EFFECT OF FIRM SIZE ON INNOVATION AMONG MANUFACTURING COMPANIES IN NIGERIA

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ABSTRACT

The relation between firms' size and innovations has produced confounding theoretical and empirical results. Many earlier authors claim that large firms adopt new innovations more than small firms while few authors argued otherwise. This study sheds light on the relation by investigating the choice of advanced manufacturing technology and modern management accounting practices among the manufacturing companies in Nigeria that are not listed on Nigeria stock exchange. A retrospective longitudinal survey was conducted to examine the usage of advanced manufacturing technology and modern management accounting practices during a period of 5 years (2011-2015). A structured questionnaire was personally administered among the management accountants/Head of accounts and Finance units of 154 manufacturing companies that were randomly sampled from the main directory of manufacturers association of Nigeria. 133 useful completed questionnaires were retrieved. The data were subjected to descriptive analysis and logistic regression. The outcome of the study shows that firms' size has a significant effect on both manufacturing technology and management accounting practices. Unlike many earlier findings, the study established a negative relation which implies that smaller firms applied advanced manufacturing technology and modern management accounting practices more than larger firms.

Keywords: Firms size, Innovations, Manufacturing technology, Management accounting practices.

INTRODUCTION

The 21st century business firms are exposed to various kinds of innovations as a result of globalization which turns the whole world into a global village. The decisions on whether to adopt/apply new innovations are often times being faced by many business firms. Technological and administrative innovations are increasingly becoming essentials for any businesses firms that want to thrive and compete favourably in the dynamic business environment of the 21st century.

Nigerian manufacturing sector and Small and Medium term Enterprises were given great attention by the transformation agenda (2011-2015) which focused on SMEs and manufacturing companies among others. Various programmes targeted at transforming and innovating the sector were carried out by the government during the period. Such programmes include the launching of National Enterprise Development Programme (NEDEP), National Micro , Small and Medium- Term Enterprises policy, establishing the

N200 billion SME/Manufacturing Refinancing and Restructuring Fund by the Central Bank of Nigeria (CBN) in March, 2010 and increased commitment of Bank of industry to SME and manufacturing sector during the period(Gyong, 2012; *Mid-Term Report*, 2013). There was also a record of 13 percent increase in capacity for design and fabrication of machines and equipment and transfer of improved post harvest processing technologies to SMEs and establishment of same in the geo-political zones of the country(*Mid-Term Report* , 2013).
However, despite the importance of technological and administrative innovations in the survival of business in the 21st century, the adoption rate of the new innovations differs across business organizations. The adoption of innovation by firms relates to various factors comprising the financial capabilities of the firm, availability of the specialists and infrastructures among others(Abdel-Kader & Luther, 2008; Askarany & Smith, 2008; Haldma & Lääts, 2002). It is further argued that financial capabilities, specialists and infrastructures needed to adopt new innovations are much more available in large firms than small firms(Abdel-Kader & Luther, 2008; Askarany & Smith, 2008). On the contrary, Nooteboom (1994) claims that small firms bring technological change to the market more quickly than large businesses. The claims of Nooteboom rest on the premises of less bureaucracy, greater motivation, better survey of the entirety of the project, and greater proximity to the market associated to small firms while Feldman(1994) posits that small businesses are the prime source of technological change in certain industries.

Intensifying global competition and rapid advancement of manufacturing technology are two realties in today's business environment. The combined effect of these two realities have shifted the business strategic priorities toward quality, cost effectiveness and responsiveness to marketplace changes (Gunawardana, 2006). Globalization brings in new technology and makes a developing country open to greater competition (Kassim, Md-Mansur, & Idris, 2003; Ominunu, 2015). With the advent of digital technologies, a variety of issues relating to pricing strategies, cost management and control mechanisms are evident as there are alterations in management accounting systems, structures, thinking, and practices(Bhimani, 2003). To this end, sophisticated management accounting practices have been developed and recommended for practice toprovide management with frequent, detail and correct financial and non-financial information for informed management decision. Business innovation can come in form of technological and administrative advancement. The advanced manufacturing technologies and sophisticated management accounting techniques are the technological and administrative innovations respectively(Askarany & Smith, 2008).This study examined the effect of firms' size on manufacturing technology and management accounting practices.

LITERATURE REVIEW

This section comprises the review of theoretical and empirical literature

Theoretical and Empirical Review

Diffusion of Innovation Theory

Diffusion of innovation theory, developed by Rogers in 1962, is one of the oldest social science theories; it originated in communication to explain how, over time, an idea or product gains momentum and diffuses (or spreads) through a specific population or social system(Léger & Swaminathan, 2007).Rogers and Scott(1997) define innovation, as simply "an idea perceived as new by the individual and diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system, or a special type of communication concerned with the spread of messages that

are perceived as new ideas. The result of this diffusion is that people, as part of a social system, adopt a new idea, behavior, or product.

There are technological and administrative innovations that manufacturing companies are confronted with in the dynamic business environment of 21st century. Examples of technological innovations confronting the manufacturing firms are the advanced manufacturing technologies such as; Robotics, Flexible Manufacturing System, Computer-Aided Design, Testing Machine, Computer Integratedmanufacturing and Just in Time among others(Askarany & Smith, 2008). Administrative innovation includes Management accounting innovations which refers to emergence of contemporary management accounting techniques or the adoption of "newer" or modern forms of management accounting systems such as activity based costing, target costing, life cycle costing, balanced score card, kaizen costing, product profitability analysis, throughput accounting, total quality management and value chain management(Ajibolade, 2013; Chenhall, 2008).Accounting methods can also be considered as innovations, and accounting change, consequently, is subject to the diffusion of innovations theory(Askarany & Smith, 2008). Contemporary management accounting techniques differ from the conventional techniques in the sense that the former are strategic-focused that combine both financial and non-financial information(Bhimani & Bromwich, 2010; Chenhall & Langfield-Smith, 1998).

Gosselin(1997) categorizes the innovation process into four stages: adoption, preparation, implementation, and routinization. The adoption stage involves the identification of the need for change by the company and the decision to adopt or reject the change subject to some contextual factors. During the preparation stage, the organization engages in employees training, extensive use of consulting services, and purchasing of computer software. During this stage, the company might modify its previous decision and even stop the installation process. The implementation stage consists of introducing the innovation and evaluating its effects. During the routinization, the innovation turns into regular practices of the firms. This study examined the innovation of modern management accounting practices and advanced manufacturing technology based on their application among the manufacturing companies in Nigeria. To this end, the study tested the following hypotheses:

H_{01} There is no significant difference on the choice of manufacturing technology among the manufacturing companies in Nigeria based on their firms' size

H_{02} There is no significant difference on the choice of management accounting practices among the manufacturing companies in Nigeria based on their firms' size

Empirical Review

Virtually all of the management accounting practices employed by firms today and explicated in leading cost accounting textbooks had been developed by 1925(Kaplan, 1984). These old management accounting techniques are referred to as traditional management accounting practices. The traditional management accounting practices such as standard costing, absorption costing and marginal costing provide information that is too late, too aggregated and too historical and therefore criticized of relevance loss in a 21st business environment characterized by stiff competition and advanced manufacturing technology which require more sophisticated management accounting information for managers to make informed decisions(Bhimani & Bromwich, 2010; Jhonson & Kaplan, 1987; Kaplan, 1984; Mat & Smith, 2014; Watts, Yapa, & Dellaportas, 2014). The modern management accounting techniques which were developed as a results of deficiencies in the traditional techniques

include activity based costing, target costing, life cycle costing, backflush costing, throughput accounting, balanced scored card, and just in time among others(Ajibolade, 2013).

Traditional manufacturing is defined as the act of convertingraw materials into finished products by using manual or mechanized transformational techniques to add value to achieve targeted objectives without precluding society's overall interests(Thareja, 2005). Advanced Manufacturing technology (AMT) represents a wide variety of mainly computer-based systems, which provide adopting firms with the potential to improve manufacturing operations greatly. Another definition is Advanced manufacturing technology refers to a family of technologies that include computer-aided design (CAD) and engineering systems, materials resource planning systems, automated materials handling systems, robotics, computer controlled machines, flexible manufacturing systems, electronic data interchange and computer-integrated manufacturing systems(Gunawardana, 2006).

The relationship between cost of a product or service and the technology involved cannot be over emphasized. The quest for lower operating costs and improved manufacturing efficiency has forced many manufacturing firms to embark on various advanced manufacturing projects (Gunawardana, 2006).To understand cost behaviour and cost drivers, it is necessary to understand the relevant technology because cost is determined by both the technologies available for production and the relative prices of the inputs. Minimising costs requires the selection of the optimal technology given the relative prices of the inputs utilised (Bhimani & Bromwich, 2010). The advanced manufacturing technologies include; computer aided manufacturing, computer aided process planning, computer aided engineering, testing machine, just in time, flexible manufacturing system, numerical control and direct numerical control among others(Askarany & Smith, 2008; Mat, 2010).

Some authors believe that large companies adopt innovations more easily than smaller ones do because they have a capability of managing the risk, abundant available resources and a strong infrastructure(Ayadi & Affes, 2014; Lucas, Prowle, & Lowth, 2013). On the contrary, small businesses suffer from the lack of resources, from financial difficulties and from the scarcity of professionals, the thing which can lead to difficulties in adopting innovations(Ko, Kim, Kim, & Woo, 2008).Having investigated the effect of firm size on adoption of modern management accounting practices among 100 Tunisian companies; the findings of Ayadi and Affes (2014) show that large firms adopt new management accounting techniques more than the small firms do.

In the same vein, Askarany and Smith(2008) found a significant positive relationship between business size and both technological innovation and the implementation of ABC. An inference from their study shows that large firms adopt ABC more than small firms do. Similarly, Lucas *et al*.(2013) conclude that larger organisations do more management accounting than smaller ones. Erserim(2012) also found out a relationship between firm size and the management accounting practices. Similarly, based on a sample of 144 responses from a survey of members of the Australian Association of Practice Managers (AAPM), King et al., (2010) established that the adoption of written budgets is related to firm size.

In like manner, the empirical investigation of 658 manufacturing companies in UK by Abdel-Kader and Luther(2008) shows that firm size influences the choice of management accounting practices. The authors sent two versions of questionnaire to Management accountants and production managers; measuring firm size based on number of employees and management accounting practices on 7-point likert scale ranging from never used to

often used. They argue that large firms adopt more sophisticated MAPs than small firms as moving from traditional to modern MAPs requires resources and specialists only affordable by large firms. Their findings lend credence to the arguments of Albu and Albu(2012) that an increase in size is usually associatedwith a tighter control on the environment and an increase in the firms' resources, as well as with an increased use of control techniques. Also ,Haldma and Lääts(2002) argue that the sophistication level of cost accounting and budgeting systems tends to increase in the line with a firm's size.

On the contrary, Nooteboom (1994) claims that small firms bring technological change to the market more quickly than large businesses. The claims of Nooteboom rest on the premises of less bureaucracy, greater motivation, better survey of the entirety of the project, and greater proximity to the market associated to small firms while Feldman(1994) posits that small businesses are the prime source of technological change in certain industries. Similarly, Van Triest and Elshahat(2007)do not find any correlation between the size of the firms and the management accounting practices.

RESEARCH METHOD

A retrospective longitudinal survey was adopted to find the relation between firms size and the type of manufacturing technology and management accounting practices among manufacturing companies in Nigeria over a period of 5 years (2011-2015). A structured questionnaire was personally handed over to the management accountants/Head of Account/Finance unit or their representatives in some cases. 154 companies were randomly selected out of the 448 manufacturing companies in Lagos and its immediate environs which were extracted from the Main directory of Manufacturers Association of Nigeria.

The research instrument developed by Baines and Langfield-Smith (2003) was adapted to measure manufacturing technology and management accounting practices. Respondent were asked to state how they have used the advanced manufacturing technologies on a 5-point likert rating scale ranging from never used to very frequently used. The scale adopted from Khandwalla (1977) was used to measure the complexity of their manufacturing process ranging from customized production, small batch of similar goods, large batch, mass production and continuous production representing increasing level of complexity and standardization. Likewise, they were asked to rate their level of automation on a 5 point likert rating scale from very little automation to completely automated. The composite figure of the responses was determined and the average was found. The index below average was regarded as traditional and coded as "0" while the index above average was regarded as modern and coded as "1",

In like manner, management accounting practices was measured based on their level of usage during the period of five years (2011-2015). The use of 15 modern management accounting techniques including; activity based costing, activity based budgeting, activity based management, target costing, throughput accounting, backflush costing, life cycle costing, product profitability analysis, quality costing, kaizen costing, balanced score card, just in time, value chain analysis, benchmarking and shareholders' value analysis/ economic value added (EVA) was tested on 5 point Likert rating scale from never used to very frequently used. The average of the index value was calculated; index value below average was regarded as traditional and coded as "0" while index value above average was regarded as modern management accounting practices and coded as "1".

Firm size was measured using the number of employees ranging from less than 10 to over 1,000. Firms were categorized into 6 based on number of employees. The categories include; less than 10, 10-49, 50- 199, 200 – 500, 501 – 1000, over 1,000. Average of the employees' number was calculated and index below average was classified as small firms and coded as "0" while the index value above average was classified as large and coded as "1".

Model Specification

The study used two models, the fist one representing the causal relation between firms' size and manufacturing technology and the second one showing the causal relation between firms' size and management accounting practices.

$\ln odds = \beta_0 + \beta_1 FS$…eq.1

$\ln odds = \beta_0 + \beta_2 FS$ …eq.3.2

Where $\beta_0 = Constant$

β_1= coefficients of the Firms size for relation between manufacturing technology and firms size.

β_2= coefficients of the Firms size for relation between management accounting practices and firms size.

RESULTS AND DISCUSSION

Factor Analysis

Factor analysis is important because it is easier to focus on some key factors rather than having to consider too many variables that may be trivial, and so factor analysis is useful for placing variables into meaningful categories(Yong & Pearce, 2013). This study adopts Principal-components method (or simply P.C. method) of factor analysis because it explains more variance than would the loadings obtained from any other method of factoring (Kothari, 2004). Field (2009) posit that a factor is reliable if it has four or more loadings of at least 0.6 regardless of sample size while Pituch and Stevens (2016) suggests using a cut-off of 0.4, irrespective of sample size, for interpretative purposes.

The outcome of factor analysis on management accounting practices table 1 shows that all the items reached the acceptable threshold of 0.4 and accepted for further statistical analysis. This acceptance implies that data gathered had relatively high internal consistency and could be generalized as a reflection of the opinion of all respondents in the target population on the effect of changes in manufacturing technology on management accounting practices among the manufacturing companies in Nigeria.

Table 1 Factor Analysis for modern management accounting practices

Component Matrix

	Component 1
Quality Costing	.678
Target Costing	.675
Throughput Accounting	.658
Activity Based Budgeting	.658
life Cycle Costing	.629
Backflush Costing	.616
Just in Time	.543
Activity Based Costing	.402
Product Profitability analysis	.400
Benchmarking	.258
Shareholdervalue analysis/Economic Value Analysis	-.091

Extraction Method: Principal Component Analysis.

Table 2 Reliability tests for management accounting practices

Reliability Statistics	
Cronbach's Alpha	N of Items
.727	9

Table 3 Factor Analysis of advanced manufacturing technology

	Components
Testing Machine	.709
Numerical Control	.668
Just in Time	.615
Computer Aided Processing	.611
Robotics	.592
Computer Aided Engineering	.582
Computer Integrated Manufacturing	.565
Flexible Manufacturing	.552
Computer Aided Manufacturing	.375
Direct Numerical Control	.305

Table 0 Reliability test for manufacturing technology

Reliability Statistics	
Cronbach's Alpha	N of Items
.764	9

Descriptive Analysis of Manufacturing Technology

The usage of 9 advanced manufacturing companies during 2011-2015 was tested. Even thou the mode show virtually all the advanced manufacturing technologies listed were used except Robotics. However, not all the technologies listed were used by them but on average, manufacturing companies in Nigeria used Flexible manufacturing system, Computer Aided Manufacturing, Testing machine and computer integrated manufacturing.

Table 5 Descriptive Analysis of Manufacturing Technology

	Never Used	Rearly Used	Not sure	Frequently Used	Very Frequently used	Sub total		
	Row N %	Row N %	Row N %	Row N %	Row N %	Mean	Mode	Sd
Robotics	39.4%	22.4%	12.4%	22.9%	2.9%	2.02	1	1.23
Flexible manufacturing system	5.8%	11.1%	3.5%	61.4%	18.1%	4.32	4	0.97
Computer Aided Manufacturing	9.9%	10.5%	8.8%	47.4%	23.4%	4.19	4	1.01
Computer Aided Engineering	8.7%	22.7%	18.0%	37.8%	12.8%	3.37	4	1.01
Computer Aided Process Planning	6.4%	31.6%	8.2%	37.4%	16.4%	3.29	4	1.06
Testing Machines	5.8%	11.6%	21.5%	43.0%	18.0%	4.09	4	1.08
Just in Time	5.2%	33.7%	16.3%	34.3%	10.5%	2.98	4	0.79
Numerical Control	5.3%	24.0%	14.6%	39.2%	17.0%	2.88	4	1.41
Computer Integrated Manufacturing	5.8%	14.5%	9.3%	45.3%	25.0%	4.17	4	1.24

Management Accounting Practices

Similarly, this study found out that manufacturing companies in Nigeria practice some modern management accounting techniques. The modern management accounting techniques that manufacturing companies in Nigeria used to provide information for management

decision during the period include activity based costing, activity based budgeting, activity based management, target costing, quality costing, product profitability analysis, value chain analysis and benchmarking. The analysis results show that life cycle costing, just in time, throughput accounting, backflush costing, balanced score card and kaizen costing were not frequently used during the period. Similarly, the outcome of this analysis partially confirms the findings of Oyerogba(2015) that Balanced score card and activity based management have not been embraced by manufacturing companies in Nigeria.

Table 6 Descriptive Statistics for modern management accounting practices

	Never Used	Rarely Used	Not sure	Frequently Used	Very Frequently used	Sub-total		
	Row N %	Row N %	Row N %	Row N %	Row N %	Mean	Mode	Sd
Activity- Based Costing	3.5%	5.2%	2.3%	68.0%	20.9%	4.03	4	1.19
Activity Based Budgeting	2.3%	16.4%	4.7%	41.5%	35.1%	4.19	4	1.03
Activity Based Management	1.7%	20.3%	4.7%	48.8%	24.4%	4.35	4	1.08
Target Costing	1.2%	19.8%	22.1%	34.3%	22.7%	3.95	4	0.98
life Cycle Costing	7.0%	19.9%	29.8%	28.1%	15.2%	3.46	3	0.88
Quality Costing	2.3%	24.0%	8.8%	40.9%	24.0%	4.02	4	1.35
Just in Time	2.9%	31.6%	18.7%	33.3%	13.5%	3.42	4	1.22
Throughput Accounting	8.1%	11.6%	27.9%	35.5%	16.9%	3.31	4	1.26
Backflush Costing	4.7%	15.2%	34.5%	28.1%	17.5%	3.37	3	1.08
Product Profitability analysis	2.9%	5.3%	4.7%	40.4%	46.8%	4.24	5	1.42
Balanced Score Card	3.5%	30.2%	16.3%	31.4%	18.6%	2.98	4	1.30
Kaizen Costing	14.5%	32.0%	22.1%	26.2%	5.2%	3.05	2	1.24
Value Chain Analysis	3.5%	12.8%	9.9%	59.3%	14.5%	4.08	4	0.96
Benchmarking	1.2%	10.5%	11.0%	52.9%	24.4%	4.10	4	1.09

Effect of firms' size on manufacturing technology

Omnibus tests of model coefficient give a Chi-square of 14.734 with additional 1 degree of freedom. This is a test of null hypothesis that adding another variable to the model has significantly increased the researcher's ability to predict the decisions made by the respondents. Since the model is significant at 0.05, the hypothesis is rejected, implying that adding another variable to the model has not significantly changed the prediction about respondents' decision.

Table 7 Omnibus Tests of Model Coefficients for manufacturing technology

		Chi-square	Df	Sig.
Step 1	Step	14.734	1	.000
	Block	14.734	1	.000
	Model	14.734	1	.000

The essence of -2 Log likelihood is to see whether adding another variable to the model would lead to a significant reduction in its value. Cox & Snell R Square can be interpreted like R2 in multiple regressions but cannot reach the maximum of 1. Nagelkerke R Square can also be interpreted like R2 in multiple regressions and it can reach 1. Nagelkerke R Square result implies that firm size contributes about 14% variation in manufacturing technology

Table 8 Model Summary for manufacturing technology

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	163.269[a]	.105	.142

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Table 9 shows that 73.1% of traditional manufacturing technology was correctly classified while 60.5% of the advanced manufacturing technology was correctly classified. The overall percentage of correct classification is 65.4%.

Table 9 Classification Table

Observed			Predicted		
			TECHNOLOGY		Percentage Correct
			0	1	
Step 1	TECHNOLOGY	0	38	14	73.1
		1	32	49	60.5
	Overall Percentage				65.4

a. The cut value is .500

Given the non-liner nature of logistic regression, it is difficult to interpret the relations between the predictor and the probability that y=1 directly. Notwithstanding the above limitation, statisticians have shown that the relation can be interpreted using a concept called the odd ratio. The odd in favour of an event occurring is defined as the probability that the event will occur divided by the probability that the event will not occur((Anderson, Sweeney, & Williams, 2011). The p-values .000 indicates that firms size significantly influence the choice of manufacturing technology. A parameter that is more crucial in the interpretation of logistic regression is Exp (B) also known as the odd ratio. The odd ratio that is greater than 1 implies that as the predictor increases the odd of outcome occurring increasers while a value that is lower than 1 implies that as the predictor increases the odd of outcome occurring decreases(Field, 2009). Therefore, Exp (B) which is .241 implies that as the firms' size increases the odd of manufacturing firms using advanced manufacturing technology decreases. Therefore, based on p-value, hypothesis 1 is not accepted

H_{01} There is no significant difference on the choice of manufacturing technology among the manufacturing companies in Nigeria based on their firms' size

Table 10 Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	NEWFIRMSIZEAVERAGE	-1.425	.387	13.584	1	.000	.241
	Constant	1.253	.303	17.089	1	.000	3.500

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

The outcome of this analysis shows that firms' size significantly influences the type of manufacturing technology that the firms used during the period. This result is supported by many earlier empirical studies that firms size has a significant effect on adoption of technological innovation(Askarany & Smith, 2008). However, unlike the findings of many earlier studies that large firms use advance manufacturing technology more than small firms do, the result of this study shows that the likelihood of small firms using advanced manufacturing technology is more than that of the large firms. This lends credence to the findings of Stock Greis and Fischer (2002) that smaller firms exhibit higher levels of dynamic innovation performance. The findings of this study is also supported by the claim of Rosnah, Ahmad and Osman (2004) that advanced manufacturing technology can be implemented in smaller firms and are more successful than in bigger firms. In both developed and developing economies, the small and medium scale enterprises (SMEs) are the backbone of the industrialization process. With globalization and free trade agreements, the SMIs are under increasing pressure to adopt advanced manufacturing technologies to be competitive or

simply to survive(Rosnah et al., 2004) . It however contradicts the findings of Kennedy and Hyland (2003) that larger firms use advanced manufacturing technologies more than the small firms both in OECD and non-OECD countries. The outcome of this study could be due to the claims of Nooteboom (1994) that small firms adopt new innovation more than large firms because of less bureaucracy, greater motivation, better survey of the entirety of the project, and greater proximity to the market associated to small firms.

Effect of Firm Size on Choice of Management Accounting Practices

Omnibus tests of model coefficient give a Chi-square of 5.322 with 1 degree of freedom not significant at 0.005. This is a test of null hypothesis that adding another variable to the model has not significantly increased the researcher's ability to predict the decisions made by the respondents. Since the model is significant at 0.05, the hypothesis is not accepted, implying that adding another variable to the model has not significantly changed the prediction about respondents' decision.

Table 11 Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	5.322	1	.021
	Block	5.322	1	.021
	Model	5.322	1	.021

-2 Log likelihood is 175.726, Cox & Snell R Square is .039 while Nagelkerke R Square is .053. It implies that firm size contributes 5.3% variation in management accounting practices.

Table 12 Model Summary for management accounting practices

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	175.726[a]	.039	.053

a. Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

Table 13 shows that 64.3% of traditional manufacturing technology was correctly classified while 55.8% of the advanced manufacturing technology was correctly classified. The overall percentage of correct classification is 59.4%.

Table 13 Classification Table[a]

	Observed		Predicted		
			MANAGEMENT ACCOUNTING PRACTICES		Percentage Correct
			0	1	
Step 1	MANAGEMENT ACCOUNTING PRACTICES	0	36	20	64.3
		1	34	43	55.8
	Overall Percentage				59.4

a. The cut value is .500

Exp (B) which is .439 implies that as the firms' size increases the odd of manufacturing firms using modern management accounting practices decreases. The p-values .023 indicates that firms size significantly influence the choice of management accounting practices. Therefore, hypothesis 2 is not accepted.

H_{02} There is no significant difference on the choice of management accounting practices among the manufacturing companies in Nigeria based on their firms' size.

Table 14 Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	NEWFIRMSIZEAVERAGE	-.823	.361	5.188	1	.023	.439
	Constant	.765	.271	7.999	1	.005	2.150

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

The hypothesis is not accepted because the analysis shows that there is a significant difference on the choice of management accounting practices based on the firms' size. This finding is supported by the claims of many earlier authors that firms size has a significant effect on the choice of management accounting practices(Abdel-Kader & Luther, 2008; Albu & Albu, 2012). However, unlike the findings of many earlier authors which established a positive relation between firm size and modern management accounting practices, this study established a negative relation. This implies that smaller firms used modern management accounting techniques more than the small firms. This could be due to the claims of Nooteboom (1994) that smaller firms adopts new innovation more than bigger firms because of less bureaucracy, greater motivation, better survey of the entirety of the project, and greater proximity to the market associated to small firms. Moreover, this study contradicts the findings of Van Triest and Elshahat(2007) who claim that there is no correlation between the size of the firms and the management accounting practices.

SUMMARY AND CONCLUSION

The study examined the effect of firms' size on the technological and administrative innovations during a period of five years (2011-2015). Advanced manufacturing technologies were used to proxy technological innovation while modern management accounting practices were used to proxy administrative innovations. The study established that firms' size significantly influenced both the technological and administrative innovations that they used during the period. Unlike the findings of many earlier authors that established a positive relations between the firms size and innovation, this study established a negative relationship which implies that as the firms size increases, their probability of adopting new innovations decreases.

This could be due to various programmes under the transformation agenda (2011-2015) which focused on transforming and innovating SMEs and manufacturing companies. Such programmes enabled them greater access to funds which must have enabled them to afford the costs of some modern manufacturing equipments. Their usage of modern manufacturing equipments must have been responsible for their choice of modern management accounting practices.

In conclusion, firms' size is one of the firms' characteristics which greatly determine the application of new innovations. It is a key driver of the type of technological an administrative innovations in manufacturing companies. Specifically, it significantly influences the choice of manufacturing technology and management accounting practices.
However, this study only investigated the non-listed manufacturing companies in Nigeria. Any generalization beyond the scope of the study should be taken with caution. A further study that combines both listed and non listed manufacturing and service companies is recommended. Also an investigation of the causal relation between management accounting practices and manufacturing technology among non-listed companies is suggested for future studies.

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