# Activity–Based Costing and Organizational Performance in Selected Manufacturing Firms in South Eastern Nigeria

**Ezeagba, C. E.**

## ABSTRACT

*The primary objective of this study is to establish the influence of Activity Based Costing (ABC) on organizational performance. In pursuance of the objectives, the research design was structured as a quasi-experimental/ex-post factor research. Secondary data was collected from the two manufacturing organizations in South East Nigeria. The Pearson product moment correlation analysis was applied to test the hypotheses stated. The result of the analysis indicates that the application of ABC method significantly influences the level of profits of manufacturing organizations. The findings of the study further indicate that cost of products remains the most important variable in the determination of manufactured products' profits. This finding implies that manufacturing organizations should make efforts to understand cost drivers in their organizations with a view to determining accurate cost of their products. Based on the findings, it is recommended that manufacturing organizations should have a deep insight into the make-up of their products' costs and the activities involved in the process and that manufacturing organizations that have advanced manufacturing technologies and have more than one product line should adopt ABC methods.*

***Keywords:*** *Activity-based-costing; organisational performance and manufacturing firms.*

## INTRODUCTION

The advancement of manufacturing technologies and their complexities have brought to the fore the question of adequacy of traditional cost accounting mechanisms in manufacturing organizations. Modern manufacturing organizations are confronted with just-in-time philosophy, robotics, flexible manufacturing systems and the like. In the views of Granof, Platt and Vaysman (2010), traditional cost information systems trace their roots to the industrial age when labour was the dominant factor of production. Traditional production costing method calculate product costs by adding on to direct cost, a proportion of overheads which are charged to products on production volume related basis usually direct labour hours (or direct wages) or machine hours. Implicit in this system is the assumption that all overheads are related primarily to production volume. This system has become suspect as a means of calculating production costs especially in today's information driven organizations with the concomitant computerization and automation. One of the greatest defects of the traditional method

***Ezeagba, C. E.,*** *Ph.D; LL.B; B.L; Senior Lecturer; Department of Accountancy,Nnamdi Azikiwe University, Awka, Nigeria. E-mail: charlesemenikeezeagba@yahoo.com.*


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of overhead costing is the under costing of some products and its consequent reduction of organizational profits. In situations where the indirect costs are over apportioned, the prices of such products are high thereby inducing demand. In the light of the observed defects of traditional method of overhead costing, Activity-Based Costing (ABC) has emerged. ABC is a method for establishing costs estimates in which a project is subdivided into discrete quantifiable activities or work units. The activity must be definable where productivity can be measured in units, for instance number of samples versus man hours. Horngren, Bhimani, Data and Joster (2002) post that 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 undertaken to produce each product or service. ABC is designed to accurately define costs and provide managers with the tools they need to improve operations and lower costs.

However, it seems many manufacturing organisations in Nigeria still hold firm to traditional overhead cost apportionment approach which supposedly increases costs of production (Eze, 2010). Therefore, it becomes necessary to analyze the extent ABC is able to enhance organizational performance in terms of cost reduction and improved operations. The thrust of the study, therefore, is to establish the implications of ABC in organizational performance in Nigeria. Most manufacturing organizations in Nigeria often seem to lack the required rudimentary cost information on the products they produce and the activities which they undertake. It has always been easier for manufacturing companies to establish the value of direct costs such as raw materials, labour and the like.

However the value of indirect costs (overhead costs) per unit of product has, been difficult to establish, in order to overcome this difficulty, "traditional product costing is used. This costing system allocates overheads to costs objects on toe basis of production volume using absorption rate which is done arbitrary (Champy, 1999). To avoid arbitrariness, accountants have in modern organizations embraced Activity-Based Costing (ABC) a technique that assigns costs objects on the basis of the activities undertaken to produce each product or service. The conjectural hypothesis therefore is to establish the extent ABC is the panacea to making overhead attribution more realistic, in providing accurate decision making tool in determining profitability of products. In other words, to what extent will ABC provide accurate cost information? Conversely, what are the virtues of ABC that tend to produce sound organizational performance? Specifically, the purpose of this study are to:

i) Establish the cost differential arising from the use of ABC as apposed to traditional costing method.
ii) Determine the extent the application of ABC method will influence the level of profits of manufacturing organizations.
iii) Ascertain the relationship existing among direct cost and indirect cost.

**Research Questions**

i) Does the introduction of ABC method produce any cost differential when related to the traditional costing method.


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ii) Does the application of ABC method significantly influence the level of profits of manufacturing organizations.

iii) Does any relationship exist among direct cost and indirect cost of manufacturing organizations?

**Hypotheses**

In order to accomplish the objectives of the study, the following hypotheses were formulated:

$H_0$1: The introduction of ABC method does not produce any cost differential when related to the traditional costing method.

$H_0$2: The application of ABC method does not significantly influence the level of profits of manufacturing organization.

**Activity–Based Costing and Organizational Performance**

To be truly world-class-organization, a company needs to work integratively with each unit understanding the importance of gross functional processes. An organization cannot compete or even begin to compare unit it knows the costs components of a product. Sullivan (1992) lists the characteristics of the new manufacturing environment (table 1), and states that in today's world, manufacturing companies are changing and becoming more information intensive, highly flexible and immediately responsive to the customers' expectation. As the basis of competition changes form, cost and quality to flexibility and responsiveness, the value of process management is now being recognized (Udu, 2007). Davenport and Short (1998) outline a new approach to the management of process, which was claimed was producing radical improvements in performance. The three driving forces behind this radical change are an extension of porter's (Porter, 1980, 1985, 1990) work on competitive advantages and are summarized as:

i Customers who can not be diverse, segmented and are expectant of consultation,

ii Competition that has intensified to meet the needs of customers in every niche (good position) and.

iii Change that has become pervasive, persistent, faster and in some markets a pre-requisite.

Customers, competition and change have created a new world for business such that organizations designed to operate in one environment are inadequately equipped to operate well in another organizations created to thrive on mass production stability, and growth cannot be simple unproved to success in a world where customers, competition, and change demand flexibility and quick response. This is also what Drucker (1969) terms the "Age of Discontinuity" or the challenge to the traditional assumptions of business. Due to the changing manufacturing environment, traditional cost accounting is rapidly disappearing. Traditional accounting systems were developed at a time when direct labour was a large percentage of the total product costs. Changes in manufacturing technologies such as the just-in-time philosophy, robotics, and flexible manufacturing systems decreased the direct labour component


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of production and increased overhead costs. Consequently, in a manufacturing environment, direct labour accounts for only 10% of the costs, whereas material accounts for 55% and overhead 35% (figures 1 and 2). As a result, product costs distortion occurs due to allocating overhead costs to the products arbitrarily on the basis of direct labour hours used by each product (Liggett, Trevino and Lavelle, 1992 and Harsh, 1993), Cooper (1988) report several situations that can cause distortions to occur, such as production volume diversity, complexity diversity, material diversity, and set up diversity. The solution to the product cost distortion problem is ABC. Activity Based Costing provides the information to identify the components of overhead more precisely such that product design, development, production and distribution decisions are better grounded. ABC assigns resource costs to products more accurately and as a result it acts as a decision support tool for companies. Decisions are not arbitrary, which is the case in traditional accounting systems, but based on facts (Johnson and Robert, 1987) and Harsh, 1993). In line with Johnson and Robert (1987) and Harsh (1993) ABC avoids or minimizes distortions in product costing that result from arbitrary allocation of indirect costs. Unlike more traditional line item budget which cannot be tied to specific outputs, ABC generates useful information on how money is being spent, if a department is being cost effective and how to benchmark or compare itself against others for quality improvement.

**Table 1:** The changes in manufacturing Environment

| **Old Paradigm** | **New Paradigm** |
|---|---|
| *High volume, long production runs, long product life cycles* | *Low volume, short production runs, Short product life cycle* |
| *Small number of product variations in a domestic market* | *Large number of product variations in an international market.* |
| *Large direct labour components, high cost of information processing* | *Relatively high technology costs, relatively low information processing* |
| *Small indirect/overhead costs in relation to direct labour* | *Large indirect/overhead costs in relation to direct labour* |

***Source:*** Sullivan, W. G. (1992). A New Paradigm for Engineering Economy. The Engineering Economist, 36, 3.

**Figure 1:** The proportion of Material direct labour and overhead costs in today's world (Pryor 1999)

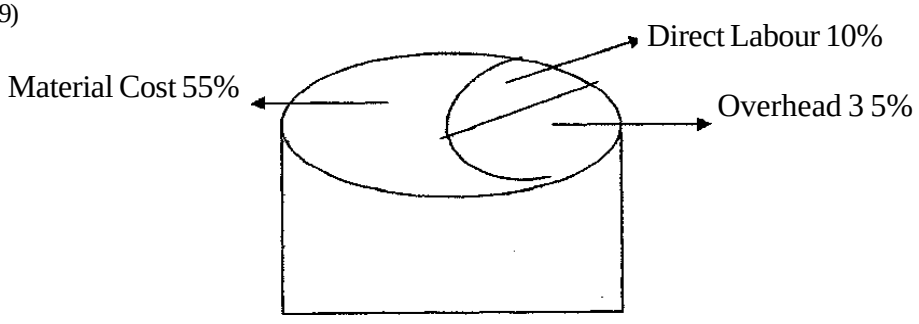



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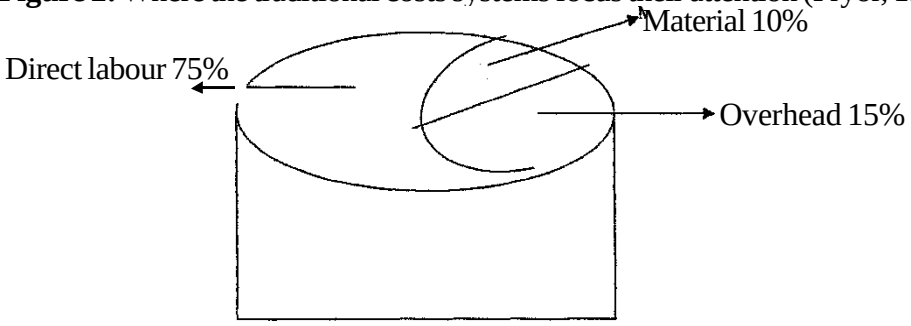
**Figure 2:** Where the traditional costs systems focus their attention (Pryor, 1999)




Loannon and Sullivan (1999) state that the information obtained by using ABC can improve decision making in manufacturing companies specially if it uses a two-stage method for the justification of investment in automated material handling systems. The first stage collects information regarding the necessary costs and benefits that will result from the implementation of a new material handling system in a manufacturing company in this stage, an ABC process management software. Decapo is used for modeling the material handling activities in the company. In the second stage, the information obtained from the first stage is used to justify the investment for the proposed material handling system by using an investment decision model that performs an Economic Value Analysis (EVA) while comparing different material handling alternatives (Pandey, 2000). Based on the results of the study, the authors conclude that using activity-based costing information together with Eva can most probably; improve decisions regarding the investments in new technologies such as automated material handling equipment.

In addition, ABC provides a clear metric for improvement, it encourages management to evaluate the efficiency and cost effectiveness of program activities. Some ABC systems rank activities by the degree to which they add value to the organization or its outputs. This helps managers identify what activities are really value-added, those that will best accomplish a mission, deliver a service or meet customer demand thus improving decision making through better information, and helping to eliminate waste by encouraging employees to look at all costs (Champy, 1995). That is why an essential aspect of any ABC endeavour is to get clear picture of the activities business area performs. This research falls into multi-disciplinary studies which will aim at producing broad but integrated conceptual framework required to solve organizational problems with respect to increasing organizational performance through using Activity-Based Costing (ABC). One of the theoretical framework upon which this study is based is costing hierarchy/activity hierarchy principles. A cost hierarchy classifies costs into different cost polls on the basis of the different types of cost drivers (or cast allocation base) or different degrees of difficulty in determining cause and effect (or benefits-received) relationships (Drury, 2001). Cooper (1990) classifies manufacturing activities along a cost hierarchy dimension consisting of:

i Unit -level activities/output-unit-level costs
ii Batch-level activities/batch-level costs
iii Product-sustaining activities/facility-sustaining cost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iv Facility-sustaining activities/facility-sustaining costs.

Activity-based costing system uses the above named costs hierarchies to identify cost -allocation bases that are preferably cost drivers, in activity cost pools. Unit-level activities are performed each time a unit of the product is produced. Expenses in this category include direct labour, direct materials, energy costs and expenses that are consumed in proportion to machine processing time (such as maintenance). Resources are consumed in unit-level activities in proportion to number of units of production and sales volume (Gossein, 1997). Batch-related activities, such as setting up a machine or processing a purchases order are performed each time a batch of goods is produced (Lucey, 2006). The cost of batch-related activities varies with the number of batches made, but is common (or fixed) for all units within the batch. Also, product-sustaining activities are undertaken to support individual products. These activities are performed to enable the production and sale of individual products. Examples of product-sustaining activities provided by Kaplan and Cooper (1998) include maintaining and updating product specifications and the support provided for individual products.

The final activity category is facility-sustaining activities. Here, resources are sacrificed on activities that cannot be traced to individual products or services but which support the organization as a whole (Davis, 1991). The activities are performed to support the facility's general manufacturing process and include general administrative staff, plant management and property costs. Therefore, these costs are unavoidable and irrelevant for most decision. Instead, they are regarded as common costs to all products made in the plant and deducted as a lump sum from the total of the operating margins from all products (Gurses, 1999).

Activity-based costing profitability analysis is another theory upon which this study will be based. This theory was first highlighted by Kaplan (1990) and Cooper and Kaplan (1991). They apply the ABC hierarchal activity classification to profitability analysis. In addition, they stress that the report of ABC product costs do not provide information that can be used directly to decision making. Instead, they report attention-directing information by highlighting those potentially unprofitable products or services that require more retarded special studies Cooper (1997) stresses that a major role of ABC is to develop profitability maps (i.e. periodic profitability analysis by cost objects) that are used to focus managerial attention. He argues that because the cost of special studies are high, the number performed has to be carefully controlled, hence the need for good attention directing information. He concludes that the primary value of ABC systems lies in the quality of the profitability analysis generated. Their greater accuracy increases the profitability that when the special study is undertaken, its findings will support the message sent by the cost system. In other words, profitable products will be found to be profitable and unprofitable products will be found to be unprofitable (Hopwood, 1999). Empirical studies of the relationship between ABC and Organizational performance comprise essentially two types. The first uses the event study methodology to assess the short run financial impact when firms engage in either ABC or traditional costing method. The second type of study examines the relationship


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between some measure of ABC and traditional costing method on the organizational performance by using accounting data or financial measure of profitability. The studies that explore the relationship between ABC and traditional cost for purpose of organizational performance have also produced mixed results. Sullivan (1992) locates a positive correlation between ABC and organizational performance index of the two companies.

## METHOD

This study adopts ex-post-facto research method to determine the cause-end-effect relationship by examining conditions and tracing back the information and available data for probable causal factors (Ofo, 2002). In this type of research, the effect and the alleged cause have already occurred, but both conditions are studied in retrospect. Also, this study is designed as a longitudinal one. A longitudinal study is designed to collect information over a spread time frame. Madu (1997) affirms that longitudinal study is a study where information is obtained on variables of interest over a long period of time usually exceeding one year or one season as the case may be. The population of this study covers all the manufacturing organizations in Enugu and Ebonyi States. But for the purpose of convenience, purposive sampling technique was used to select a total of two manufacturing (one from each State) firms from the two States study. Both primary and secondary sources of data are employed in the study. Primary data are made up of personal interviews and observations. Such data are in the raw form as some other researchers had not used them. Secondary data are from the financial records of the companies studied. The data collected for the study were presented using tables and analyzed statistically using simple percentage and correlation analysis. That is the Pearson product moment coefficient to determine the influence of the variables studied on the performance of manufacturing organizations. Statistical analysis of data involved the following

The data gathered for the purpose of this research were tested to establish the exact functional relationships between the variables using the correlation analysis.

The value of Y range from -1 to +1 (inclusive).

A value of Y = -1, indicates perfect negative relationship

A value of Y = - *t* - 1, indicates perfect positive relationship

A value of Y = 0, indicates no relationship situation.

## RESULTS AND DISCUSSION

**Edon Nigerian Limited indirect Cost Allocation Base:**

i) ***Design Activity:*** The cost driver is per-square meter. More parts and larger surface area require greater design department resources. Hence, 5mm Aluminum required 225 per-square meters X = N15,000 per-square meter and .4mm aluminium 525 per-square meters X = W15,000 per-square meter. The cost hierarchy of design activity is product sustaining.


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ii) ***Set-up of machines activity:*** Set-up hour is used as a measure of set-up activity. Overhead costs of the set-up activity increase as set-up hour increase .5mm alluminium used 6,250 set up hours X = ₦ = 300 per hour and .4mm aluminum used 18,750 set-up hours X = ₦ = 300 per hour. The cost hierarchy of set-up of machines activity is batch level.

iii) ***Manufacturing Operations Activity:*** The cost driver for manufacturing operations activity is machine hour. Manufacturing overhead costs support automated machines and hence increase with machine usage .5mm aluminum required 75,000 machine hours X = ₦ = 150 per machine hour and 4mm aluminum required 31,250 machine hours X- ₦ = 150 per machine hour. Output unit level is the cost hierarchy of manufacturing operations activity.

iv) ***Shipping set up activity:*** The measure of shipping set-up activity is shipment costs incurred to prepare batches for shipment increase with the number of shipments. Hence both .5mm and .4mm alluminium required 1266 shipments X= ₦ = 800 per shipment. Batch level is the cost hierarchy of shipping set-up activity.

v) ***Distribution Activity:*** The cost driver for distribution activity is cubic meter of packages moved. Overhead costs of the distribution activity increase with cubic meter of packages shipped .5mm aluminum used 435,000 cubic meters X = ₦ =15 per cubic meter and .4mm aluminum used 217,000 cubic meter X = ₦ =15 per cubic meter. The cost hierarchy of distribution activity is output unit level

vi) ***Administration Activity:*** Direct manufacturing labour hour is used as a measure of administration activity. Administration department resources increases with direct manufacturing labour hours .5mm alluminium required 160,380 direct manufacturing labour hours X = ₦ =30 and .4mm aluminum required 52,125 direct manufacturing labour hours X = ₦ =30 facility sustaining is the cost hierarchy for administration activity.

ABC total direct cost amounted to ₦71,625,000 as against traditional total direct cost of ₦64,875,000 leaving a cost differential of ₦6,750,000 higher than traditional total direct cost. Traditional total indirect cost amounted to ₦59,625,000 while ABC total indirect cost was ₦52,875,750. This means that there is a cost differential of ₦146,749,250 lower than traditional total indirect cost. ABC cost per unit of .5mm aluminum amounted to ₦l,249.57 whereas that of traditional method was ₦l,468.75, thus there is a cost differential of ₦219.18 lower than traditional cost per unit of .5mm aluminum. Traditional cost per unit of .4mm aluminum was ₦2,425 while ABC cost per unit of .4mm aluminum was ₦3,301.77, leaving a cost differential of ₦876.77 higher than traditional cost per unit of .4mm aluminum. From the above analysis and interpretation, the introduction of ABC method in Edon Nigeria Limited produced cost differential when related to the traditional costing methods therefore, it is accepted that the introduction of ABC method will produce cost differential when related to the traditional costing method.


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**The Innocent Industries Limited cost allocation base:**

1. Overheads for traditional costing method used direct labour overhead rate as allocation base, that is, total overhead cost/total direct labour hour.

$$Direct\ \ Labour\ \ Overhead\ \ Rate = \frac{Total\ \ Overhead}{Total\ \ Direct\ \ Labour\ \ Hour}$$

$$= \frac{N\,24{,}000.00}{600{,}000} = N\,40$$

2. Delivery overhead costs used number of deliveries as cost driver, that is, delivery overhead costs/number of deliveries.

$$Deliveries = \frac{N\,4{,}800{,}000}{300} = N16{,}000$$

3. Set-up overhead costs used number of set-up as cost driver, that is, set up overhead costs/number of set-ups.

$$Set - ups = \frac{N\,12{,}000{,}000}{130} = N\,92{,}308$$

4. Purchasing orders overhead costs used number of purchase orders as cost driver, that is, purchase orders overhead costs/number of purchase orders.

$$\text{Purchasing} = \frac{\text{N7,200,000}}{800} = \text{N9,000}$$

ABC total cost equal to N35,320,040 while traditional total cost was N35,420,000 leaving a cost differential of N99,960 lower than traditional total cost. ABC cost per unit of PC amounted to N7,382.70 whereas traditional cost per unit of production cost was N8,087.5. This means that there is a cost differential of N704.80 lower than traditional cost per unit of production cost. ABC cost per unit of hour was N14,619.25 and traditional cost per unit of hour was N11,800, leaving a cost differential of N2,819.25 higher than traditional cost per unit of HA. From the above analysis and interpretation, with the introduction of ABC method, Innocent Industries Limited produced cost differential when related to the traditional costing method. Therefore, Ha is accepted, that is, the introduction of ABC method will produce cost differential when related to the traditional cost method.

Coefficient of Determination ($Y^2$) means the contribution of variation in X to variations is Y. This is the square of the coefficient of correlation which gives the proportion of all the variation in the Y-value that is explained by the variations in the X – values.

Therefore, $Y = (0.9871)^2 = 0.9744 = 97\%$

A correlation coefficient (Y) of 0.9871 indicates a very strong linear relationship between the two variables activity based costing of products and profit of Edo Nigeria Limited. A correlation of determination ($Y^2$) of 0.9744 means of 97% of variation in profit of Edo Nigeria Limited is influenced by the activity based cost of product. In other words, 3% of the variation in the profit of Edo Nigeria Limited products is due to other factors


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beyond this study. From the above analysis and interpretation, the application of ABC method has a very strong positive relationship with the profits of Edon Nigeria Limited. Therefore, null hypothesis is rejected, that is, the application of ABC method significantly influences the level of profits of Edon Nigeria Limited.

A correlation coefficient (Y) of 0.8524 shows a very strong linear relationship between the activity based costing of products and profit of Innocent Limited. A correlation of determination ($Y^2$) of 0.7266 means of 73% of variation in profit of Innocent Limited is influenced by the activity based cost of product. In other words, 27% of the variation in the profit of Innocent Limited products is due to other factors beyond this study. From the above analysis and interpretation, the application of ABC method has a very strong positive relationship with the profits of Innocent Limited. Therefore, the null hypothesis gives way for the alternate hypothesis, that is, the application of ABC method significantly influences the level of profits of Innocent Limited.

The major significance and objective of this study is that it will enable manufacturing organizations to understand activity based costing (ABC) systems and its influence on the overall performance of manufacturing organizations and how it impact on their profitability fortune. In understanding the variable(s) that influence the profits of manufacturing organizations, it will enable manufacturing organizations to use costing method that will trace costs of manufacturing products more accurately. The result from hypothesis one indicates that the introduction of ABC method produced cost differential when related to the traditional costing method as indicated in table 6 and 9. This corroborates earlier studies by Johnson and Robert 1987 and OSD comptroller 2002 with respect to cost distortion in product costing that resulted from arbitrary allocation of indirect costs in manufacturing organizations. In the test of hypothesis two (that is, the influence of the application of ABC method on the level of profits of manufacturing organizations) there is a positive significant influence on the application of ABC method on the level of profits of manufacturing organizations. This is affirmed by the result for correlation co-efficient (r) of 0.9871 of Edon Nigeria limited and 0.8524 of Innocent Industries Limited.

ABC methods of costing products evaluate the efficiency and cost effectiveness of program activities and rank activities by the degree to which they add value to the organization or its outputs, that is, it provides a clear metric for improvement, organizations should identify and eliminate the non-value added activities in their value chains. This is because when organizations eliminate the non-value added activities from their products costing by using costing method that cost accurately, they are improving the profits of those products. The profit model tested indicates that 97% of the variations in profits of Edon Nigeria Limited are related to the activity based cost of products. Also that the profit model tested indicated that 73% of the variations is profits of Innocent Industries Limited is related to the activity based cost of products. This is an indication that cost of production remains the major influence in the determination of profits of manufacturing products. Furthermore, the sizes of organizations under study that is Edon Nigeria Limited and Innocent Industries Limited

are N18b and N30.5b respectively. The adoption of ABC method by these organizations in South East, Nigeria is mostly due to the organizations sizes. Perhaps this is the major reason why many manufacturing organizations in South East, Nigeria are reluctant to embrace ABC method.

**Table 4:** Analysis of costs using the traditional costing Method of Edon Nigeria limited

| | Total (₦) | 5mm Per | Total (₦) | 4mmPer |
|---|---|---|---|---|
| unit (₦) | unit (₦) | | | |
| Direct materials | 28,125,000 | 468.75 | 16,875,000 | 1,125 |
| Direct Manufacturing Labour | 15,000,000 | 250 | 4,875,000 | 325 |
| Total direct cost | 43,000,000 | 8.75 | 217.50 | 1450 |
| Total indirect cost allocated | 45,000,000 | 750 | 14,625,000 | 975 |
| Total cost | 88,125,000 | 1,468.75 | 36,375,000 | 2,425 |

**Source:** Statistical Analysis of Empirical Data as shown to appendix A1

**Table 2:** Activity Based Costing Method of Edon Nigeria Limited

| **Direct Costs** | Total (₦) | Per unit(₦) | Total (₦) | Per unit(₦) |
|---|---|---|---|---|
| Direct materials | 28,125,000 | 468.75 | 16,875,000 | 1,125 |
| Direct Manufacturing Labour | 15,000,000 | 250 | 4,875,000 | 325 |
| Direct mould, cleaning maintenance | 3,000,000 | 50 | 3,750,000 | 250 |
| Total direct cost | 46,125,000 | 768.75 | 25,500,000 | 1700 |
| **Indirect Costs** | | | | |
| Design activity Costs | 3,375,000 | 56.25 | 7875,000 | 525 |
| Set-up activity costs | 1,875,000 | 31.25 | 5,625,000 | 375 |
| **Manufacturing operations** | | | | |
| Activity costs | 11,250,000 | 187.50 | 4687,500 | 312.5 |
| Shipping set-up activity | 1,012,800 | 16,88 | 1,012,500 | 67.5 |
| Distribution activity | 6,525,000 | 108,75 | 3,262,500 | 217.5 |
| Administration activity | 4,811,400 | 80,19 | 1,563,750 | 104.25 |
| Total Indirect costs | 28,849,200 | 480.82 | 24,026,250 | 1601.25 |
| Total Costs: | 74,974,400 | 1,249.57 | 49,526,250 | 3,301.75 |

***Source:*** *Statistical Analysis of Empirical data as shown in appendix A1*

**Table 3:** The comparison of traditional costing method and ABC method of Edon Nigeria Limited

| **Items** | **Traditional costing Method** | **ABC method** | **Difference** |
|---|---|---|---|
| Direct cost | Direct materials<br>Direct manufacturing Labour | Direct materials<br>Direct manufacturing labour<br>Direct cleaning & material labour | |
| Total direct cost | ₦64,875,000 | ₦71,626,000 | ₦6,750,000 |
| | Single indirect cash Pool using manufacturing Labour hours of packages and manufacturing labour hours | Six indirect activity cost Pools parts-square meters Set-up hours, machine hours no | |
| Total Indirect cost | ₦59,625,000 | ₦52,875,750 | (₦6,749,250) |
| Cost assigned to .55mm | ₦88,125,000 | ₦74,974,200 | (₦13,150,800) |
| Cost per unit of .5mm | ₦1,468.75 | ₦1,249.57 | (₦219.18) |
| Cost assigned to .4mm | ₦36,375,000 | ₦49,526,550 | ₦13,151,550 |
| Cost per unit of .4mm | ₦2,425 | ₦3,301.77 | ₦876.77 |

***Source:*** Extracted from tables 1 and 2.

**Table 4:** The traditional costing method of Innocent Industries Limited

| | Plastic Chair 1 | | Home Accessories | |
|---|---|---|---|---|
| | Total (₦) | Per unit (₦) | Total (₦) | Per unit (₦) |
| Direct materials | 3,840,000 | 1200 | 1440,000 | 1,800 |
| Direct manufacturing labour | 4440,000 | 1,387.5 | 1600,000 | 2,000 |
| Overhead cost | 17,600,000 | 5500 | 6400,000 | 8000 |
| Total cost | 25,980,000 | 8,087.5 | 9440,000 | 11,800 |

***Source:*** Statistical Analysis of Empirical Data as shown in appendix B1


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**Table 5:** The method of Innocent Industries Limited

| | Plastic Chair 1 | | Home Accessories | |
|---|---|---|---|---|
| | Total (₦) | Per unit (₦) | Total (₦) | Per unit (₦) |
| Direct materials | 3,840,000 | 1200 | 1480,000 | 1,800 |
| Direct labour | 4,440,000 | 1,387.5 | 1600,000 | 2,000 |
| **Overheads** | | | | |
| Deliveries | 2,560,000 | 800 | 2,240,000 | 2,800 |
| Set-ups | 7,384,640 | 2307.7 | 4615,400 | 5,769.25 |
| Purchasing | 5,400,000 | 1687.5 | 1800,000 | 2250 |
| Total cost | 23,624,640 | 7,382.7 | 11,695,400 | 14,619.25 |

***Source:*** Statistical Analysis of Empirical Data as shown in appendix B1

**Table 6:** The comparison of Traditional Costing Method and ABC Method of Innocent Industries Limited

| | Traditional costing method (N) | ABC method (N) | Difference (N) |
|---|---|---|---|
| Total cost | 35,420,000 | 35,320,000 | (99,960) |
| Total cost assigned to PC | 25,980,000 | 23,624,640 | (2,355,360) |
| Cost per unit of PC | 8,087.5 | 7,382.70 | (704.8) |
| Total cost assigned to HA | 9,440,000 | 11,695,400 | 2,255,400 |
| Cost per unit of HA | 11,800 | 14,619.25 | 2,819.25 |

***Source:*** Extracted from tables 4 and 5.

**Table 7:** The correlation of profit against the activity based costing of products of Edom Nigeria Limited

| Year | Cost (x) | Profit (y) | XY | $X^2$ | $Y^2$ |
|---|---|---|---|---|---|
| | N000,000 | N000,000 | N000,000 | N000,000 | N000,000 |
| 2009 | 35.61 | 8.25 | 293.78 | 1268.07 | 68.06 |
| 2010 | 40.29 | 10.90 | 439.16 | 1,623.28 | 118.81 |
| 2011 | 41.99 | 11.86 | 498.00 | 1,763.16 | 140.66 |
| 2012 | 46.51 | 13.54 | 629.75 | 2,163.18 | 183.33 |
| 2013 | 52.56 | 18.94 | 995.49 | 2762.55 | 258.72 |
| Total | 216.96 | 63.49 | 2856.18 | 9,580.24 | 869.58 |

***Source:*** Statistical Analysis of Empirical Data see Appendix A II

**Table 8:** The correlation of profit as against activity based costing of products of Innocent Industries Limited

| Year | Cost (x) | Profit (y) | XY | $X^2$ | $Y^2$ |
|---|---|---|---|---|---|
| | N000,000 | N000,000 | N000,000 | N000,000 | N000,000 |
| 2009 | 47.3 | 1.5 | 70.95 | 223729 | 2.25 |
| 2010 | 82.7 | 1.8 | 148.86 | 6,839.29 | 3.24 |
| 2011 | 96.2 | 3.1 | 298.22 | 9254.44 | 9.61 |
| 2012 | 82.2 | 5.5 | 452.10 | 6756.84 | 30.25 |
| 2013 | 149.9 | 8.3 | 1,244.17 | 22,470.01 | 68.89 |
| Total | 458.3 | 20.2 | 2,214.3 | 47,557.87 | 114.24 |

***Source:*** Statistical Analysis of Empirical Data see Appendix B II

## CONCLUSION AND RECOMMENDATIONS

Activity based costing (ABC) is at the forefront of modern business establishment, as the public become increasingly aware of the growth and adoptions of benefit and environmental consequences of modern day business activities. Managers are therefore forced to adopt and implement systems capable of enabling them to identify, allocate and measure the impacts of their activities on the world around. ABC corroborates itself with some cost drivers that generate the cost by identifying the cost drivers that cause the costs to change and assigning costs to cost objects on the basis of cost driver usage, costs can be more accurately traced. This cause-and-effect relationship


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provides a superior way of determining relevant costs. Based on the findings of this study the following recommendations are hereby made:

i) Manufacturing organizations should adopt and implement ABC costing method to enable them identify, allocate and measure profits level of each product.

ii) The activity based costing method should be developed within the national, industry and firm level context to enable managers account for specific costs of operation affecting them.

iii) That manufacturing organizations in South East Nigeria who are capital intensive and have advanced in manufacturing technologies and have more than one product line should embrace activity based costing (ABC) methods.

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## APPENDIX A I

| **Edon Nigeria Limited** | .5mm | .4mm |
|---|---|---|
| | Per unit (N) | Per unit (N) |
| Direct materials | 468.75 | 1,125 |
| Direct manufacturing labour | 250 | 325 |
| Quantity | 60,000 units | 15,000 units |
| Indirect cost rate 60 per direct manufacturing labour hours | | |
| Total direct labour hours to make .5mm | 750,000 | |
| Total direct labour hours to make .4mm | 243,750 | |
| Indirect cost allocation base for .5mm and .4mm is Direct manufacturing labour hours | | |
| **Activity cost pools** | **5mm per** | **4mm** |
| | Per unit (N) | per unit (N) |
| Direct mould-cleaning & maintenance | 50 | 250 |
| Design activity costs | 56.25 | 525 |
| Set-up activity costs | 31.25 | 375 |
| Manufacturing operations activity costs | 187.50 | 312.5 |
| Shopping set-up activity | 16.88 | 67.5 |
| Distribution activity | 108.75 | 217.5 |
| Administration activity | 80.19 | 104.25 |

Extracted from cost profile of Edon Nigeria Limited

## APPENDIX A II

| **Edon Nigeria Limited** | 2013 | 2012 | 2011 | 2010 | 2009 |
|---|---|---|---|---|---|
| | N | N | N | N | N |
| Total cost | 52,563,937 | 46,509,596 | 41,990,004 | 40,293,428 | 35,611,016 |
| Profit | 18,942,856 | 13,541,189 | 11,860,880 | 10,900,524 | 8,254,557 |

**Source:** An extract from Edon Nigeria Limited Annual Report and Statement, 2013.


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## APPENDIX B I

| **Innocent Industries Limited** | Output (units) | Direct labour hour | Raw material cost |
|---|---|---|---|
| Plastic Chair | 3,200 | 440,000 | 1,200 |
| Home Accessories | 800 | 160,000 | 1,800 |

The cost driver volume relating to each activity and for each type of plastic were as follows:

| | No of deliveries | No of set-ups | No of purchase order |
|---|---|---|---|
| Plastic Chair | 160 | 80 | 600 |
| Home Accessories | 140 | 50 | 200 |

The overhead costs relating to these activities were as follows:

| | N |
|---|---|
| Deliveries | 4,800,000 |
| Set-up costs | 12,000,000 |
| Purchase orders | 7,200,000 |

All direct labour was paid of N10 per hour.

Extracted from cost profile (2011) of Innocent Industries Limited.

## APPENDIX B II

## Innocent Industries Limited

| | 2013 | 2012 | 2011 | 2010 | 2009 |
|---|---|---|---|---|---|
| | ₦.000 | ₦.000 | ₦.000 | ₦.000 | ₦.000 |
| Total cost | 149,905 | 82,222 | 96,200 | 82,650 | 47,287 |
| Profit | 8,345 | 5,480 | 3,075 | 1,774 | 1,471 |

***Source:*** An extract from Innocent Industries Limited Annual Report and Accountant 2013.


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