine that the use of ABC results in improving in firm's performance.

**Keywords:** ABC adoption, Environmental uncertainty, Performance, Moroccan firms

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## Introduction

Certainly, during the last decades, the Activity Based Costing (ABC) represents a major innovation in management accounting. According to Johnson (1990), "...ABC certainly ranks as one of the two or three most important management accounting innovations of the twentieth century". It was developed, by Cooper and Kaplan (Cooper, 1988; Cooper and Kaplan, 1988), in the last decade of the twentieth century (Cooper, 1990), as an approach to address problems associated with classical cost management practices such as standard costing or variable costing, which tend to have the inability to provide detailed and timely information (Cooper & Kaplan, 1991). The Consortium of Advanced Manufacturing International (CAM-I) defined ABC as a "methodology that measures the costs and performance of activities, resources and cost objects". Innes, Mitchell & Sinclair (2000) and Turney (1996) defined ABC as method of measuring cost and performance of activities and cost objects.

This method is now one of the most-researched management accounting areas, especially in developed countries: the United States of America (Krumwiede, 1998; Kiani and Sangeladji, 2003; etc.), France (De La Villarmois and Tondeur, 1996; Gueye, 1997; Bescos and Cauvin, 2000; Alcouffe, 2002; etc.), the United Kingdom (Innes et al., 2000; Tayles and Drury, 2001; etc.), Sweden (Dahlgren et al. 2001; etc.), Norway (Bjornenak, 1997; etc.), Ireland (Pierce and Brown, 2004; etc.), Australia (Chenhall and Langfield-Smith, 1998 ; etc.), etc. But a very few studies have been done in developing countries. The most of these researches focused on the relationship between the ABC adoption and several contingency factors like strategy (Gosselin, 1997, 2000; Elhamma and Yi Fei, 2013; Elhamma, 2013; etc.), firm size (Bjørnenak, 1997; Elhamma, 2012; Elhamma, 2013; etc.), organizational structure (Gosselin, 1997; etc.), structure of charges (Malmi, 1999; etc.), etc.

Recently, the impact of ABC success implementation on the firms' performance is considered as an important research area. Generally, the contemporary management accounting literature argues that ABC systems are "better" than traditional systems. But, the implementation rates appear low in several countries. In this context, Cotton et al. (2003, 3-4) note: "after the initial flush of articles advocating the use of ABC and extolling the virtues of the technique, several writers began to express some reservations. Some questioned the substance of its practical application (Bjornenak 1997; Gosselin 1997; Malmi 1999) arguing that it may be a fad or a fashion, riding a wave of popularity, rather than providing a genuine enhancement". However, the empirical researches on the relationship between ABC implementation and firms' performance are very few, especially in the African context.

In this context, this article aims to present the results of an empirical study done in Morocco and attempts to answer the following questions:

What is the adoption rate of ABC model in Morocco?

- What is the impact of the PEU on the use of the ABC method?

- What is the impact of ABC method on competitiveness, profitability and productivity? And
- What is the impact of ABC method on competitiveness, profitability and productivity according to the PEU?

The paper is divided into three sections. The next section is dedicated to the development of theoretical framework and to the formulation of hypotheses. Section 2 presents the methodology of research and the last section exposes and discusses results of this research.

### **Theoretical framework and formulation of hypotheses**

In this section, we highlight, firstly, the ABC method and its adoption in some developed and developing countries, and secondly,.

#### *ABC: a new method of the management accounting*

The activity-based costing technique has been substantially developed in the last decade of the twentieth century (Cooper, 1990). It is claimed to avoid the deficiencies of the traditional absorption costing methods, which commonly use direct labour to assign indirect costs (Dugdale, 1990). ABC is a management accounting process that allocates resource costs to products based on activities, which are the factors causing work and incurring cost, used by products or services (Krumwiede and Roth, 1997). According to this method, it is essential to organize the firm by activities and not by functions or products. The heart of ABC is the activity concept (Turney, 1991). According to Bescos et al. (2002, p.238), "activities are a group of actions or tasks that add value to a product or a service and that generate costs and resource consumption". According to Gosselin (1997), there are three levels of ABC adoption: AA (Activity Analysis); ACA (Activity cost analysis) and ABC. AA is the lowest level of adoption, it "consists of identifying the activities and procedures carried out to convert material, labor and other resources into outputs" (Gosselin, p.106). ACA is the next stage after AA. It "identify the costs of each activity and the factors that cause them to vary" (Gosselin, p.106). The final stage is the ABC. In this stage cost pools are created and applied to better inform decision-makers.

In the USA, Kiani and Sangeladji (2003) conducted a survey of the largest 500 US industrial firms. They showed that 44 out of 85 participated companies (around 52%) used ABC model. In the UK, Innes and Mitchell (1995) survey of ABC practices in the 251 UK firms found that 19.5% of the respondents had adopted ABC and 27.1% were considering its adoption. Five years after, Innes et al. (2000) demonstrated, from a survey of 177 UK's largest companies, that the ABC adoption rate has fallen to 17.5%. In Ireland, Pierce and Brown (2004) conducted a survey of large organizations. The results show that 28% of respondent companies were implementing ABC systems, 52.4% of respondent companies were not considering the implementation of this method, 9% of respondent companies were still considering it and 10.7% had rejected the implementation of the ABC model.

In table 1, we present the evolution of the adoption rate of ABC in some developed countries.

Table 1. The extent of ABC implementation in some developed countries

Countries	Year	Study	Population	Adoption rate
USA	1998	Krumwiede	Members of IMA	%
	2003	Kiani and Sangeladji	500 largest industrial corporations	52%
UK	1991	Innes and Mitchell		6%
	1994	Drury and Tayles	Manufacturing industry	13%
	1995	Innes and Mitchell		19.5%
	2000	Innes, Mitchell and Sinclair	The largest 1000 companies	17.5%
	2001	Tayles and Drury		23%
Canada	1993	Armitage and Nicholson	Manufacturing industry	23%
	1997	Gosselin	Manufacturing industry	30%
France	2002	Alcouffe		15.9%
	2007	Cauvin and Neumann		23%
	2008	Rahmouni		33.3%
Australia	1998	Chenhall and Langfield-Smith	78 Australian companies	56%
Ireland	2004	Pierce and Brown	large manufacturing, service and financial sector organizations	27.9%

Over the last decade, many surveys show that the trend in developed countries has been an increase in the adoption and implementation of the ABC method (Baird et al. 2004). In the USA, the adoption rate of the ABC method has increased from 11% (1993) to 52% (2003) and that of UK companies has increased from 6% (1991) to 23% (2001). Also, the firms in France increased their ABC adoption from 15.9% (2002) to 33.3% (2008). In Australia, the ABC adoption rate is very high in 1998 (56%) and it is 27.9% in Ireland (2004).

In recent years, some studies have been conducted on the adoption and implementation of the ABC method in developing countries. Generally, the adoption rate of the ABC method is higher in Asian than in African countries. It is 20% in India (Joshi, 2001); 36% in Malaysia (Ruhanita and Daing, 2007) and 35% in Thailand (Chongruksut and Brooks, 2005). This rate is only 24% in Tunisia (Moalla, 2007) and 12% in South Africa (Sartorius, Eitzen and Kamala, 2007). Also, 9.3% of the Cameroonian companies adopt this method of the management accounting (Ngongang, 2010). Unfortunately, we could not find statistics for Moroccan firms.

### *Impact of the PEU on the use of ABC*

Certainly, the environment uncertainty has been considered as a major variable in contingency-based research (Chenhall, 2003). 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 discriminate between relevant or irrelevant data”. Gupta and Govindarajan (1984) adopted a similar definition who focused on the concept of perception.

The relationship between PEU and managerial innovations is still not explored. The results of different studies are conflicting. The literature relating to the managerial innovations has found generally a positive relationship between organizational innovation and uncertainty (Russel and Russel, 1992). Dekker and Smith (2003) demonstrate that the adoption of costing practices is related to a competitive and unpredictable environment in Dutch firms listed at the Amsterdam stock exchange. Also, the results found by Naranjo-Gil (2009) demonstrated a positive relationship between environmental uncertainty and the adoption of technical and administrative innovations at Spanish public hospitals. But, Ax *et al.* (2008) demonstrated that is no evidence of a direct relationship between PEU and the adoption of target costing in Swedish industrial companies.

The empirical researches on the impact of PEU on ABC adoption are relatively few and the results obtained are generally conflicting. Innes and Mitchell (1991), in their case study, found that the change in external environment is the motivator for management accounting. Shield (1995) attempted to test the relation between ABC adoption and environmental factors such as globalization, deregulation, and customer demand. He found that the dynamic changes of these factors lead to shifts in practices of management accounting. In this context, from a research conducted on the diffusion of ABC in Finland, Malmi (1999) showed that the level of competition and product diversity are significantly higher for firms adopting ABC compared to others. But in France, Alcouffe (2002) found no significant difference between firms adopting ABC and others. The author has identified three dimensions of the environment: the intensity of competition, the environmental stability and the environmental predictability.

About us, we expect that organizations that face environmental uncertainty will be more likely to adopt administrative innovations such as activity-based costing than organizations operating in certain environment. We formulate the following hypothesis:

*Hypothesis H1: environmental uncertainty has a significant and positive impact on the use of ABC.*

### *Performance of ABC*

According to the theories of diffusion of innovations (Kwon and Zmud 1987), firms adopt the managerial innovations such as ABC for example to obtain to obtain a positive impact on the global performance.

The impact of ABC on organizational performance has been studied by several authors, especially in the Anglo-Saxon countries like the U.S. and the UK for example. According to its partisans, the ABC method can reduce the inexactitude about the allocating costs and improve the performance (Ittner et al., 2002). Shields (1995), from an empirical study conducted in the United States, showed that 75% of respondents said that the use of ABC resulted in improving in financial performance, and only 25% who said the opposite. This result was confirmed later by McGowan and Klammer (1997) and Foster and Swenson (1997). The first researchers examined whether employees' satisfaction levels associated with ABC. They found employees' satisfaction with ABC implementation was positively correlated with clarity of objectives, quality of ABC information.

According to an empirical study comparing the performance of traditional methods and that of the ABC method, Mc Gowan (1998) demonstrated that the relevance, the causality, the availability and the meaning of information are improved by using the ABC system. In the same sense of ideas, Krumwiede (1998) obtained that 42% of enterprises using ABC method consider that their system of the management accounting is "good" or "excellent", while the percentage is only 28% for all enterprises.

During the XXI century, Ittner et al. (2002), in their survey of 2789 US firms, have shown that the use of ABC is associated positively and significantly with reducing of the costs in the U.S. manufacturers. Kennedy and Affleck-Graves (2001) show that the choice of a management accounting system, such as ABC, may have a significant impact on firm value. Specifically, they note "firms adopting activity-based costing techniques outperform matched non-ABC firms by approximately 27 percent over the three years beginning on January 1 of the year in which the ABC techniques are first implemented". In this context, Cagwin and Bouwman (2002) demonstrate that there indeed is a positive association between ABC and improvement in ROI. According to Pizzini (2006), the use of the ABC approach usually results in an increase in profitability, competitiveness and shareholder value. Recently, Banker et al. (2008), from an empirical study of 1250 U.S. companies, have shown that ABC method has an indirect positive impact on the industrial performance. More recently, Zaman (2009) confirmed that the use of the ABC method results in a better overall performance for enterprises that have adopted it in Australia. Pavlatos and Paggios (2009), in their survey conducted among 146 leading Greek hotel enterprises, concluded that the use of ABC is very satisfactory. In China, Yi Fei and Ruhana Isa (2011) found that the ABC success implementation could results in the improvement in manufacturing performance and business performance. We can formulate the following hypotheses:

*Hypothesis H2: the use of the ABC model results in an increase in firm's competitiveness better than the use of traditional management accounting systems.*

*Hypothesis H3: the use of the ABC model results in an increase in firm's profitability better than the use of traditional management accounting systems.*

*Hypothesis H4: the use of the ABC model results in an increase in firm's productivity better than the use of traditional management accounting systems.*

However, these results must be relativized, several authors believe that the adoption of this method is far from having replaced the system of direct costing in the Anglo-Saxon world or the systems of full costing in the continental Europe (Mévellec, 2002). Recently, several researchers found that the traditional costing system is still increasingly implemented in several companies (Al-Omiri & Drury, 2007; Askarany & Smith, 2008).

The implementation of the ABC should be used with great caution. Gordon and Silvester (1999), in their study about the performance of ten ABC user firms, demonstrated that the ABC does not lead to creation of firm value. In the United Kingdom, companies that implement the ABC said a few years ago, according to a survey conducted by Innes et al. (2000), have abandoned it. Also, Bergeron and Bélaïd (2006) could not confirm the expected relationship between the use of ABC and performance. Recently, some researchers asserted that the ABC model is in crisis, because its implementation rate is still low (Abdel-Kader and Luther, 2008; Rasiah, 2011). According to Byrne, Stower and Torry (2009), if ABC implementers find it unsuccessful, the low adoption rate could be justified.

These conflicting results require researchers to introduce some contingency variables such as PEU for example. According to our analysis developed above, we can formulate this hypothesis:

*Hypothesis H5: There is a significant positive effect of ABC adoption on firm's competitiveness in firms operating in an uncertain and dynamic environment. There is not a significant effect of ABC adoption on firm's competitiveness in firms operating in a certain and stable environment.*

*Hypothesis H6: There is a significant positive effect of ABC adoption on firm's profitability in firms operating in an uncertain and dynamic environment. There is not a significant effect of ABC adoption on firm's profitability in firms operating in a certain and stable environment.*

*Hypothesis H7: There is a significant positive effect of ABC adoption on firm's productivity in firms operating in an uncertain and dynamic environment. There is not a significant effect of ABC adoption on firm's productivity in firms operating in a certain and stable environment.*

## **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 collections.

### *Data collection*

In order to promote the scientific and external validity of the results of this research, we conducted a questionnaire survey among a sample of management controllers and CFOs. We preferred that all of our questions to be asked in a multiple choice. This is intended not to require the respondent to think too hard about an answer and have the

maximum of useful information. 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 for a response rate of 18%. Of these, 14 questionnaires were eliminated for various reasons (incomplete questionnaires; companies not adopting the management control, etc...). The total number of responses analysed is 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 4 other managers (6%).

To test the responses bias, we compared the first 20 respondents and the last 20 respondents on the basis of two criteria: "the industry" and "the number of employees." the results of the Student tests show that the difference between the two populations based on the number of employees are not significant. Also, the chi-square test for comparison between populations based on the industry is not significant.

### *Sample*

According to several previous studies such as Shields, (1995); Brown et al. (2004); Cohen et al. (2005); Baird et al. (2007); etc., we examine in this paper the ABC implementation without distinguishing between Manufacturing and Non-Manufacturing industries. In selecting the sample of our study, we focused on two elements: the industry and the existence of a system costing. Regarding the industry, the first experiences of implementing the ABC method were performed in industrial enterprises. During this period, the studies on the ABC method were performed in the context of industrial company. More recent studies have extended their field of study in industrial and financial sector (Innes and Mitchell, 1995 and Innes et al., 2000). Then the service sector has attracted the attention of some researchers (Bescos et al. 2001) who conducted their studies with industrial and service companies. Other more recent studies (Alcouffe, 2002 and Cohen, 2004) have expanded their investigation to study the three main areas of activities are commercial, industrial and services. We chose to make our study with companies in these three sectors of activity. Regarding the second element, we have chosen just companies that adopt a formal or informal system costing. The sample consists of 48 industrial enterprises (77%), 6 firms of building and public works (10%), 6 enterprises of services (10%) and 2 commercial enterprises (3%). Regarding the firms size, 48% of this sample consists of SMEs and 52% of large firms.

### *Variables measurement*

In this research, three variables will be used: the use of the ABC, the PEU and the organizational performance.

#### The use of the ABC

For have information about the use of the ABC method, we have formulated the following question: what is the method that you use to calculate the costs of your products? Five answers were offered: "the full cost method (homogeneous sections)"; "the method of partial costs (direct / variable)"; "the activity based costing (ABC)"; "informal methods" and "other methods". ABC adoption was considered as a



dichotomous variable that takes the value “1” if ABC is adopted and “0” if another method is used.

### The PEU

Severale Researchers have suggested that the environmental uncertainty should be conceptualized as a perceptual phenomenon referred to as perceived environmental uncertainty (Gul & Chia, 1994; Milliken 1987). PEU refers to uncertainty about future environmental states and can be defined as “...an individual’s perceived inability to predict something accurately” (Milliken, 1987). In this study, PEU is interpreted as an individual’s inability to predict customer preferences and competitors’ future behavior. To measure this variable, we selected five items. These items are developed by Gordon and Narayan (1984): “dynamism of the economic environment”; “dynamism of the technological environment”; “predictability of the competitor’s activity in the market”; “predictability of tastes and preferences of customers” and “review of marketing policies”. For the first two items, 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. These items are used by several researchers in management accounting (Ax et al., 2008; etc.).

The Cronbach’s alpha for the five items is 0.793, suggesting that the items have relatively good internal consistency. According to the exploratory factor analysis, the eigen value for the first factor is quite a bit larger than the eigen value for the next factor (2.752 versus 0.938). Additionally, the first factor accounts for 55.04% of the total variance. This suggests that the scale items are unidimensional.

### Organizational performance

In front of the impossibility to isolate the performance generated by the management accounting methods, we had chosen a perceptual approach. This approach involves an assessment of the respondent on a five-point scale (ranging from “very low” to “very high”), the average contribution of the management accounting method adopted in the improvement of three dimensions of performance: "profitability", "competitiveness" and "productivity"<sup>2</sup>.

## Results and Discussion

This part of study has three sub-sections. First sub-section reports the results about ABC adoption by firms surveyed, focusing on the characteristics of their environment, the second one presents the effect of PEU on ABC adoption, and the last sub-section reports the results about performance of ABC according to PEU.

### *Main results and impact of environmental uncertainty on the use of ABC*

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<sup>2</sup> Using these three dimensions of performance is recommended by several authors in management control (Naro, 2003).

According to the survey, 12.9% of companies have adopted the ABC approach. The sample is divided into two groups: on the one hand, companies that haven't adopted ABC and on the other, those which are already using this method.

Results show that 87.5% of adopters are big firms and also, 87.5% operate in industrial sector. Those results are consistent with the finding of other researchers 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.

Using Ward's hierarchical method of cluster analysis, we identified two main types of environment in which the surveyed firms operate: "uncertain and dynamic environment" and "certain and stable environment". The following table summarizes the results relating to the adoption of ABC by firms based on their environment.

Table 2. Relationship between ABC adopters and their environment

	ABC	Classical methods
Uncertain and dynamic environment	87.5%	44.4%
Certain and stable environment	12.5%	55.6%
Total	100%	100%
Chi-square test statistic=5.167		

87.5% of companies adopting ABC operate in an uncertain and dynamic environment and 12.5% in certain and stable one. To test the association between environmental uncertainty and ABC adoption, we used the Chi Square Test of Independence. The chi-square test is significant at the threshold of 5% demonstrating a statistically significant association between PEU and ABC adoption.

To test the hypothesis H1, logistic regression analysis is used to examine the statistical relationship between PEU and the use of ABC. In this research we have chosen to use the firm size as a control variable. Several researchers (Bjornenak, 1997; Krumwiede, 1998; Dahlgren et al., 2001; Elhamma, 2013; etc.) showed that the size of organizations that adopt the ABC is superior to the size of organizations that do not adopt it. However, to avoid large gaps that may exist between the employees number of each company, we have chosen to use the "Log" of number of employees (LOGSIZE).

The logistic regression analysis was carried out by the Logistic procedure in SPSS.

$$\text{Logit}(p) = \text{Log} [p / (1-p)] = \alpha + \beta_1 \text{PEU} + \beta_2 \text{LOGSIZE}$$

- $p / (1-p)$  is called the "odds ratio".
- $\text{log} [p / (1-p)]$  is "log odds ratio" or "logit".
- "p" is the probability that a firm adopts the ABC method according to its PEU.

We can calculate "p" as follows:  $p = 1 / [1 + e^{-(\alpha + \beta_1 \text{PEU} + \beta_2 \text{LOGSIZE})}]$

The output of the logistic regression is:  $\text{Logit}(p) = (0.298) * \text{PEU} - 7.558$

Therefore,  $p = 1 / [1 + e^{(0.298 \text{ PEU} - 7.558)}]$

Also, the output of the logistic regression model indicates that Chi-square value is 3.266 ( $p < 10\%$ ). 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 Square indicates that the PEU explains 9.6% of the variance in ABC use. The output of the logistic regression analysis is presented in table 3.

Table 3. Logistic regression for the PEU influencing the ABC adoption

Independent variables	B	S.E.	Wald	Sig.
Constant	-7.558	3.456	4.784	0.029
PEU (independent variable)	0.298	0.176	2.878	0.090
LOGSIZE (control variable)				
Chi-square	3.266			
Sig.	0.071			
Nagelkerke R Square	0.096			

The statistics relating to hypothesis H1 reveal that the PEU has a significant and positive effect on the use of ABC model with a beta of 0.298 (Wald statistics=2.878). The hypothesis H1, which predicts a direct and positive relationship between PEU and the use ABC, is supported at the 10% significance level. Therefore, hypothesis H1 is accepted by our statistical analysis. These results are consistent with the findings of Ax et al. (2008) who demonstrated the absence of a significant relationship between the adoption of target costing and environmental uncertainty. However, comparison must be interpreted carefully because of the differences in the characteristics of innovations. Contrariwise, Naranjo-Gil (2009) found a positive relationship between environmental uncertainty and administrative and technical innovations.

*Performance of the ABC and the traditional methods of management accounting*

The main results of the survey are shown in table 4 (performance of ABC method) and table 5 (performance of classical methods).

Table 4. Performance of the ABC method

	Competitiveness	Profitability	Productivity
Very high contribution	75.00%	37.5%	12.5%
High contribution	12.50%	50.00%	62.5%
Moderate contribution	12.50%	12.5%	25.0%
Low contribution	00%	00%	00%
Very low contribution	00%	00%	00%
Total	100%	100%	100%

Table 5. Performance of the classical methods of management accounting

	Competitiveness	Profitability	Productivity
Very high contribution	1.9%	11.1%	11.1%
High contribution	40.7%	33.3%	29.6%
Moderate contribution	55.6%	55.6%	50.0%
Low contribution	1.9%	00%	9.3%
Very low contribution	00%	00%	00%
Total	100%	100%	100%

87.5% of the ABC adopters have considered that the use of the ABC method results in a “very high” or “high” improving in competitiveness and in profitability. Concerning the classical methods, this percentage is only 42.6% for the competitiveness and 44.4% for the profitability. Also, the use of this new method of the management accounting results in a better productivity for enterprises that have adopted it. To show statically these results, we will code the responses (5: very high contribution; 4: high contribution; 3: moderate contribution; 2: low contribution and 1: very low contribution) and we will compare the means between ABC adopters and ABC non adopters. To do it, we will use the Student's t-test for a difference in means. The main results of this test are shown in table 6.

Table 6. Performance average compared between the ABC and the classical methods

Performance dimensions	ABC adopters mean value	ABC non adopters mean value	Difference	t-value	Sig.
Competitiveness	4.6250	3.4259	1.1991	5.340	0.000*
Profitability	4.2500	3.5556	0.6944	2.644	0.010***
Productivity	3.8750	3.4259	0.4491	1.488	0.142ns

\* Significant at the 1% \*\*\* Significant at the 10% ns Not Significant

According to our data, the use of ABC results in an increase in competitiveness (t-value=5.340;  $p < 1\%$ ). Therefore, hypothesis H2 is accepted by our statistical analysis. Also, the use of ABC results in an increase in profitability (t-value=2.644;  $p < 10\%$ ). Therefore, hypothesis H3 is accepted by our statistical analysis. But, this difference in means is not significant for the productivity (t-value=1.488; ns). Therefore, hypothesis H4 is not accepted by our statistical analysis.

#### *Performance of the ABC method according to the PEU*

To test statistically the hypotheses H5, H6 and H7, we will use the Student's t-test for a difference in means of the performance of the management accounting methods in firms operating in an uncertain and dynamic environment and those operating in a certain and stable environment.

Table 7. Performance average compared between the ABC and the classical methods in firms operating in an uncertain and dynamic environment and those operating in a certain and stable environment

Dimensions	Firms operating in an uncertain and dynamic environment (N=31)					Firms operating in a certain and stable environment (N=31)				
	ABC adopters mean	ABC non adopters mean	Diff.	t	Sig.	ABC adopters mean	ABC non adopters mean	Difference	t	Sig.
Competitiveness	4.714	3.375	1.339	5.05	0.000*	4.000	3.466	0.533	0.918	0.366 <sup>ns</sup>
Profitability	4.285	3.458	0.827	2.64	0.013**	4.000	3.633	0.366	0.539	0.594 <sup>ns</sup>
Productivity	3.857	3.333	0.523	1.63	0.113 <sup>ns</sup>	4.000	3.500	0.500	0.571	0.572 <sup>ns</sup>

\* Significant at the 1%      \*\*\* Significant at the 10%      ns: Not significant

In firms operating in an uncertain and dynamic environment, the use of ABC results in an increase in competitiveness (test-t=5.050;  $p < 1\%$ ). However, this difference in means is not significant in firms operating in a certain and stable environment. The hypothesis H5 is accepted by our statistical analysis. The first firms have an interest to use the ABC, but those operating in a certain and stable environment are indifferent between adopting and not adopting this new method of the management accounting. Firms operating in an uncertain and dynamic environment have an interest to adopt ABC to improve their profitability. The use of this management accounting model results in an increase in profitability (test-t=2.644;  $p < 5\%$ ). However, this difference in means is not significant in firms operating in a certain and stable environment. The hypothesis H6 is accepted by our statistical analysis. For the productivity, the two categories of firms have not an interest to use the ABC model, the hypothesis H7 is not accepted.

## Conclusion

According to Bescos et al. (2002, p. 243), “there is still a lot of work to do to fully understand the diffusion process for management accounting innovations in various contexts”. In this context, this article evaluated the relationship between ABC adoption, PEU and performance. Despite its popularity, only 12.9% of the responding companies had declared implementing the ABC method. The results of the study show that:

- The PEU has not a significant impact on the use of ABC.
- The use of ABC approach results in increase in competitiveness and profitability in surveyed firms;
- The use of ABC results in an increase in competitiveness and profitability in firms operating in an uncertain and dynamic environment, but those operating in a certain and stable environment are indifferent between adopting and not adopting this new method of the management accounting.

Two major methodological limits should be highlighted in this research: the modest size of the sample and the use of a perceptual approach to collect data. The results obtained in this research must be used with caution.

We used in this research the PEU to explain the use and performance of ABC. In this context, many avenues of research are considered. First, it is necessary to use other organizational variables like strategy, environment uncertainty, etc. Second, it is important to use non organizational determinants (behavioral) like leadership styles, the culture of leadership, legal ownership (independent or subsidiary of a Moroccan or foreign companies), etc.

## References

Alcouffe, S. (2002), La diffusion de l'ABC en France : une étude empirique utilisant la théorie de la diffusion des innovations, 23rd Congress of the French Association of Accounting, Toulouse, May.

Armitage, H. M. and Nicholson, R. (1993), Activity based costing: a survey of Canadian practice, Issue paper n° 3, Society of Management Accountants of Canada.

Banker, R. D., Bardhan, I. R. and Chen, T. (2008), The role of manufacturing practices in mediating the impact of activity-based costing on plant performance, *Accounting, Organizations and Society*, 33 (1):1-19.

Bergeron, H. and Bélaïd, Z. (2006), Pratiques de calcul des coûts, utilisation de l'information et performance dans les PME manufacturières, 27th Congress of the Francophone Association of Accounting, Tunis.

Byrne, S., Stower, E. & Torry, P. (2009). 'Is ABC Adoption a Success in Australia?' *The Journal of Applied Management Accounting Research*, 7(1), 37-51.

Bescos P.-L., Cauvin E (2000), L'ABC/ABM: où en est-on actuellement? *Echanges*, 168: 23-26.

Bescos, P.L., Cauvin, E., Gosselin, M. and Yoshikawa, T. (2001), La mise en place de la méthode ABC/ABM au Canada, en France et au Japon – Étude comparative, 22nd Congress of the French Association of Accounting, Metz, May.

Bescos, P.-L., Cauvin, E. and Gosselin, M. (2002), Activity-Based Costing and Activity Based Management: a comparison of the practices in Canada and France, *Revue Comptabilité-Contrôle-Audit*, numéro special, mai: 229-244.

Bjornenak, T. (1997), Diffusion and accounting: the case of ABC in Norway, *Management Accounting Research*, 8 (1): 3-17.

Brown, L. A. (1981), *Innovation diffusion: A new perspective*, New York: Methuen.

Cauvin, E. and Neumann, B. (2007), French Cost Accounting Methods: ABC and other Structural Similarities, *Journal of Cost Management*, May-June.

Chenhall, R. H. and Langfield-Smith, K. (1998), The relationship between strategic priorities, management techniques and management accounting: an empirical investigation using a systems approach, *Accounting, Organizations and Society*, 23 (3): 243-264.

Chenhall, R.H. (2003), Management Control Systems Design within its Organizational Context; Findings from Contingency-based Research and Directions for the Future, *Accounting, Organizations and Society*, 28(2/3): 127–168.

Chongruksut, W. and Brooks A., (2005), The adoption and implementation of activity-based costing in Thailand, *Asian Review of Accounting* 13 (2): 1-17.

Cooper, R. (1990), Implementing an Activity-Based Costing System, *Journal of Costing Management*, spring: 33-42.

Al-Omiri, M. & Drury, C. (2007). A survey of factors influencing the choice of product costing systems in UK organizations. *Management Accounting Research*, 18(4), 399-424.

Askarany, D. & Smith, M. (2008). Diffusion of innovation and business size: a longitudinal study of PACIA. *Managerial Auditing Journal*, 23(9), 900-916.

Dahlgren, J., Holmström, M. and Nehler, H. (2001), Activity Based Costing diffusion and adoption, congress EAA, Athens.

De La Villarmois, O. and Tondeur, H. (1996), L'ABC en France : les déterminants de la mise en place, *Echanges*, Supplément au n° 125 : 51-62.

Donaldson, L. (1996), The normal science of structural contingency theory, in *Handbook of organizational theory*, ed. Clegg S.R., Hardy C. & Nord W.R.: 57-76

Drury, C. and Tayles, M. (1994), Product costing in UK manufacturing organizations, *The European Accounting Review*, 3(3): 443-469.

Dugdale, D. (1990), The Uses of Activity-Based Costing, *Management Accounting*, October: 36-38.

Elhamma A. (2010), La comptabilité par activités au Maroc : une étude empirique utilisant la théorie de la contingence, *Revue du chercheur* 8 : 39-48.

Fisher, J. (1995), Contingency-Based Research on Management Control Systems: Categorization by Levels of Complexity, *Journal of Accounting Literature*, 14: 24-53.

Foster, G. and Swenson, D. W. (1997), Measuring the Success of Activity-Based Cost Management and its Determinants, *Journal of Management Accounting Research*, 9: 109-141.

Gosselin, M. (1997), The effect of strategy and organisational structure on the adoption and implementation of accounting-based costing, *Accounting, Organisations and Society* 22 (2): 105-122.

Gosselin, M. (2000), Influence de la stratégie sur l'adoption et la mise en œuvre d'une comptabilité par activités, *Finance, Contrôle et Stratégie*, 3(4) : 37-56.

Gueye, M. (1997), Contribution à la réflexion sur la mise en place d'outils d'analyse de gestion adaptés au contexte actuel des entreprises - L'approche par les activités et les processus : l'exemple de la France, Thèse de Doctorat, Ecole Centrale des Arts et Manufactures de Paris.

Hopper, T. and Powell, A. (1985), Making sense of research into organizational and social aspects of management accounting: a review of its underlying assumptions, *Journal of Management Studies* 22 (5): 429-465.

Gordon, L. A., and K. J. Silvester (1999). "Stock market reactions to activity-based costing adoptions," *Journal of Accounting & Public Policy*, Vol. 18(3), Autumn, pp. 229-251.

Innes, J. and Mitchell, F. (1991), Activity based costing: a survey of CIMA members, *Management Accounting*, October: 28-30.

Innes, J., Mitchell, F. and Sinclair, D. (2000), Activity based costing in the UK's largest companies: a comparison of 1994 and 1999 survey results, *Management Accounting Research* 11: 349-362.

Ittner, C.D., Lanen W.N. and Larcker D.F. (2002), The association between Activity Based Costing and manufacturing performance, *Journal of Accounting Research* 40, (3): 711-726.

Johnson, H.T. (1990), Beyond Product Costing: A Challenge to Cost Management's Conventional Wisdom, *Journal of Cost Management* 4 (3): 15-21.

Kiani, M. and Sangeladji, M. (2003), An empirical study about the use of ABC/ABM models by some of the fortune 500 largest industrial corporations in the USA, *Journal of American Academy of Business*, Cambridge, 3(1/2): 174-182.

Krumwiede, K. P. (1998), The implementation stages of Activity-Based Costing and the impact of contextual and organizational factors, *Journal of Management Accounting Research* 10: 239-277.

Krumwiede, K.P. and Roth, H.P. (1997), Implementing Information Technology Innovations: The Activity-Based Costing Example, *S.A.M. Advanced Management Journal* 62 (4): 4-13.

Malmi, T. (1999), Activity-based costing diffusion across organizations: an exploratory empirical analysis of Finnish firms, *Accounting, Organizations and Society*, 24: 649-672.



McGowan, A.S. and Klammer, T P. (1997), Satisfaction with Activity-Based Cost Management implementation, *Journal of Management Accounting Research* 9: 217-237.

McGowan, A. S. (1998), Perceived benefits of ABCM implementation, *Accounting Horizons*, 12(1): 31–50.

Mévellec, P. (2002), Les paramètres de conception des systèmes de coûts : étude comparative, 23rd Congress of the French Association of Accounting, Toulouse, May.

Moalla, H. (2007), Les mécanismes de diffusion, d'adoption et de rejet de la méthode ABC dans l'environnement tunisien, 28th Congress of the Francophone Association of Accounting, Poitiers, May.

Naro, G. (2003), Compétitivité, rentabilité, productivité, emploi ... face à la variété des critères de performance, *Revue internationale des relations de travail* 1 (4) :89-124.

Ngongang, D. (2010), Analyse de la pratique des coûts dans les PMI camerounaises, *Revue Libanaise de Gestion et d'Economie*, n°5.

Nooteboom, B. (1994), Innovation and Diffusion in Small Firms: Theory and Evidence, *Small Business Economics*, 6(5): 327-348.

Pierce, B. and Brown, R. (2004), An empirical study of activity based systems in Ireland, *The Irish Accounting Review*, 11(1):55.

Pizzini, M. J. (2006), The relation between cost-system design, managers evaluations of the relevance and usefulness of cost data, and financial performance: an empirical study of US hospitals, *Accounting, Organizations and Society* 31 (2):179–210.

Rahmouni, A . F. (2008), La mise en œuvre de la comptabilité par activités dans les entreprises françaises, Thèse de doctorat, Université du Sud Toulon– VAR.

Ruhanita, M. and Daing, N.I. (2007), Factors influencing activity based costing (ABC) adoption in manufacturing industry, *Investment Management and Financial Innovations* 4 (2): 113-124.

Sartorius, K., Eitzen, C. and Kamala, P. (2007), The design and implementation of Activity Based Costing (ABC): a South African survey, *Meditari Accountancy Research* 15 (2): 1-21.

Scott, W.R. (1992), *Organizations: Rational, Natural, and Open Systems*. Englewood Cliffs, N.J.: Prentice-Hall.

Shields, M D. (1995), An Empirical Analysis of Firms: implementation experiences with Activity-Based Costing, *Journal of Management Accounting Research* 7: 148-166.

Shim, E. and Sudit, E. (1995), How manufacturers price products, *Management Accounting (USA)*, 76(8):37-39.

Pavlatos, O. and Paggios, I. (2009) “Management accounting practices in the Greek hospitality industry”, *Managerial Auditing Journal*, Vol.24, No.1, pp. 81-98.

Tayles, M. and Drury, C. (2001), “Autopsy of a stalling ABC system: a case study of activity based cost management and performance improvement”, The 24th Annual Congress of the European Accounting Association, Athens, Greece, April 18-20.

Turney, P.B.B. (1991), How Activity-Based Costing Helps Reduce Costs, *Journal of Cost Management* 4 (4): 29-35.

Zaman, M. (2009), The Impact Of Activity Based Costing On Firm Performance: The Australian Experience, *International Review of Business Research Papers* 5 (4): 200-208.