

The association between Activity-Based Costing and performance: Empirical evidence from Moroccan companies

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Abstract

Research Question: Can the adoption of ABC have a positive impact on the performance of the company?

Motivation: We have observed in the literature that studies on the impact of ABC on performance most often focus on financial performance. We want to explore this theme by studying, in addition to financial performance, non-financial performance.

Idea: This study attempts to study the impact of ABC on performance.

Data: Data was gathered using a multi-item questionnaire survey on large companies. To obtain rich data, three semi-structured interviews were conducted with management controllers. In total, 62 companies responded to the questionnaire.

Tools: We used two types of tests to analyze the data: the Wilcoxon and Mann-Whitney tests and the median test.

Findings: The results indicate that, overall, companies that have adopted ABC have improved their performance significantly. Indeed, its adoption has a positive effect that is more important than the traditional method on the non-financial performance of companies. However, a direct relationship between ABC and financial performance has not been confirmed.

Contribution: Previous studies have focused on the effect of ABC on financial performance with inconclusive results. Our contribution has been to demonstrate the positive impact of ABC on non-financial performance. We have also concluded an indirect relationship between ABC and financial performance, which happens precisely through improving non-financial performance. We also concluded the importance of the time variable in evaluating the link

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between ABC and performance. The expected benefits from ABC depend on time and cannot be delivered immediately and simultaneously.

Keywords: Activity-Based Costing, performance, management accounting, performance dimensions.

JEL codes: M41

1. Introduction

Activity-based Costing was devised more than twenty-five years ago; its adoption has mainly been motivated by the search for greater efficiency in the face of competitive pressures (Malmi, 1999, Bjørnenak, 1997). Also, ABC information can be widely used to make strategic decisions, improve companies' profit performance (Bjørnenak & Mitchell, 2002), and assess continuous performance improvement (Cagwin & Bouwman, 2002). However, although ABC has experienced a broad and rapid diffusion worldwide, there is still divergence regarding its role in improving company performance.

The purpose of this article is to evaluate the consequences of adopting ABC on companies' performance. The number of books and articles dealing with ABC is considerable. These studies are related to the fundamentals of ABC and the processes for implementing it, especially within specific companies. However, there has been less research on the impact of ABC on the performance of companies. Among these studies, we cite Cagwin and Bouwman (2002), Ittner *et al.* (2002), Kennedy *et al.* (2001), Banker *et al.* (2008), Bescos and Charaf (2013), Maiga (2014), Henri *et al.* (2016), Uyar and Kuzey (2016), Kissa *et al.* (2019) and Vetchagool *et al.* (2020).

We retain the definition of performance used by Bourguignon (2004) because it seems the most complete. According to Bourguignon, performance can be defined as "the achievement of organizational objectives, whatever the nature and variety of these objectives. This realization can be understood in the strict sense (result) or in the broad sense of the process that leads to the result (action)". The expected goal of any managerial innovation is generally to improve progressively, directly or indirectly, companies' financial and operational performance and ultimately help them achieve their objectives. Before adopting any organizational innovations such as ABC, companies need to know if it positively impacts their performance. Because a management tool that does not improve financial and non-financial performance will have a low chance of being adopted, in this sense, it is essential to show the impact of the ABC method on the performance of companies.

The use of ABC by companies allows them to reduce the costs, improve the quality of information, reduce the manufacturing cycle time, eliminate the activities that do not create value to the customers, and ultimately improve the Economic Value Added. In the literature on ABC, some authors have demonstrated that the adoption of ABC can have a positive impact on financial and non-financial performance (Bescos & Charaf, 2013; Maiga, 2014; Cooper & Kaplan, 1991; Ittner *et al.*, 2002; Anderson & Young, 1999; Kissa *et al.* 2019; Zeghal & Bouchekoua 2000). However, other researchers have not found a positive impact of ABC on performance (Cagwin & Bouwman, 2002; Ittner *et al.*, 2002; Bergeron & Bélaïd, 2006). In this sense, in the literature on ABC, we do not find a consensus between the various studies. This topic deserves further research in different contexts.

Studies on the impact of ABC on performance in Morocco are not numerous. To our knowledge, two studies have been published on this topic in Morocco (ELhamma & Yi Fei, 2013; Bescos & Charaf, 2013). Given the development experienced by Moroccan companies in terms of management tools, it is essential to conduct more research to improve knowledge on management control practices in Morocco. Researchers should pay more attention to the study of management control tools in the Moroccan context. In this sense, this research aims to study through a survey the adoption of ABC and its impact on the performance of Moroccan companies.

This article presents theoretical and practical contributions. First of all, it makes it possible to enrich the academic debate on ABC and performance in general and test this problem in a context that has not been cleared enough up until now. Much of the preceding work has found a positive relationship between ABC adoption and financial performance. In this article, we have shown a positive and indirect link between the adoption of ABC and non-financial performance. The practical contributions consist of the fact that this research work can aid companies that wish to adopt the ABC method. It gives them guidance on the main elements impacted by the adoption of this tool.

This paper is structured as follows. First, we will present a literature review on the relationship between ABC and performance. Then, we will discuss the methodology used to validate our hypothesis, and finally, the results, the discussions, and the conclusion will be presented.

2. Literature review and research model

The ultimate purpose of adopting Activity-Based Costing is to get benefits that directly or indirectly affect performance (Bescos & Charaf, 2013). Organizations that adopt ABC can obtain efficiency gains by identifying, reducing, or eliminating (or removing) activities that do not add value to their customers and redesigning products and processes (Bescos & Charaf, 2013; Maiga, 2014; Cooper & Kaplan,

1991). Therefore, ABC can reduce product costs, improve information quality, and reduce the manufacturing cycle time (Ittner *et al.*, 2002; Anderson & Young, 1999; Kissa *et al.*, 2019).

According to several studies, the implementation of ABC impacts financial performance. According to Zeghal and Bouchekoua (2000), companies that adopted ABC in the USA have successfully improved their Economic Value Added. Kennedy *et al.* (2002) studied the impact of ABC on the share value of American companies during three years. They conclude that the value of the shares in companies that have adopted ABC increased more than those companies that did not implement ABC. Indeed, in companies that adopted ABC, the improvement caused by the ABC is not immediate. According to the same study, the authors conclude that because of the complexity of the new costing system and the time needed for its full implementation, the benefits of ABC appear only after two years of use.

Bescos and Charaf (2013) studied one Moroccan bank and confirmed that the adoption of ABC had a positive impact on the bank's financial performance. Notably, the bank reduced its production costs and improved its productivity and profitability. Also, in Morocco, Elhamma and Yi Fei (2013) studied the impact of ABC adoption on firm performance. They confirm the results mentioned above, namely that the adoption of ABC by Moroccan companies positively impacts firms' profitability. In Jordan, Hardan and Shatnawi (2013) found that adopting ABC improved the financial performance of telecom companies. Companies that have adopted ABC have optimized their expenses, increased their profitability, and improved the cost calculation of provided services. In the USA, Maiga (2014) confirmed that the adoption of ABC had a positive impact on profitability. Henri *et al.* (2016) found that the tracking of environmental costs positively and significantly influences financial performance through ecological initiatives. Finally, in Thai companies, Vetchagool *et al.* (2020) demonstrated that using ABC for cost calculation and analysis and cost strategy directly affected operational performance and can therefore indirectly improve financial performance.

This association is positive and significant when ABC is established in companies with specific characteristics related to the cost structure, the complexity of the firms' operations, and the diversity of services offered. Nevertheless, Cagwin and Bouwman (2002), in their study of internal auditors who were members of the Institute of Internal Auditors in the United States, did not find a significant impact of ABC adoption on the financial performance of firms. Similarly, Ittner *et al.* (2002) and Bergeron and Bélaïd (2006) found no significant association between ABC and financial performance in their studies of industrial companies.

However, Ittner *et al.* (2002) found that ABC had an indirect and significant impact on production costs by improving quality and production cycle time. Likewise, Bergeron and Bélaïd (2006) show that companies that have implemented ABC use

and exploit the information provided by their costing system more than those firms using a traditional costing system. They also found a positive relationship between the use of cost information and non-financial performance measured in particular by quality, time, and cost variations. In the same way, Banker *et al.* (2008) find an indirect impact of ABC on industrial performance. They indicate that new production management practices play a mediating role in the relationship between ABC and non-financial performance (the industrial performance is delimited here to cycle time, quality, and reduction of unit costs). The results provide a new conceptual direction showing significant links between the variables that explain performance, such as ABC and other production management practices. This research also suggests that the adoption of ABC alone does not improve non-financial performance. Bescos and Charaf (2013) find that adopting ABC by the Moroccan bank positively impacts organizational performance.

According to the findings, the use of ABC results in improving communication, improving quality, the capability to calculate the number and cost of activities of movement-control values, business registration, and the monitoring of technical incidents reported by bank managers. Elhamma and Yi Fei (2013) found that adopting ABC positively impacts business performance in general. Dubihlula and Rundora (2014), in their study of South African small and medium-sized enterprises (SMEs), find that the implementation of ABC has a positive impact on the business performance of South African SMEs. However, Dubihlula and Rundora (2014) and Elhamma and Yi Fei (2013) did not detail business performance criteria in their studies. Maiga (2014) confirms that the adoption of ABC can result in cycle-time improvement, quality improvement, and cost improvement. However, Uyar and Kuzey (2016) conclude that the cost system design alone does not impact firm performance. It affects performance via management accounting practices. The performance improvement can be obtained because the firm utilizes the cost data obtained through various decision-making tools; otherwise, there is no point in bearing the cost of building such a system.

The main results of the studies on the relationship of ABC and firms' performance are summarized in the appendix.

From the literature review, we propose the following hypothesis: Companies that adopt ABC are performed better than those that do not adopt it (cf. Figure 1).

Figure 1. Impact of ABC on company performance



The supporters of ABC consider it to be an indicator of performance. Its use is justified by the need to improve performance. Indeed, ABC is viewed as a tool that allows firms to understand cost components. Cooper and Kaplan (1992) state that ABC's objective is not to calculate costs accurately but to improve profitability. The elimination of low value-added activities, the measurement of performance, the development and monitoring of budgets, the analysis of the profitability of products/services and customers, the tracking of cost reduction actions, price-fixing, making outsourcing decisions, and carrying out quotes for customers are considered the primary uses of ABC by French companies (Bescos *et al.*, 2002).

3. Research methods

3.1 Sample

This study aims to test the link between the adoption of ABC and business performance. Our literature review led us to the following hypothesis: the adoption of ABC has a positive association with the company's performance.

Data for this research was drawn from a survey using a questionnaire. The initial sample consists of the Kompass ranking of the 350 largest companies in Morocco. From this sample, 49 companies were removed as nine did not have complete addresses, and 40 were not appropriate for the analysis as they are consulting companies. Finally, our survey is composed of 301 companies. The questionnaire was written in French using questions from the literature. To improve the questionnaire's quality, we tested it using a sample composed of 38 management controllers and five academics in management accounting. After that, we sent a fax to the prospective sample companies to explain the survey's aims and inform them that we would be mailing the questionnaire to them in the following days.

The survey was administered by mail using Dillman's method (2000). We included a cover letter written in French to improve the response rate. After the initial mailing, three follow-ups were conducted by e-mail, phone, and fax. A total of 62 companies responded to the questionnaire for an overall response rate of 20.6%. Table 1 below shows the business sectors of the respondents. Three semi-structured interviews were conducted with Moroccan management controllers to obtain rich data. The interviews were recorded, and notes were taken. The average duration of these interviews was 25 minutes.

Table 1. Demographics of survey respondents by business sector

Business sector	Number	%	%
Manufacturing	23	37.1	37.1
Services to businesses and particulars	22	35.5	
Services Banking and insurance industry	8	12.9	62.9
Retail	9	14.5	
Total	62	100	100

3.2 Variable measurements

To test our research model, we will first compare the organizational performance of the two populations (ABC adopters/non-adopters). Then, we will study the impact of the implementation of cost accounting on the perceived performance of the two populations (firm's adopting/non-adopting ABC).

3.2.1 Independent variable: Activity-Based Costing adoption

To assess ABC adoption, we used the responses to the survey question about the status of ABC in each company. The survey results indicate that only 21% of companies had already implemented ABC, and 1.6% noted that ABC is being implemented in their firm. We estimate that 22.6% of the Moroccan companies have adopted ABC by summing the two percentages. In addition, 9.7% of the companies in our sample have examined the possibility of adopting ABC, and 67.7% point out that they were not considering adopting the ABC approach. Consequently, 77.4% of the Moroccan companies we surveyed have not adopted ABC. Table 2 below recapitulates these main results.

Table 2. Status of ABC in Moroccan companies

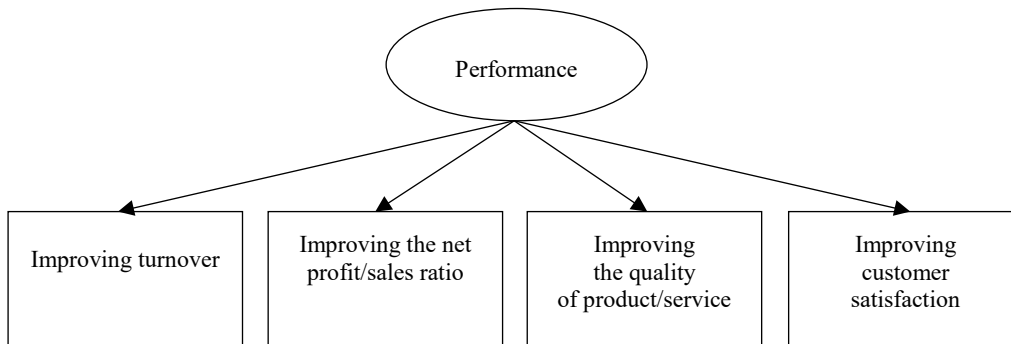
ABC adoption status		Number of companies	Percentage
Yes	Currently using ABC or ABC is being implementation	14	22.6
No	Currently considering ABC adoption	6	9.7
	No consideration of ABC to date	42	67.7
Total		62,0	100,0

3.2.2 Dependent variable: company performance

We have selected two measures of company performance. The first measure is the companies' overall performance, including quality, turnover, net profit/sales ratio, and customer satisfaction. A subjective five-scale rating is given to questions asked for all the companies in the sample. For this question, the respondents indicate whether the performance of their organizations has improved recently independently of the introduction of a cost system calculation. This variable is widely used in previous studies dealing with the relationship between ABC and performance (Cagwin & Bouwman, 2002; Ittner *et al.*, 2002). In our study, we obtained a high Cronbach Alpha (0.831), which is acceptable for the reliability of the measurement scales (alpha more significant than 0.5).

Figure 2 below summarizes the four dimensions of organizational performance selected for this study:

Figure 2: The four dimensions of organizational performance (adapted from Cagwin & Bouwman, 2002; Ittner *et al.*, 2002)



We have introduced a second measure to evaluate performance to deepen the analysis. This measure comprises quality, cost reduction, and financial performance (cf. Table 3). According to the literature, each element includes several items that could improve when ABC is adopted. In total, we selected nine items from the literature, and we obtained a high Cronbach Alpha (0.782), which is acceptable for the reliability of the measurement scales (alpha more significant than 0.5).

- Quality: Improving the quality of products and services is often cited as one of the benefits of implementing ABC (Banker *et al.*, 2008, Ittner *et al.*, 2002). According to AFNOR (French Association of Normalisation), a good quality product or a service has characteristics that allow it to satisfy consumers' expressed or implicit needs. The final consumer is an essential client, but each service is both a client and a provider of other services within the organization. In this research, to measure quality, we used a subjective appreciation of the impact of ABC's adoption on the communication between services, the quality of products, and customers' satisfaction. This dimension is measured using three items based on a five-point scale where one is "strongly disagree" and five is "strongly agree."
- Cost reduction: To measure the impact of ABC on cost reduction, we asked three subjective questions based on a five-point scale. Indeed, the introduction of activity-based Costing can reduce costs by eliminating activities with low value-added characteristics, redefining pricing and pricing models, adopting new production models, and improving the design of products and services.
- Financial performance: Financial performance was measured by answers to a subjective question. The impact of using information from the ABC system on economic performance is assessed based on a five-point scale.

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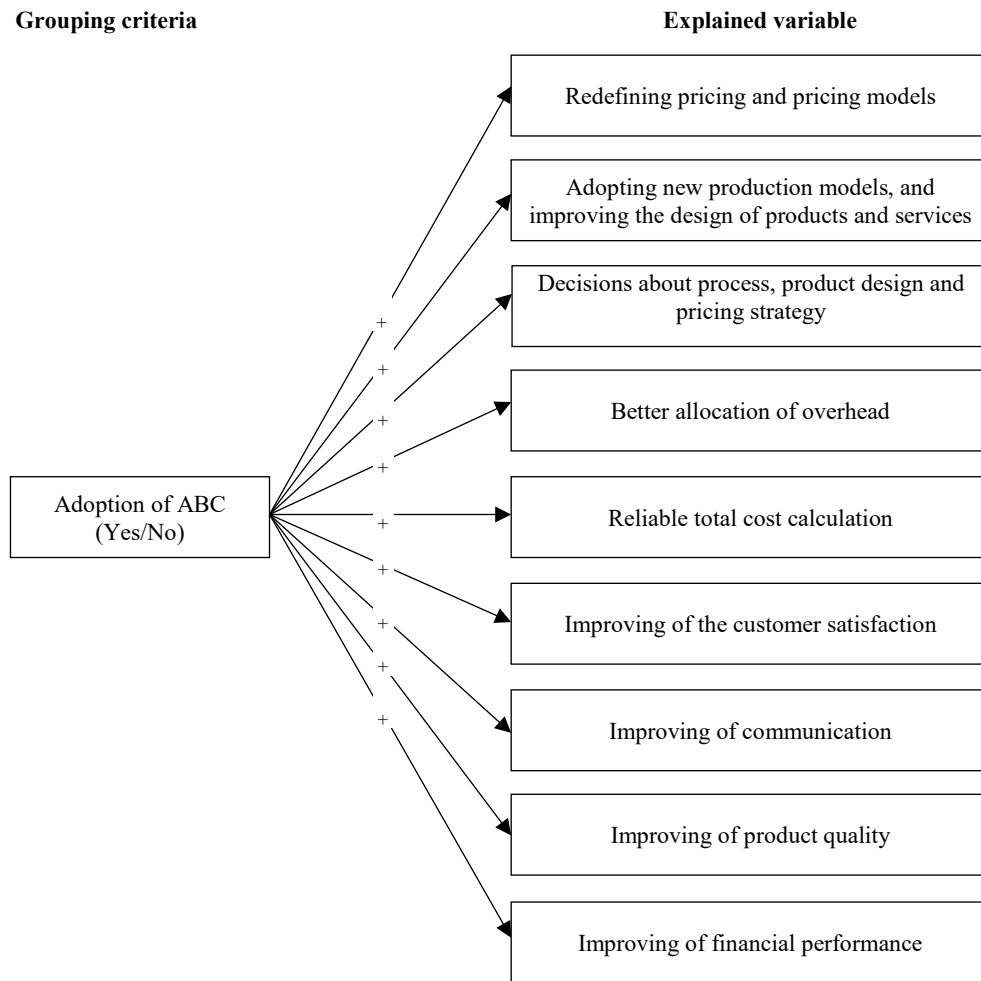
The companies who had not adopted ABC were also questioned about the impact of their cost system calculation on the dimensions cited above to compare the two populations (adoptive and non-adoptive ABC).

Table 3. Items of dependant variable performance

Performance Dimensions	Items	Bibliographic references
Cost reduction	Redefining pricing and pricing models	Bescos and Charaf (2013) Innes <i>et al.</i> (2000)
	Adopting new production models and improving the design of products and services	Bescos and Charaf (2013) Banker <i>et al.</i> (2008) Ittner <i>et al.</i> (2002) Innes <i>et al.</i> (2000) Foster et Swenson (1997)
	Decisions about the process, product design, and pricing strategy	Bescos and Charaf (2013) Banker <i>et al.</i> (2008) Ittner <i>et al.</i> (2002) Innes <i>et al.</i> (2000) Foster et Swenson (1997)
	Better allocation of overhead Reliable total cost calculation	Bescos and Charaf (2013) Bescos and Charaf (2013) Bescos and Charaf (2013)
Improving quality	Improving customer satisfaction	Ittner <i>et al.</i> (2002) Foster et Swenson (1997)
	Improving communication	Bescos and Charaf (2013)
	Improving product quality	Bescos and Charaf (2013) Ittner <i>et al.</i> (2002)
Financial performance	Improving of financial performance	Zeghal and Bouchekoua (2000) Kennedy <i>et al.</i> (2001) Cagwin et Bouwman (2002)

The impact of ABC on performance items is represented in Figure 3 below.

Figure 3. The impact of ABC on performance items



4. Results

Two comparisons are made between the performance of ABC adopters and non-adopters to confirm our hypothesis. On the one hand, we compared the overall performance within the two populations (improving the firm's performance independently of implementing the cost calculation system). This comparison is widely used in previous studies dealing with the relationship between ABC and performance. We cite in particular the studies of Cagwin and Bouwman (2002) and

Ittner *et al.* (2002). On the other hand, we compared the impact of cost accounting systems on items that may reflect financial and non-financial performance (or the effect of the implementation of cost accounting systems on financial and non-financial performance).

4.1 Comparison of perceived performance of adopters and non-adopters of ABC

4.1.1 Wilcoxon and Mann-Whitney tests

The Wilcoxon and Mann-Whitney tests are nonparametric identity tests that compare two independent samples from ordinal or numerical variables. These are the most commonly used tests among rank tests. The general philosophy of the two tests is to rank in ascending order all the observations of the two samples and separately add the ranks of the elements of each sample. If the samples are from the same population, a balanced existence of the low, medium, and high ranks is predictable in each of the two samples.

Table 4. Rank Statistics

	Status of ABC	Number	Average rank	Sum of ranks
Perceived improvement in performance]	No (,00)	48	29.31	1407
	Yes (1,00)	14	39	546
	Total	62	-	

U de Mann-Whitney = 231.000

Wilcoxon W = 1407.000

Significance level = 0.039

We wonder if the performance score depends on the adoption of ABC. We believe that companies that have adopted the ABC have a higher performance than those that have not adopted it. In this case, the Mann-Whitney test is well suited, especially if the sample is small. We reasonably expect that the low-performance ranks will dominate the non-adopting population, and firm ranks will dominate the adoptive population. Both samples come from populations whose positions differ. The average rank for adopters (39.00) is higher than for non-adopters (29.31). The lowest ranks are associated with the non-adopters of ABC, and the strongest ranks are associated with ABC adopters at the 0.05 level of significance. According to the results, we can argue that the most performant companies have adopted the ABC system.

4.1.2 The median test

To confirm our results, we conducted the Mood median test. Mood's median test is used to compare the medians for two samples to find out if they are different (adopters and non-adopters of ABC). The number of observations under and above or equal to the median is given in Table 5 below.

Table 5. Number of observations below and above or equal to the median for adopters and non-adopters of ABC

		[Status of ABC]			
		No (0)		Yes (1)	
		N1	%	N2	%
Perceived improvement in performance	> Median	20	41.7	10	71.4
	≤ Median	28	58.3	4	28.6
	Total	48	100	14	100

N = 62

Median = 0.0531995

Khi-deux = 3.844

Asymptotic significance = 0.05

The results indicate that most ABC adopters' performance has improved over three years. Table 5 shows that 71.4% of the companies that have adopted ABC are above the median compared to 41.7% for non-adopters. We note that all the companies that have adopted ABC in our sample have a relatively current ABC system. The median test results confirm our research hypothesis at the threshold $\alpha = 0.05$. Therefore, companies that adopt the ABC report have a higher performance than those not.

In addition, to draw further conclusions about the relationship between ABC and performance, we studied the impact of implementing a cost calculation system (ABC and other costing methods) on some elements that could reflect performance improvements to make comparisons between the two systems.

4.2 Comparison of the impact of the adoption of ABC and the traditional system of costing on companies' performance

The expected goal of implementing an ABC system is to improve firms' performance either directly or indirectly. The ABC should facilitate the reengineering of processes to obtain better productivity while allowing better analysis and allocation of the costs. It should also lead to improved communication between the various

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departments, increased quality of the services offered, improved customer satisfaction, and, ultimately, improved financial performance.

We interviewed the Moroccan management controllers about the items that usually reflect financial and non-financial performance improvements. Table 6 shows a comparison between adopters and non-adopters of ABC. This comparison aims to verify the effect of adopting a cost accounting system on performance in general and the ABC system. We conducted this verification using the Wilcoxon and Mann-Whitney and median tests.

4.2.1 The Wilcoxon and Mann-Whitney tests

Table 6 below summarizes the main statistics of the Wilcoxon and Mann-Whitney tests.

Table 6. Ranks statistics

<i>The impact of the costing system on the following elements:</i>	Status of ABC ^(a)	N	Average rank	Sum of ranks
Redefining pricing and pricing models	0	44	26.18*	1152
	1	12	37*	444
	Total	56		
Adoption of new production models and improvement of product and service design	0	41	23.87**	978.5
	1	12	37.71**	452.5
	Total	53		
Decisions about processes, product design, and pricing strategies	0	41	23.44**	961
	1	12	39.17**	470
	Total	53		
Reliable total cost calculation	0	44	25.68**	1130
	1	12	38.83**	466
	Total	56		
Improving of customer satisfaction	0	42	24.29**	1020
	1	12	38.75**	465
	Total	54		
Best allocation of overhead costs	0	43	24.65**	1060
	1	12	40**	480
	Total	55		
Improving communication	0	38	21.49**	816.5
	1	12	38.21**	458.5
	Total	50		

<i>The impact of the costing system on the following elements:</i>	Status of ABC ^(a)	N	Average rank	Sum of ranks
	0	37	20.03**	741
Improving of product quality	1	12	40.33**	484
	Total	49		
	0	43	26.07	1121
Improving of financial performance	1	12	34.92	419
	Total	55		

^(a) Status of ABC: ,00 = yes, 1 = no
 Significance level: ** = 0.01 ; * = 0.05

The fourth column of Table 6 displays the average ranks of adopting cost accounting on business performance. According to this analysis, the lowest rankings are associated with firms that use the traditional costing system. This difference is statistically significant for all aspects of performance except the "improvement of financial performance" criterion, which has a significance of 0.079.

Table 7 below synthesizes the results of the Wilcoxon and Mann-Whitney tests. The last line of this table provides information on the exact significance level of all aspects of performance. With a possible error rate of 5%, the ABC has a more significant impact than the traditional costing system on the following elements:

- Redefinition of pricing and pricing models;
- Adoption of new production models and improvement of product and service design;
- Decisions about processes, product design, and pricing strategies;
- Reliable total cost calculation;
- Improving customer satisfaction;
- Better allocation of overhead;
- Improving communication; and
- Improvement of product quality.

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Table 7. Wilcoxon and Mann-Whitney tests ^(a)

	Redefinition of pricing and pricing models	Adoption of new production models and improvement of product and service design	Decisions about processes, product design, and pricing strategies	Reliable total cost calculation	Improving customer satisfaction	Better allocation of overheads	Improving communication	Improvement of product quality	Improving financial performance
Mann-Whitney test	162	117.5	100	140	117	114	75.5	38	175
Wilcoxon test	1152	978.5	961	1130	1020	1060	816.5	741	1121
Z	-2,134	-2,823	-3,231	-2,667	-2,892	-3,192	-3,62	-4,419	-1,759
Asymptotic significance (bilateral)	0.033*	0.005**	0.001**	0.008**	0.004**	0.001**	0.000**	0.000**	0.079

a. Grouping criteria: [Status of ABC]
Significant level : ** = 0,01 ; * = 0,05

4.2.2 Median test

The statistical results of the cost accounting impact on firms' performance appear in the fourth and sixth columns of Table 8. The results suggest that the proportion of companies that have adopted ABC above the median is higher than companies that did not adopt it. This median difference is statistically significant at the 5% significance level for most aspects of performance (cf. Table 9), which are:

- The adoption of new production models and improvement of the design of products and services;
- Decisions about processes, product design, and pricing strategies;
- Reliable total cost calculation;
- Improvement of customer satisfaction;
- Better allocation of overhead;
- Improving communication; and
- Improving product quality.

However, the criteria "redefining pricing and pricing models" and "improving financial performance" did not result in a statistically significant effect.

Table 8. Number of observations below, above or equal to the median for adopters and non-adopters of ABC

		ABC status			
		No (0)		Yes (1)	
		N1	%	N2	%
Redefining pricing and pricing models	> Median	10	22.7%	5	41.7%
	<= Median	34	77.3%	7	58.3%
The adoption of new production models and improvement of the design of products and services	> Median	11	26.8%	9	75.0%
	<= Median	30	73.2%	3	25.0%
Decisions about processes, product design, and pricing strategies	> Median	8	19.5%	9	75.0%
	<= Median	33	80.5%	3	25.0%
Reliable total cost calculation	> Median	5	11.4%	5	41.7%
	<= Median	39	88.6%	7	58.3%
Improvement of customer satisfaction	> Median	11	26.2%	9	75.0%
	<= Median	31	73.8%	3	25.0%
Better allocation of overhead	> Median	2	4.7%	5	41.7%
	<= Median	41	95.3%	7	58.3%
Improving communication	> Median	10	26.3%	10	83.3%
	<= Median	28	73.7%	2	16.7%
Improving the product quality	> Median	9	24.3%	11	91.7%
	<= Median	28	75.7%	1	8.3%
Improving financial performance	> Median	12	27.9%	5	41.7%
	<= Median	31	72.1%	7	58.3%

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Table 9. Median test ^(a)

	Redefining pricing and pricing models	The adoption of new production models and improvement of the design of products and services	Decisions about processes, product design, and pricing strategies	Reliable total cost calculation	Improvement of customer satisfaction	Better allocation of overheads	Improving communication	Improving product quality	Improving financial performance
N	56	53	53	56	54	55	50	49	55
Median	4	3	3	4	3	4	2	2	4
Chi-square	1.725	9.168	13.119	5.903	9.535	11.573	12.354	17.011	0.832
Degrees of freedom	1	1	1	1	1	1	1	1	1
Asymptotic significance		0.002**	0.000**	0.015*	0.002**	0.001**	0.000**	0.000**	0.362
Correction for the Yates continuity	0.894	7.232	10.695	4.017	7.557	8.48	10.092	14.337	0.312
Degrees of freedom	1	1	1	1	1	1	1	1	1
Asymptotic Significance	0.344	0.007**	0.001**	0.045**	0.006**	0.004**	0.001**	0.000**	0.576

a. Grouping criteria: N°9 Status ABC
Significance levels: ** = 0.01 ; * = 0.05

Our results suggest that, on the whole, companies that have adopted ABC have been able to improve their performance significantly. This increase in performance is reflected in improved decision-making, communication, product quality, and customer satisfaction. These results confirm our hypothesis that the adoption of ABC has a positive effect that is more important than the traditional method on the non-financial performance of companies.

From the preceding, we find that ABC has enabled Moroccan firms (1) to adopt new production models and improve the design of products and services; (2) to improve decision-making mechanisms for process management, product design, and pricing strategies; (3) to calculate costs reliably and to allocate overheads in a precise manner; (4) to improve customer satisfaction; (5) to improve the communication between the different divisions; and finally, (6) to increase the quality of the products. However, the direct relationship between the implementation of ABC and the improvement of financial performance has not been confirmed.

5. Conclusion and discussion

This paper aims to examine the relationship between ABC adoption and performance companies. Previous research most often focused on the impact of ABC on financial performance. We want to explore this theme by studying, in addition to financial performance, non-financial performance. We tested the link between the adoption of the ABC and the overall performance. We also individually analyzed the connection between the adoption of the ABC and the items representing the performance. Overall, the results indicate that companies that have adopted ABC have improved their performance significantly. Indeed, its adoption has a positive effect that is more important than the traditional method on the non-financial performance of companies. However, a direct relationship between ABC and financial performance has not been confirmed.

Our study is one of the first Moroccan contributions concerning the relationship between Activity-Based Costing and performance. It attempts to enrich the debate on the benefits of ABC and the role it could play to improve performance. The inputs consist of defining the dimensions, allowing us to determine what it could mean to enhance the firms' performances due to ABC's adoption, cement its beneficial effects, and evaluate this impact as objectively as possible.

Previous studies have focused on the effect of ABC on financial performance without any convincing results. Our contribution has been to supplement these studies by introducing the impact of ABC on non-financial performance. Our results have shown an indirect relationship between the establishment of ABC and the firms' financial performance, which happens precisely through improved non-financial performance. For example, and based on the comments of one of the survey

participants, using ABC allowed his company "to have a much clearer vision of the use of resources, improve communication between the various departments/divisions, facilitate the reengineering of processes, increase the quality of services offered, better analyze cost allocations, and improve customer satisfaction." Only then, and over time, did these improvements in non-financial performance translate into better financial performance.

Our results do not confirm those obtained by Zeghal and Bouchekoua (2000), Kennedy *et al.* (2001), and Cagwin and Bouwman (2002). According to these authors, there is a direct relationship between sales and financial performance. On the other hand, our results partially confirm the studies of Ittner *et al.* (2002), Bergeron and Belaïd (2006), and Banker *et al.* (2008). According to Ittner *et al.* (2002), ABC has an indirect and significant impact on production costs by improving the quality and duration of the production cycle. Our results also confirm those obtained by Bescos and Charaf (2013), Elhamma and Yi Fei (2013), Dubihlela and Rundora (2014), and Maiga (2014). Our study goes in the same direction by confirming the direct impact of ABC on the firms' non-financial performance by explaining a little more the types of non-financial performance that may be affected. In this sense, we have been able to demonstrate that the ABC has enabled Moroccan companies to (1) adopt new production models and improve the design of products and services; (2) improve decision-making mechanisms for process management, product design, and pricing strategies; (3) calculate costs reliably and allocate overhead in a precise manner; (4) improve customer satisfaction; (5) improve the communication between the different divisions, and finally (7) to increase the quality of the products. However, our work could not confirm the direct relationship between the implementation of ABC and the improvement of the firms' financial performance.

Our results also confirm those obtained by Banker *et al.* (2008) by stating that ABC has no significant direct impact on financial performance but an indirect relationship through improved operational performance.

We also found through our investigations that the conclusions of Bergeron and Belaïd (2006) show that companies that have adopted ABC use and exploit more information from their costing system than other firms.

The anchoring of our research in the Moroccan context is the first contribution since it is undoubtedly, one of the first times research has been conducted in this country on the link between ABC and performance. But the most significant possible contribution of our research for companies is on other grounds. In particular, we have highlighted the perceived impact of the implementation of the ABC on the performance of companies adopting it in Morocco.

The interviews underline that the variable time must be considered to appreciate the link between ABC and performance. In practice, the objectives are inevitably hierarchical regarding time and cannot be realized in the short term or simultaneously. Some goals are achieved in the nine months following the implementation of ABC, while others take longer to be completed, such as those highlighting activities of no value. These expected benefits to firms' performance cannot be delivered immediately and simultaneously.

Also, the operationalization of some variables used in our research presents some limits. This is particularly the case for the classification of cost systems used by Moroccan companies (traditional, ABC), the measurement of the adoption rate of the ABC, and the measurement of organizational performance. Using perceptual indicators to evaluate the latter is another limitation because perceptual measures introduce bias in responses. Past performance research also indicates the difficulty of adopting a satisfactory definition of this concept. The approach we propose, however, partially addresses this constraint since we retained three definitions of performance to test the impact of ABC on performance: (1) achieving objectives; (2) obtaining financial and non-financial improvements; and (3) stakeholders' perceptions of the benefits of ABC, particularly in the decision-making process. The results obtained regarding these three aspects agree with each other.

The generalization of our results should therefore be considered with caution. Indeed, the number of responses we collected for our survey is low (62 companies). This number of responses did not allow us to use more advanced statistical tools such as structural equations.

Finally, future research should lead to a collective case study to replicate the results obtained in several public or private organizations. Future research should further study the link between the adoption of ABC and financial performance and use other methodologies such as the case method or longitudinal method to find more noticeable results.

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**The association between Activity-Based Costing and performance:
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**Appendix: The main contributions of articles dealing with the relationship
between ABC and performance (2000-2019)**

Authors	Objectives	Sample	Indicators	Results
Zéghal and Bouchekoua, (2000)	This study measures the effects of adopting managerial innovations such as just-in-time, quality management, and ABC on the performance of North American companies.	571 US companies (67)	Economic Value Added (EVA)	Companies that have adopted one of the three managerial innovations have significantly increased the economic value added after adoption.
Kennedy <i>et al.</i> (2001)	This study examines the relationship between the implementation of the ABC and the creation of shareholder value.	853 companies in England (234)	Holding Period Returns (HPR), cumulative Abnormal Returns (CAR)	The value of the shares of companies that have adopted the ABC increases faster than those firms that have not implemented ABC.
Cagwin and Bouwman (2002)	This study discusses the association between the use of ABC and the improvement of firms' financial performance.	990 working internal auditors who are members of the U.S. Institute of Internal Auditors in the U.S. (2010)	Return On Investment (ROI)	The adoption of ABC positively impacts the ROI in companies with specific characteristics (importance of cost structure, complexity, diversity.).
Ittner <i>et al.</i> (2002)	This study evaluates the association between ABC and companies' operational and financial performance.	25,361 US companies (2,789)	Return on net plant assets, product quality, production cycle time, cost variations.	The extensive use of ABC has an indirect and significant effect on production costs by improving the quality and production cycle time.
Bergeron and Belaïd, (2006)	This study analyzes the impact of the use	800 Quebec, Canada	Product quality, production and	A positive relationship exists between the use of cost and performance

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Authors	Objectives	Sample	Indicators	Results
	of ABC on the performance of companies in Quebec, Canada. It examines the applicability of ABC for Quebec industrial SMEs by examining its effects on performance.	industrial SMEs (34)	delivery time, production cost variations	information. However, there is no relationship between ABC and firm performance.
Banker <i>et al.</i> , (2008)	This paper evaluates the impact of ABC on the adoption of new production practices and plant performance.	27,000 operational and management controllers of U.S. companies (1,250)	Product quality, production cycle time, variation of production unit costs	ABC has an indirect impact on plant performance.
Bescos and Charaf (2013)	Examine Relationship between ABC adoption and performance	One Moroccan case study	Financial and organizational performance	ABC adoption has a positive impact on financial performance (cost reduction, improving productivity, improving profitability) and organizational performance (improving communications, improving quality, ability to calculate the number and cost of activities of movement-control values, business registration, and monitoring of technical incidents reported by managers of the bank).
El Hamma and Yi Fei (2013)	Relationship between ABC, business strategy and performance	48 Moroccan industrial firms	Firm strategy Competitvity Profitability	The strategy had not a significant impact on ABC adoption. The use of ABC results in an increase in competitiveness, profitability, and general performance, both in prospector and defender companies.

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Authors	Objectives	Sample	Indicators	Results
Hardan and Shatnawi (2013)	Explore the impact of ABC on telecom companies' performance.	Five telecom companies in Jordan	Financial performance: optimize expenses, increase profitability, improve cost of provided services,	Applying ABC helps the telecom companies to reduce their expenses, which leads to profitability enhancement. The infrastructure needed to implement ABC is available in telecom companies' operations.
Dubihlela and Rundora (2014)	Impact of employee training and organizational commitment on the implementation of ABC.	300 South Africa SMEs (149)	Impact of employee training and managerial commitment on Abc implementation Impact of ABC implementation on performance	Employee training and organizational commitment positively correlate with SMEs' ability to adopt and implement ABC. The implementation of ABC has a positive impact on the business performance of South African SMEs.
Maiga (2014)	This paper investigates the association between ABC adoption and four manufacturing plant performance measures and assess selection bias and the endogenous nature of their interrelationship.	4,903 US companies (1,266)	Cycle-time improvement, quality improvement, cost improvement, and profitability	Overall, ABC adoption is associated with the four manufacturing plant performance measures. Controlling for sample selection bias and endogeneity is essential to assess the significance of the ABC-performance association properly.
Henri <i>et al.</i> (2016)	This study explores the relationship between the environmental costs in executional and structural cost management and firms' financial performance.	1,514 Canadian manufacturing firms (319)	The tracking of environmental costs (executional cost management) The implementation of environmental initiatives	The implementation of environmental initiatives positively and significantly influences firms' financial performance. The tracking of environmental costs positively and significantly indirectly influences firms' financial

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Authors	Objectives	Sample	Indicators	Results
			(structural cost management)	performance through environmental initiatives.
Uyar and Kuzey (2016)	Investigate the mediating effect of management accounting practices (MAPs) upon the association between cost system design (CSD) and performance	1,500 non-financial firms in Turkey (553)	Cost system design, management accounting practices (effective use of resources, financial controls, planning, reduction of waste of business resources)	Cost system design alone does not impact firms' financial performance. It affects performance via MAPs. Incurring high costs for establishing a functional cost system might be justifiable because the firm will utilize the cost data obtained through various decision-making tools; otherwise, there is no point in bearing the cost of building such a system.
Kissa <i>et al.</i> (2019)	This paper deals with the implementation of TDABC and the how it can be used to improve the managerial activities	One academic library in Greece	Processes and activities of the library	The implementation of the TDABC allowed managers to know the costs of activities better, make the right decisions on the allocation of resources, and improve the efficiency of activities.
(*) in brackets is the number of questionnaires received and used in the cited research				