

## Effects of Firm Size on Activity-based Costing Implementation in Nigerian Manufacturing Sector

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**ABSTRACT:** Activity-based costing system represents a major innovation in management accounting. It is one of the most investigated management accounting concepts, especially in the advanced market economies of United States of America, United Kingdom, amongst others. In the organizational innovative literature usually a positive association is found between size and organizational innovativeness. Larger firms are argued to have more complex and diverse facilities and greater resources available, and to employ more professional and skilled workers, that facilitate the implementation of innovations. The results of prior studies in the area of activity-based costing are somewhat mixed, however. Using a survey research design, this study examines the influence of firm size on activity-based costing implementation in the Nigerian Manufacturing sector. Data were obtained using structured questionnaire administered to 500 Accountants, Cost Accountants, Management Accountants and Financial Managers who are in full-time employment of 24 randomly selected manufacturing firms listed in the Nigerian Stock Exchange. The result of regression analysis revealed significant relationship between the extent of ABC implementation and firm size in the Nigerian manufacturing sector. It is recommended that future studies should seek to investigate the influence of other contextual factors such as top management support, product diversity and level of competition.

**KEYWORDS:** Business Size, Accurate Product Costing, Activity-based Costing, Manufacturing, Nigeria.

### 1 INTRODUCTION

During the last few decades, business organizations have been challenged to change their costing practices and more specifically to implement new cost management innovations such as activity-based costing [1] in order to ensure accurate product costing. Activity-based costing system represents a major innovation in management accounting [2]. This costing system is one of the most investigated management accounting concepts, especially in the advanced market economies of United States of America, United Kingdom, amongst others [3], [4], [5].

#### 1.1 STATEMENT OF THE PROBLEM

Organizational size refers to the size of the firm, usually measured in terms of number of employees. In the organizational innovative literature usually a positive association is found between size and organizational innovativeness. Larger firms are argued to have more complex and diverse facilities and greater resources available, and to employ more professional and skilled workers, that facilitate the implementation of innovations [6]. The results of prior studies in the area of activity-based costing are somewhat mixed, however. For instance, [7], [8] and [9] have found a significant positive association, whereas, for instance [9] and [10] have found no association between the size of firms and the implementation of activity-based costing. Also, [11] reported a negative association between firm size and activity-based costing implementation. In Nigeria, manufacturing firms are grouped into three main categories based on size. These include small

size firms, medium size firms and the big firms [12]. Since manufacturing firms are in these various sizes, one wonders if there is any link between the size of firm and the implementation of activity-based costing system.

## 1.2 OBJECTIVE OF THE STUDY AND RESEARCH QUESTION

The main objective of this study is to explore the influence of firm size on activity-based costing system implementation in Nigerian Manufacturing Sector. In other to achieve the objective of this study, the following research question is posed: 'What is the influence of firm size on ABC implementation in Nigerian Manufacturing Sector?'

### 1.2.1 RESEARCH HYPOTHESIS

In other to achieve the objective of this study, the hypothesis that:

*H<sub>0</sub>*: There is no significant relationship between firm size and activity-based costing system implementation in the Nigerian manufacturing sector.

## 2 LITERATURE REVIEW

Reference [9] conducted a study on the diffusion of activity-based costing in Norway. The study was based on a questionnaire survey, incorporating data from 75 of the largest manufacturing companies in Norway. The findings show that companies which had knowledge of activity-based costing were significantly larger than the others. However, size did not significantly discriminate between adopters and non-adopters within the group with activity-based costing knowledge.

Reference [13] conducted a survey in the State of Victoria in Australia. The questionnaires were sent to 350 Australian manufacturing companies and resulted in 120 useable responses which represent a response rate of 34%. The results report that only 12.5% (15 companies) had implemented activity-based costing, 2.5% (3 companies) rejected the implementation of the activity-based costing, 8.3% (10 companies) indicated that they intended to implement activity-based costing in the future, and the remaining 76.7% (92 companies) did not plan to implement activity-based costing. The findings of the study show significant differences between companies implementing activity-based costing and those not implementing activity-based costing in relation to production complexity and firm size.

Reference [14] in a survey of 60 large and medium-sized manufacturing companies in India found adoption rate of 20% for activity-based costing, 13% for activity-based management, and 7% for activity-based budgeting. The size in terms of total assets has been found to be significant factor in adoption of these contemporary management accounting techniques. Reference [15] conducted their study on the relationship between activity-based costing and firm size in Plastic manufacturing industry in Australia. Using number of employees, annual gross operating revenue and total assets as proxies for firm size; correlation analysis was carried out. The result of the analysis revealed a positive and significant relationship between firm size and activity-based costing implementation in Australia.

Reference [16] examined the extent to which activity management practices are adopted by Australian business units. They also examined the association between extent of adoption and the organizational factors of size and decision usefulness of cost information. Data were collected by mail survey questionnaire of a random sample of business units. Adoption rates were found to be higher than in prior studies, suggesting the continuing relevance of activity management. All factors were found to be associated with all activity management practices. In particular, business unit size was found to be associated with extent of adoption of Activity Analysis and Activity Cost Analysis, while decision usefulness was associated with Activity-based Costing.

Reference [4] reported on the findings of a postal questionnaire that examines the extent to which potential contextual factors influence the characteristics of product costing systems. Results indicated that higher levels of cost system sophistication are positively associated with the importance of cost information, size, extent of the use of just in time/lean production techniques and the type of business sector. Similarly, [15] conducted a longitudinal study on the diffusion of innovation and business size in Australian context. Primary data were collected through the administration of questionnaire while the data were analyzed using Pearson Product Moment Correlation (PPMC). The study revealed that there is a significant positive relationship between business size and both technological innovation and the implementation of activity-based costing system.

Reference [17] conducted a survey using a sample of four hundred (400) Sweden manufacturing firms having more than 50 employees. Although several factors were incorporated in that study, however, only the size of firm has a positive and significant relationship with the diffusion and the implementation of activity-based costing in Swedish manufacturing. In a

related study [1] conducted a survey of manufacturing, service and financial sector organizations to investigate the implementation state of activity-based costing systems in Ireland. The result reported in that study indicated that most of the firms that have not implemented activity-based costing belong to the small-size category. In other words, the few firms that have implemented activity-based costing system in Ireland belong to the large-size categories. This means that firm size is positively related to activity-based costing implementation.

In like manner, [18] carried out an empirical study to find out the application of contemporary management accounting techniques in Indian industry through a survey of 530 member companies of the National Association of Financial Directors and Cost Controllers. The sample was stratified in two segments; activity-based costing user firms and Non activity-based costing user firms. The researcher found a positive significant association between the implementation of activity-based costing and business size.

In Malaysia, [19] examined the usage of management accounting practices, particularly activity-based costing system in manufacturing firms in the context of Malaysian companies. They also studied the relationship between company size and usage of advanced management accounting practices. Obtaining data from five hundred (500) randomly selected manufacturing firms in Malaysia, the study examined whether company size is related to the use of advanced management accounting practices. Spearman correlation indicated significant positive relationships between activity-based costing usage/implementation and company size.

Reference [20] used logistic ordinal regression analysis to examine the impact of the level of competition, product customization, manufacturing overhead costs and operating unit size on the level of consideration for activity-based costing when measured on a three-point ordinal scale ranging from not considered, considering and considered activity-based costing. The results indicate that operating unit size is related positively to the level of consideration for activity-based costing.

Reference [11] conducted an exploratory study on the organizational factors influencing the choice of activity-based costing system in 170 Iranian organizations. Postal questionnaires were administered to Financial Managers of the selected companies in Tehran Stock Exchange. The findings revealed a negative relationship between industry type and activity-based costing implementation. While most of the manufacturing companies still use the traditional costing method, most of the service companies have implemented activity-based costing system. Furthermore, a negative relationship was reported between firm size and activity-based costing implementation.

Reference [21] investigated the influence of company characteristics factors on activity-based costing implementation in Jordanian manufacturing companies. The study investigated company characteristics factors which include (i) Industry type (ii) company size (Number of Employees) and Products diversity (Number of Product); and how each of these factors influences activity-based costing implementation. Questionnaire survey was used in the study, 92 surveys were distributed within the Jordanian manufacturing companies. Logistic regression (logit) analysis was carried out on the data collected. The findings in the study reveals that company sectors, size - number of employees, and diversity -number of product do not have significant influence on the implementation of ABC among manufacturing shareholding firms in Jordan.

### **3 MATERIALS AND METHODS**

The survey research design is employed in this study. The population comprises the 86 manufacturing companies that are quoted in the Nigerian Stock Exchange, meanwhile, the sample comprise of 24 randomly selected manufacturing companies. Primary data were obtained through the administration of structured questionnaire to 500 accountants, cost accountants, management accountants, senior accountants and financial managers on full-time employment in the Nigerian manufacturing sector. Data analysis is conducted using logistic regression analysis with the model below:

$$Y_1 = b_0 + b_1 X_1 + \epsilon \quad (1)$$

### **4 RESULTS AND DISCUSSIONS**

The results of the analysis are presented in this section with the discussion of findings. Table 1 below reports the "Omnibus Tests of Model Coefficients." Omnibus means overall, and so this output is simply telling us whether the model with 1 predictor (firm size) predicts the dependent variable better than chance alone. What the above table is telling us is that the model with 1 predictor does better than chance at predicting the dependent variable, and is statistically significant at  $p < .001$ .

**Table 1. Omnibus Tests of Model Coefficients**

		Chi-square	df	Sig.
Step 1	Step	254.454	1	.000
	Block	254.454	1	.000
	Model	254.454	1	.000

Source: Output of data analysis by author

Table 2 below is the "model summary" which is a summary statistics for the model at "Step 1," which recall the model with 1 predictor. The first statistic is the -2 Log likelihood value, and is equal to 210.290. Furthermore, table 2 below reports the Cox & Snell R Square value of .465. This statistic is referred to as a "pseudo-R<sup>2</sup>" statistic; in that it is designed to tell us something similar to what R-squared tells us in ordinary least squares regression, that of the proportion of variance accounted for in the dependent variable based on the predictive power of the independent variable (predictor) in the model. Overall, high values are better than low values here, with higher values suggesting that your model fits increasingly well. Next is the "Nagelkerke R Square" statistic, it is a "pseudo" R-square value, purporting to tell us something along the lines of an OLS R-square, but not directly comparable to it.

**Table 2. Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	210.290 <sup>a</sup>	.465	.683

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Source: Output of data analysis by author

Table 3 below presents the Hosmer and Lemeshow Test, a measure of fit which evaluates the goodness of fit between predicted and observed probabilities in classifying on the DV. We see that the test is statistically significant ( $p < .001$ ), suggesting that the probabilities of predicted vs. observed do not match up as nicely as we would like.

**Table 3. Hosmer and Lemeshow Test**

Step	Chi-square	df	Sig.
1	25.198	3	.000

Source: Output of data analysis by author

Table 4 below presents the variables in the Equation. The above table is a major part of the logistic regression output. First, we see that SPSS is reporting the Step number, which is "1," and noting that the variable in this step include firm size. Let us look at the coefficient "B" under "size." It is equal to 2.815. It means that given an increase of firm size by one unit, we can expect the log odds (or "logit") of implementing ABC system to increase by 2.815.

Next, we see "S.E." which stands for "standard error. Essentially, the standard error is a measure of how stable our estimate is. A large standard error means the estimated coefficient is not that well estimated, and a low standard error means we have a fairly precise estimate. For "firm size," the standard error is equal to .305. The Wald statistic, is very much like a t-statistic conceptually, and is a test of the null hypothesis that the "B" population coefficient is equal to 0. Do we have good reason to reject the null hypothesis? Based on the p-value of .001, we have evidence to suggest that the "B" coefficient is not equal to 0 in the population from which these data were presumably drawn. That is, we have evidence to suggest that firm size, predicts the response variable better than chance alone. Next, we see "Exp(B)," and for firm size, the value is equal to 16.685. The number 16.685 has a very special meaning. It is called an "odds" and is interpreted as follows: an increase of 1 unit on firm size increases the odds of implementing ABC system by 16.685. The 95% confidence interval is also provided for the value of Exp(B).

Table 4. Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Step 1 <sup>a</sup> Size	2.815	.305	85.217	1	.000	16.685	9.179	30.329
Constant	-10.621	1.225	75.126	1	.000	.000		

a. Variable(s) entered on step 1: size.

Source: Output of data analysis by author

From the analysis above, particularly with the result of the Hosmer and Lemeshow test and other tests conducted above suggests that significant relationship exists between the extent of ABC implementation and firm size in the Nigerian Manufacturing Sector as the p value (0.001 is less than the beta value 0.05). Thus the null hypothesis that “there is no significant correlation between the extent of ABC implementation and firm size in the Nigerian Manufacturing Sector,” is rejected. It can be concluded therefore that “there is a significant relationship between the extent of ABC implementation and firm size in the Nigerian Manufacturing Sector.”

This study focused on the relationship between firm size and activity-based costing system implementation in Nigerian manufacturing sector. The findings from the analysis of data revealed that there is a positive and significant relationship between activity-based costing implementation and firm size in manufacturing sector in Nigeria. This result is consistent with the result reported by [13], [17], [15], and [16] who reported a significant relationship between activity-based costing and firm size, indicating that larger firms are more likely to implement activity-based costing system than the smaller firms. Similarly, the result of this study is similar to the results reported by [1], [18], [19], and [20]; as each of them reported a positive relationship between firm size and activity-based costing system implementation in the Nigerian manufacturing sector. The reason for a positive relationship between firm size and activity-based costing implementation may be due to the cost implication of conversion from the traditional costing system to the activity-based costing system by small size firms. Since larger firms have easier access to financial and human resources, it becomes easier for such big firms to implement activity-based costing system.

## 5 CONCLUSION

This study examines the relationship between firm size and activity-based costing system implementation in Nigerian manufacturing sector. From the review of literature and data analysis, it becomes glaring that a positive relationship exists between firm size and activity-based costing system implementation in the Nigerian manufacturing sector. Large size firms tend to be favourably disposed to activity-based costing system implementation.

This study examines the influence of firm size on activity-based costing system implementation in the Nigerian manufacturing sector. Size is only one of the contextual factors influencing costing system implementation. Future studies should seek to investigate the influence of other contextual factors such as top management support, product diversity and level of competition, amongst others.

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