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THE RELATIONSHIP BETWEEN ACTIVITY BASED COSTING, BUSINESS STRATEGY AND PERFORMANCE IN MOROCCAN ENTERPRISES

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ABSTRACT

The Activity Based Costing (ABC) represents a new model in the management accounting. In recent decades, it has been the subject of several research papers, especially in developed countries (USA, UK, France...). However, this type of works is still absent in the Arab countries. In this context, this article highlights the results of an empirical study on the relationship between ABC, business strategy and organizational performance in 62 Moroccan enterprises. 12.9% of the responding companies reported using the ABC method. The results using logistic regression indicate that the business strategy has not a significant influence on the use of this new method of the management accounting. 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 both types of firms (prospectors and defenders) have an interest to adopt the ABC method.



Activity Based Costing (ABC) – Business strategy – Prospectors – Defenders – Organizational performance.

INTRODUCTION

Nowadays, environment of manufacturing firms has been changed tremendously, competition has become more intensive in last decade. Accurate costing information is essential for any businesses to retain competitive advantages. Therefore, more accurate costing information is needed for effective decision making in today's advanced manufacturing environment. However, the traditional volume-based costing system is argued to result in inaccurate costing information.

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Activity-Based Costing (ABC) was introduced by Cooper and Kaplan (1988) to overcome the weaknesses of the traditional volume-based costing system. Compare to traditional costing system, ABC system employed multiple cost drivers and allocation basis to allocate overhead cost to final products and services (Cooper & Kaplan, 1988, 1992). Number of researchers argued that ABC could lead to more accurate costing information (Cooper & Kaplan, 1992; Shields, 1995; Innes *et al.*, 1995, 2000; Bjørnenak, 1997; Lana & Fei, 2007; Banker *et al.*, 2008). Due to its capabilities to produce more accurate costing information for operating decision making, both practitioners and researchers are motivated to investigate factors influencing ABC success adoption. Prior studies found that ABC success adoption was associated with firms' size (Bjørnenak, 1997; Alcouffe, 2002; Dahlgren *et al.*, 2001; etc.), organizational structure (Gosselin, 1997; Elhamma, 2010; etc.), structure of charges (Bjørnenak, 1997; Malmi, 1999; etc.), etc.

However, among prior researches about factors influencing ABC success adoption, only some empirical studies that have tested the relationship between strategy and ABC. According to Chenhall (2003), type of strategy a firm employs could produce great impact on the effectiveness and efficient of any management accounting and control system. ABC is regarded as one of the innovation in management accounting, thus, its success could be affected by type of strategy.

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 method in Morocco?
- What is the impact of business strategy on the use of the ABC method?
- What is the impact of ABC method on global performance according to the business strategy?

This paper is organized as follows: section 1 shows the relevant literature review, such as ABC definition and its adoption rate in various countries, and the research hypotheses for current study are formulated. Section 2 presents the methodology for this study. Conclusions of this study are shown in section 3.

1. LITERATURE REVIEW AND FORMULATION OF HYPOTHESES

In this section, we define firstly the ABC method. Secondly, we highlight the impact of business strategy on the use of ABC system, and thirdly, we examine the performance of ABC model.

1.1. The ABC approach: definition and adoption

Much has been written about the ABC system. Several definitions have been given for the ABC system. The examples are as follows:

The Computer Aided Manufacturing-international (CAM-I) viewed ABC as “a

method that measures the cost and performance of process-related activities and cost objects. ABC assigns cost activities based on their use of resources, and assigns cost to cost objects, such as products or customers. ABC recognizes the causal relationship of cost drivers to activities (Cited in Raffish, 1991, p. 37).

Turney (1996) defined ABC as a method for tracing cost and measuring performance of activities and cost objects. It traces cost to activities according to their consumption of resources and then assigns cost to cost objects based on their use of activities.

Krumwiede and Roth (1997) stated that ABC system is an accounting system, which is used to measure the cost and performance of activities, products as well as other cost objects. They also stressed that when manufacturing processes are complex or products are manufactured in a large volume, the cost data produced by ABC is generally more accurate than the data generated by traditional volume-based costing system.

Needy and Bopaya (2000) argued that ABC is an approach for cost management that aims to avoid the shortcomings inherent to conventional costing system for dealing with the overhead cost. Baxendale (2001) claimed that ABC uses accounting information produced by accounting standard to analyze product profitability and to identify unused cost information for strategic decision making and planning. Furthermore, Roztocki and Needy (2000) stressed that ABC is a reliable method for cost analysis, and ABC is also a highly effective tool in assisting strategic decision making.

Hornrgren *et al.* (2003: 141) proposed that:

“Activity-Based Costing refines a costing system by focusing on individual activities as the fundamental cost objects. An activity is an event, task, or unit of work with specified purposes; for example, designing products, setting up machines, operating machines, and distributing products. ABC systems calculate the costs of individual activities and assign costs to cost objects such as products and services on the basis of the activities needed to produce each product or service”.

Akyol *et al.* (2004) presented that ABC is an economic model; it is used to identify the cost pools and activity of an organization in producing a product or service and to trace cost to cost drivers according to the number of each activity consumed

Tho (2006: 28) described ABC as:

“A methodology that measures the cost and performance of activities, resources and cost objects. Resources are assigned to activities, then

activities are assigned to cost objects based on the use or consumption of the relevant activities. ABC recognizes the causal relationship of cost drivers to activities”.

From the various definitions presented above, it can be concluded that ABC is an instrument that provides a better understanding about the relationship between cost and organizations activities.

Over the last decade, several 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 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	Adoption rate
USA	1993	Armitage and Nicholson	11%
	1995	Shim and Sudit	25%
	2003	Kiani and Sangeladji	52%
UK	1991	Innes and Mitchell	6%
	1994	Drury and Tayles	13%
	2000	Innes, Mitchell and Sinclair	17.5%
	2001	Tayles and Drury	23%
France	2001	Bescos <i>et al.</i>	23%
	2002	Alcouffe	15.9%
	2007	Cauvin and Neumann	23%
	2008	Rahmouni	33.3%
Australia	1998	Chenhall and Langfield-Smith	56%
Ireland	2004	Pierce and Brown	27.9%

Table 1 shows that ABC adoption rate among Western countries. From the U.S perspective, Armitage and Nicholson (1993) showed that among manufacturing firms in the USA. the ABC adaptors only accounted for 11% of total respondents. Shim and Sudit's (1997) survey among US Fortune 1000 companies show that an ABC system is becoming more popular and rapidly accepted in the U.S.A, and the ABC adoption rate jumped to 25%. In addition, research conducted by Kiani and Sangeladji (2003) on the largest 500 US industrial firms shows 44 out of 85 participated companies (around 52%) used ABC model.

In the UK, the first research on ABC implementation was carried by Innes and Mitchell in 1991. They found that ABC development was apparently at an early stage and only 6% of respondents in 1990 were implementing ABC and 33% of respondents were taking ABC into consideration. Drury and Tayles (1994) found that among the manufacturing firms, 13% of respondents were using ABC for

various purposes. However, a more recent study by Innes, Mitchell and Sinclair (2000) reported a lower average adoption rate of 17.5%, which consisted of 14.3% among manufacturing firms, 12.1% among service firms, and 40.7% among financial firms which adopted ABC. The latest research done by Tayles and Drury (2001) showed a 23% of ABC adoption rate.

Study by Pierce and Brown (2004) in Ireland found that overall rate of ABC adoption was 27.9%. Among all the ABC users, the adoption rate of ABC system in manufacturing sector increased from 12% to 34.9%, also, they also reported 17.8% and 28.6% in the service industry and finance sectors respectively.

In Australia, Chenhall and Langfield-Smith (1998), who conducted a survey on the adoption and benefits of management accounting practices in Australia, found that the new management accounting practices, such as ABC, were more widely implemented than had been found in previous studies. They showed that the largest Australian manufacturing firms, listed on the Business Review Weekly, ABC adaptors made up 56% of the 78 participants.

As for the ABC adoption in French Context, Bescos *et al.* (2001) found a adoption rate of 23% among the surveyed companies. While, Alcouffe's (2002) study shows that 15.9% of total respondents were currently using ABC system. Another study in 2007 by Cauvin and Neumann found 23% firms adopted ABC system. Latest study by Rahmouni in 2008 found an adoption rate of 33% among total respondents. Prior studies showed that over the last decade, there is a general increase in ABC adoption rate in western countries

The ABC adoption rate for developing nations are summarized in Table 2.

Table 2. The extent of ABC implementation in some Asian and African countries

Countries	Study	Adoption rate
Cameroon	Ngongang (2010)	9.3%
Tunisia	Moalla (2007)	23.75%
South Africa	Sartorius, Eitzen and Kamala (2007)	12%
Thailand	Chongruksut and Brooks (2005)	35%
Malaysia	Ruhanita and Daing (2007)	36%

Study by Ruhanita and Dating (2007) among manufacturing firms in Malaysia found that 36% of total respondents were employing ABC system to allocate overhead costs. Chongrukut *et al.* (2005) found a 35% adoption rate in Thailand. Latest study by Ngongang (2010) in Cameroon found an adoption rate of 9.3%.

It can be concluded that ABC adoption rate in both Western nations and Asian, African countries is increasing. Western countries reported the highest ABC adoption rate, followed by Asian countries. The lowest of adoption rate of ABC system was found in African nations.

1.2. Business strategy and ABC adoption

To explain the use of the ABC by the business strategy, it seems necessary to use the contingency theory. The basic principle of the contingency theory is clearly mentioned by Scott (1992: 89): "the best way to organize depends on the nature of the environment to which the organization relates". During the last four decades, the management control systems literature has been dominated by the contingency paradigm. Fisher (1995: 32) demonstrates that "... the contingent control literature is based on the premise that a correct match between contingent factors and a firm's control package will result in desired outcomes".

Strategy is a word with many meanings. In management control, Anthony (1965) defined strategy as "the pattern of objectives, purposes or goals and major policies and plans for achieving these goals stated in such a way as to define what business the company is or is to be in and the kind of company it is or is to be". Several typologies of strategic behaviours are invented. The Miles & Snow's (1978) typology involves four strategic types:

1. Defenders are organisations which have narrow product-market domains;
2. Prospectors are organisations that almost continually search for market opportunities, and they regularly experiment with potential responses to emerging environmental trends;
3. Analyzers are organisations that operate in two types of product-market domains, one relatively stable, the other changing;
4. Reactors are organisations in which top managers frequently perceive change and uncertainty occurring in their organisational environments but are unable to respond effectively.

According to Porter's typology, a business can maximize performance either by striving to be the low cost producer in an industry or by differentiating its line of products or services from those of other businesses.

Many management accounting practices may provide benefits to organizations emphasizing either product differentiation or low-cost strategies. According to Shank (1989), different managerial mind sets underlying differentiation and low-cost strategies may influence preferences for particular management accounting methods.

In Canada, Gosselin (1997, 2000) examined the influence of strategy and business structure on the propensity to adopt of the "management activities" (MA). To conduct this research, the author has chosen the Miles and Snow's typology. The survey results showed that the prospector companies adopt the ABC system more than the defender firms. This conclusion is supported by Krumwiede and Jordan (1998) who examined a group of adopters and non-adopters and found an indication of a quality and price focus, respectively. In France, Alcouffe (2002) showed that the proportion of firms pursuing a strategy of type "prospector" and "analyzer" among the companies adopting ABC would be greater than those found among businesses not adopting the method. Hence, we predict that:

H1: *There is a significant and positive effect of prospector strategy on the use of the ABC method.*

1.3. Performance of ABC

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 cost allocation 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).

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) have shown that the use of ABC is associated positively and significantly with reducing of the costs in the U.S. manufacturers. 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.

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). The implementation of the ABC should be used with great caution. 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.

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

H2: *There is a significant positive effect of ABC adoption on organizational performance in prospector firms. There is not a significant effect of ABC adoption on organizational performance in defender firms.*

2. METHODOLOGY

It is important to present the methodology for any study conducted. The following sub-sections describe study design and the methods for data collections

2.1. Sample

The study was based on data collected using questionnaires sent to enterprises based in morocco. The questionnaires were completed by 18 CFOs (29%), 23 management controllers (37%), 17 accountants (27%) and 4 other managers (6%).

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.

2.2. Variables measurement

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

2.2.1. Use of the ABC method

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”.

2.2.2. Business strategy

To operationalize the business strategy in this research, we had chosen the Miles and Snow's typology (1978). We have established seven items. Each item consists of two opposite strategies (defenders vs. prospectors). This approach is borrowed from a research work done by Mouline (2000) in French SMEs. These items are:

Table 3. Items relating to the identification of the strategy pursued

Defenders.....		Prospectors
The company focuses on product standardization to achieve low costs.	0.....1.....2.....3.....4.....5	The company focuses on product differentiation to satisfy a wider clientele.
Growth was achieved mainly by extension of existing products to existing customers.	0.....1.....2.....3.....4.....5	Growth was achieved mainly by developing new products to new customers.
The main concern in the firm is the protection of a stable product line within clearly defined markets.	0.....1.....2.....3.....4.....5	The main concern in the firm is to identify and satisfy new customers with new products.
In the enterprise, the main concern is to keep the current products or services.	0.....1.....2.....3.....4.....5	In the enterprise, the main concern is the development of new products or services.
In the company, the preference is marked for risk-free investments with a moderate returns.	0.....1.....2.....3.....4.....5	In the company, the preference is marked for risk investments with a high returns.
The strategy is based on the actions of competitors.	0.....1.....2.....3.....4.....5	The strategy is to take the initiative of the action.
The company is rarely the first to introduce new production processes.	0.....1.....2.....3.....4.....5	The company is usually the first to introduce new production processes.

The respondent has chosen the strategic position of its business. He had a choice of six responses (from 0 to 5). The Cronbach's alpha for performance is 0.798, indicating a good level of reliability. A high global score means that the prospection strategy is dominant and vice versa.

2.2.3. Performance of ABC model

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"¹. The Cronbach's alpha for global performance is 0.848, indicating a good level of reliability. A high score means a high performance and vice versa.

3. RESULTS AND DISCUSSION

According to the survey, 12.9% of companies use the ABC approach. The sample can be divided into two groups; on the one hand, companies use not the ABC and the other, those already using the technique. In this section, we report, firstly, the results about the effect of the business strategy on the use of ABC method, and secondly, we present the results related to the performance of the ABC model according to the business strategy.

3.1. Impact of business strategy on ABC adoption (Testing the H1)

To test the hypothesis H1, logistic regression analysis is used to examine the statistical relationship between business strategy and the ABC adoption. The logistic regression analysis was carried out by the Logistic procedure in SPSS.

$\text{Logit}(p) = \text{Log} [p / (1-p)] = \alpha + \beta \text{ Strategy}$

- $p / (1-p)$ 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 strategy.

We can calculate "p" as follows: $p = 1 / [1 + e (\alpha + \beta \text{ Strategy})]$

The output of the logistic regression is: $\text{Logit}(p) = (0.173) * \text{Strategy} - 5.544$

Therefore, $p = 1 / [1 + e (0.173 \text{ Strategy} - 5.544)]$

Also, the output of the logistic regression model indicates that Chi-square value is 2.152 ($p > 10\%$). This value is not significant, which means that the overall model is not predicting display rule understanding significantly better than it was with only the constant included. The Nagelkerke R Square indicates that the business strategy explains only 6.4% of the variance in ABC use. The output of the logistic regression analysis is presented in table 4.

Table 4. Logistic regression for the business strategy influencing the ABC adoption

Independent variables	B	S.E.	Wald	Sig.
Constant	-5.544	2.649	4.380	0.036
Business strategy	0.173	0.121	2.045	0.153
Chi-square	2.152			
Sig.	0.142			
Nagelkerke R Square	0.064			

The statistics relating to hypothesis H1 reveal that the business strategy has not a significant effect on the use of ABC model with a beta of 0.173 (Wald statistics=2.045). The hypothesis, which predicts a direct relationship between business strategy and the use of ABC, is not accepted by our statistical analysis.

3.2. Performance of the ABC method according to the business strategy

3.2.1. Performance of the ABC and the traditional methods of management accounting

The main results of the survey are shown in table 5 and table 6.

Table 5. 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 6. 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 7.

**Table 7. 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
Performance	12.7500	10.4047	2.3426	3.399	0.001*

* 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; $p < 1\%$), profitability (t-value=2.644; $p < 10\%$) and in general in performance (t-value=3.399; $p < 1\%$). Therefore, the surveyed firms have an interest to use the ABC approach.

3.2. Testing the hypothesis H2

To test statistically the hypothesis H2, we will use the Student's t-test for a difference in means of the performance of the management accounting methods in prospector firms and defender enterprises.

In prospector firms, the use of ABC results in an increase in competitiveness (test-t=4.04; $p < 1\%$), profitability (test-t=2.51; $p < 5\%$) and in general in performance (test-t=2.94; $p < 1\%$). Also, in defender enterprises, the use of this new model of the management accounting results in an increase in competitiveness (test-t=2.79; $p < 1\%$), productivity (test-t=1.76; $p < 10\%$) and in general in performance (test-t=1.86; $p < 10\%$). These results show that the both types of firms (prospectors and defenders) have an interest to adopt the ABC method. The hypothesis H2 is not accepted by our statistical analysis.

Table 8. Performance average compared between the ABC and the classical methods in prospector firms and defender firms

Performance dimensions	Prospector firms (N=31) ¹					Defender firms (N=31)				
	AEC adopters mean value	ABC non adopters mean value	Difference	t-value	Sig.	AEC adopters mean value	ABC non adopters mean value	Difference	t-value	Sig.
Competitiveness	4.5714	3.4583	1.1131	4.084	0.000*	5.0000	3.4000	1.6000	2.795	0.009*
Profitability	4.2857	3.5000	0.7857	2.508	0.018**	4.0000	3.6000	0.4000	0.583	0.564 ^{ns}
Productivity	3.7143	3.2917	0.4226	1.309	0.201 ^{ns}	5.0000	3.5333	1.4667	1.761	0.089***
Performance	12.5714	10.2500	2.3214	2.937	0.006*	14.0000	10.5333	3.4667	1.860	0.073***

* Significant at the 1% ** Significant at the 5% *** Significant at the 10% ^{ns} No significant

CONCLUSION

According to Bescos *et al.* (2002: 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 business strategy, ABC adoption and organizational 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 business strategy has not a significant impact on the use of ABC. Also, we demonstrated that the both categories of firms (prospectors and defenders) have an interest to adopt the ABC method.

Two major methodological limits should be highlighted in this article: the modest size of the sample and the use of a perceptual approach to collect data. In front of these limitations, the results obtained must be used with great caution.

We used in this research the business strategy to explain the use of the ABC approach. In this context, many avenues of research are considered. First is the use of other organizational variables, for example: organizational structure, environment uncertainty, etc. Second is the use of the non organizational and behavioural determinants, for example: leadership styles, the culture of leadership, legal ownership, etc.

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¹ Using these three dimensions of performance is recommended by several authors in management control (Naro, 2003).