
The determinants of innovation capability in Nigeria

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Abstract: Although there is a substantial body of literature on technological capabilities and innovation in general, in-depth understanding of the technological behaviour of manufacturing enterprises in the developing country context is still largely limited. What factors influence them to innovate? What should be the concern of policy makers and practitioners in enhancing firm-level innovativeness? The study reported herein attempted to answer these questions using microlevel data from the cable and wire manufacturing subsector in Nigeria. Focusing on product and process innovations, measures were constructed to assess the factors that significantly influence the incidence of product and process innovations. Our results point out that linkage and collaboration are more important than firm-related variables in promoting an innovation capability. Ultimately, this suggests that policies need to be directed at facilitating partnerships within the National Innovation System (NIS) and that firms need to consciously pursue and engage in collaborations and linkages.

1 Introduction

The purpose of this chapter is to explore the possible determinants of the capability of firms in Nigeria's cable and wire manufacturing subsector to innovate. The reason why the economies of the world with the strongest industrial bases are also the world's leading economies in terms of productivity and living standards is not unconnected with the capability of their industrial sectors to innovate. It is therefore important for any nation to establish the strengths and weaknesses of its industrial sector with a view to designing appropriate policies and structures to initiate and sustain growth. This chapter seeks to make some contributions in this regard by exploring the capability of firms in Nigeria to innovate using the results of an industry-level study.

The literature is abundant on the level of interaction among the various elements of Nigeria's National Innovation System (NIS) (*e.g.*, Oyewale, 2005; Oyebisi *et al.*, 1996; Ilori *et al.*, 2000) and the factors influencing the generation and successful adoption or nonadoption of industrial innovation by Nigerian firms (*e.g.*, Adjebeng-Asem, 1996; Oyelaran-Oyeyinka *et al.*, 1996). However, not much has been done on understanding the technological behaviour of manufacturing enterprises, especially in terms of their propensity to innovate and the factors that influence them to do so. The study reported herein is premised upon the need to fill this gap in knowledge.

The cable and wire manufacturing subsector was chosen given its economic significance in the nation. Besides being one of the most economically significant subsectors of the Nigerian economy, the firms in this subsector produce some of the best electrical cables in terms of quality in the entire West African subregion. Moreover, the firms in this subsector have some of the highest capacity utilisation in the entire industrial sector of the country and the subsector is about the only one where competition with cheap imports has been practically overcome.

2 Conceptual framework

We adopt a broad conceptualisation of innovation which is appropriate for our developing country context. According to the Organisation for Economic Cooperation and Development (OECD, 2005) and the United Nations Conference on Trade and Development (UNCTAD, 2007), innovation takes place when products and processes that are new to a country or to an individual enterprise are commercially introduced, whether or not they are new to the world or the industry. It has also been argued that innovation within the developing country context comprises both radical changes and many small improvements in product design and quality, in production processes or the way in which production is organised, and in management, marketing or maintenance routines that collectively modify products and processes, bring costs down, increase efficiency, enhance welfare and ensure environmental sustainability (Mytelka, 2000; UNU-INTECH, 2004).

To implement the foregoing changes, manufacturing firms require technological capabilities which, according to Lall *et al.* (1993), refer to the information and skills (technical, managerial and institutional) that allow productive enterprises to utilise equipment and technology efficiently. Several kinds of technological capabilities are distinguished in the literature (see, for instance, Lall, 1992; Romijn and Albaldejo, 2002),

but our focus in this work is on innovation capability. The notion of innovation capability applies to process and product technology as well as the way in which these are organised and managed.

Bearing this in mind, we argue that, besides R&D and patents which generally occur at later stages of development, a significant set of 'soft' complementary entrepreneurial, management and organisational capabilities is critical for firms in developing countries to achieve competitiveness. Therefore, the test of any innovation effort, according to Drucker (1985), lies not in its novelty, scientific content or cleverness – such as is achieved through formal R&D – but in its success in the marketplace. And for developing countries, firms would hardly need to create new technologies; innovation is more about learning to choose and assimilate traditionally available technologies (Lall, 1991). In consonance with this, we adopt Ernst's (2007) definition of innovative capabilities as the skills, knowledge and management techniques needed to create, change, improve and successfully commercialise products, services, equipment, processes and business models, among other forms of 'artefacts'.

Innovation capability depends on a broad range of factors that are either internal or external to the firm (UNU-INTECH, 2004; Albu, 1997; Romijn and Albaladejo, 2002). About 50 organisational and general economic factors have been established to influence the innovative ability of an enterprise (Abereijo *et al.*, 2007). For a representative overview, we have drawn our variables based on UNU-INTECH (2004). These variables and their measurement are discussed in the section on methodology. In the next section, the industrial context in Nigeria is discussed, followed by a background on the cable and wire manufacturing subsector. The results of the study are discussed after the section on methodology and this is followed by a section on the strategic implications of the findings before the chapter concludes.

3 The industrial context in Nigeria

Players in the Nigerian industrial and manufacturing sector can be classified into four groups, namely: multinational, national, regional and local. Apart from the multinational operators, most of the other players have disappeared in the last two decades, due to unpredictable government policies and the lack of basic raw materials, most of which are imported (BPE, 2007). The local players in the nation's industrial sector comprise manufacturing firms of various scopes and sizes. These have ordered themselves over the years into a central industry association – the Manufacturers Association of Nigeria (MAN, 2007) – which comprises several smaller industry associations. MAN is organised into ten sectors which are further disaggregated into 75 subsectors and one export group made up of firms with export products.

Despite having plentiful natural resources, the largest domestic market in Africa and an abundant and cheap labour force, Nigeria's industrial performance has been highly disappointing in the last decade. Using figures from United Nations Industrial Development Organisation (UNIDO)'s Competitive Industrial Performance (CIP) index, Albaladejo (2003) showed that, between 1990 and 2000, total manufacturing value added and manufactured exports have declined, and the country has become dangerously dependent on petroleum as the only means to obtain foreign exchange; as a result, the nation is losing its competitive manufacturing edge and is becoming increasingly marginalised in the international industrial scene.

Today, the Nigerian industrial and manufacturing sector accounts for less than 10% of Nigeria's GDP, manufacturing capacity utilisation having fallen from over 70% in 1980 to about 46% in 2003 (CBN, 2004) and remaining below 35% for the most part of the last decade (BPE, 2007). Manufactured exports in Nigeria only accounted for 0.2% of total exports in 2000, declining from an already low 1.5% in 1985. This is among the lowest manufacturing propensity ratios in Sub-Saharan Africa, and is the result not only of declining manufactured exports but also an increased dependence on primary exports, particularly oil. In fact, the share of oil exports in Nigeria's total exports increased from 95.4% in 1996 to almost 99.6% in 2000 (Albaladejo, 2003). These make Nigeria one of the less export-oriented economies and one of the less diversified economies within the region and in the world.

Scholars have identified some major constraints faced in the Nigerian manufacturing sector (Biggs *et al.*, 1995; Tyler, 2002). These include:

- infrastructural inadequacies leading to high production costs
- high interest rates
- unpredictable government policies
- nonimplementation of existing policies
- lack of effective regulatory agencies
- dumping of cheap products
- unfair tariff regime
- low patronage.

In addition to the foregoing constraints, Albaladejo (2003) identified severe flaws in the education system, the technological stagnation of domestic companies, the lack of foreign investment in manufacturing, negligible technology transfer and weak Information and Communication Technology (ICT) infrastructure as constituting significant factors for failure. Additionally, he argued that inappropriate policies, macroeconomic instabilities, a distorted business environment, the lack of transparent governance and weak industrial capabilities in Nigeria have given rise to severe flaws in its production and export structures.

4 The cable and wire manufacturing industry in Nigeria

The Nigerian cable and wire manufacturing industry comprises a total of 14 firms, according to a MAN (1994) estimate. More recent figures (MAN, 2007) put the total number of firms in the subsector at 26. However, only 11 firms have been reported to be actively engaged in manufacturing at the moment (Chukwualu, 2007). The others are either no longer existent or simply deal in marketing. The 11 virile firms have effectively organised themselves into an association known as the Cable Manufacturers Association of Nigeria (CAMAN), with member firms spread across the country. This industry association, which has been in existence for over 15 years now,¹ leads in the manufacture of electrical and telecommunications wires and cables in the entire West African subregion, and has successfully captured a large portion of the market in the subregion and beyond. Of the 11 active firms, however, one is currently out of production and was therefore not included in the study sample.

The Nigerian cable and wire subsector belongs to the electrical and electronics sectoral group. Alongside two other sectoral groups, this sector is regarded as the most economically significant constituent group of the engineering sector. The performance of the Nigerian cable and wire industrial subgroup is, no doubt, noticed by all who should be in the know. The subsector is one of the very few in the country that have successfully dealt with foreign competition, especially in terms of superior product quality. In spite of the difficult economic conditions in Nigeria, the firms in the cable and wire industry are reputed to produce world-class products. The quality of products from this subsectoral group of the manufacturing industry is considered superior even by multinationals. Moreover, despite the prevalent capacity underutilisation in the industrial sector of the country as a whole, the cable and wire manufacturing firms have done relatively well (RMRDC, 2003, pp.32–33).

Moreover, in a Nigerian Institute for Social and Economic Research (NISER, 1990) input-output analysis of the Nigerian economy, the cable and wire manufacturing subsector was ranked with others using very tight quantitative criteria. The variables used included technology, the degree of linkages or level of intersectoral interdependence, and the degree of local sourcing, employment, output and income. The sector ranked first in the exercise followed by the chemical, agro-allied and construction materials subsectors. Thus, understanding how to optimise the potentials of this sector is very strategic to the nation's drive towards industrial development.

5 Methodology

Data were obtained for this study mainly through a structured questionnaire supplemented with additional information from published sources and personal interviews. Our population comprised the 11 firms presently involved in the local production of electrical cables and wires, but data were collected from a sample of ten firms that are currently operational. The response rate was about 40%. A detailed description of the variables that we considered is given in Table 1.

Realising that a better understanding of the role of capabilities in economic development requires detailed microlevel measurement (Jonker *et al.*, 2006), we have disaggregated each firm into microsystems made up of the departments in the firm that are relevant to this study. Therefore, our unit of analysis is not the cable and wire company as a whole but rather the individual department where data were gathered. Specifically, we administered questionnaires in the Production, Engineering/Maintenance, Marketing/Sales and Administration/Human Resource Departments. This means that all the companies where more than one department returned questionnaires occur in our sample more than once. This approach, similar to the one applied by Jonker *et al.* (2006) in their study of paper manufacturing firms in West Java, allows us to examine capabilities at the lowest level of aggregation, that is, the microsystems formed by each department.

The dependent variables are measures of the firm's innovation activities during the 2003–2006 period. Our discussion here deals with only product and process innovations because these are the areas where technological changes are most pronounced (OECD, 2005). The adopted questionnaire asks firms directly whether they were able to introduce a new product or process or make changes in any of their product(s) or process(es). In this way, we included reverse engineering of a product or process as innovation. Each

innovation type was measured as the weighted sum of all the activities that amounted to each type of innovation. In other words, a firm only needed to carry out any product or process innovative activity for it to be classified as innovative. The maximum possible score was 18 for product innovation and 15 for process innovation.

Table 1 Description of the variables

<i>S/N</i>	<i>Variable name</i>	<i>Definition/Measure</i>
<i>Dependent</i>		
1	Product innovation	The weighted sum of variables indicating the introduction of a new product or the modification/improvement of an existing one by the firm
2	Process innovation	The weighted sum of variables indicating the introduction of a new process or the modification/improvement of an existing one
<i>Independent</i>		
1	Firm size	Measured as the total number of the firm's employees in 2006
2	Firm age	Evaluated as the difference between the year of the survey (2007) and the firm's year of establishment
3	Organisational structure	The number of levels in the firm's organisational structure
4	Ownership	The types of stakeholders that own the firm. Possibilities include Nigerian or foreign individuals, firms or government and partnerships between these
5	Training of the CEO*	The weighted sum of three binary variables indicating whether or not the CEO possesses a foreign degree, working experience or attended training programmes abroad
6	Experience of the CEO*	The weighted sum of three quantitative variables indicating in years the working experience, if any, that the CEO had in a university/related institutions, a large/multinational firm or a small enterprise (including a family business)
7	Clustering	Whether or not the firm is located within an urban area
8	Incidence of collaboration	A constructed measure of whether or not the firm engages in a joint activity with any of several actors; 1 if this is so and 0 otherwise
9	Breadth of collaboration	Constructed as the sum of actors a firm collaborates with
10	Breadth of knowledge sources	Constructed as the sum of knowledge sources that a firm draws on
11	Depth of knowledge sources	Constructed as the sum of scores on the knowledge sources that have been rated by the firm as very important in its innovation activities
12	Incidence of proximity advantage from actors	A constructed measure of whether or not the firm gains any proximity advantages from being located close to any of several actors; 1 if this is so and 0 otherwise
13	Breadth of proximity advantage from actors	Constructed as the sum of actors a firm gains proximity advantages from
14	Innovation budget	A binary variable taking a value of 1 if the firm has a separate designated budget for innovation and 0 otherwise

Note: * Values for this variable were obtained by weighting each of the three component variables from 3 to 1 in the order in which they are listed.

In our analyses, we made a distinction between radical and incremental innovation by attaching weights (ranging from 1 to 3) to each product or process innovative activity by its degree of novelty. For instance, the development of an entirely new product carried a weight of 3, while the improvement or modification of an existing one carried a weight of 2. An innovative activity that was started but later abandoned during the reference period carried a weight of 1.

A total of 14 independent variables were included in the correlation analyses. These are appropriately detailed in Table 1 and will therefore not be individually discussed here. It is worth mentioning, however, that the term ‘actors’ is used to refer collectively to competitors, customers, suppliers, associated companies within a firm’s corporate group, consulting and marketing firms, private research institutes, public research institutes, universities or other higher education institutions, government ministries, financial institutions, training institutions and industry associations – a total of 12 distinct stakeholders within the NIS. Also, we constructed variables to particularly capture the interactions within the NIS as predictors of firm-level innovativeness. These interaction indicators include the incidence of collaboration (ranging from 0 to 1), breadth of collaboration (ranging from 0 to 12), breadth of knowledge sources (ranging from 0 to 11), depth of knowledge sources (ranging from 0 to 33), incidence of proximity advantage from actors (ranging from 0 to 1) and breadth of proximity advantage from actors (ranging from 0 to 12).

6 Results and discussion

6.1 Sample characteristics

Data on the features of the study sample are shown in Table 2. Of the 15 respondents, only 3 indicated that their firm had over 100 employees. It follows that most of the responses are from Small and Medium Enterprises (SMEs). Since firm size was not a factor in the selection of respondents, the prevalence of SMEs in the sample points to the fact that SMEs dominate the industry that was studied. The industry is also seen to be relatively young in terms of age, as a good number of the responses came from firms that are just about a decade old. The number of levels in the firms’ organisational structure revolves around five, meaning that the firms are rather short in structure. This arrangement keeps the chain of command short and facilitates speedy intrafirm information and resource flows. It also makes it easier for management to involve staff at the lower levels in decision making.

Finally, on the sample features, most of the firms in the industry are fully owned by citizens of the country. While there are no obvious reasons to explain this phenomenon, it is not impossible that the indigenisation policy implemented in the 1960s when ownership of most foreign-owned firms was transferred to nationals had played a role. The import of the foregoing becomes more obvious considering the fact that the nation’s first cable manufacturing firm was started in 1966.

Table 2 Sample characteristics

<i>Number of employees</i>	<i>Percentage (n = 15)</i>
Less than 50	20
50–100	60
Above 100	20
<i>Firm age</i>	<i>Percentage (n = 15)</i>
Less than 5	20
5–10	20
15–20	20
Above 20	40
<i>Levels in organisational structure</i>	<i>Percentage (n = 15)</i>
Less than 5	60
More than 5	40
<i>Ownership structure of the firm</i>	<i>Percentage (n = 15)</i>
Fully owned by Nigerian individual(s)	80
Joint venture	20

6.2 Descriptive statistics

The results of the descriptive analyses performed on all the variables considered in this study are shown in Table 3. The low skewness figures obtained on nearly all the variables indicate that the data set is mostly normally distributed. Besides ownership structure and incidence of collaboration, all the variables are evenly distributed around their mean values. The logarithmic transformation performed on the two uneven variables did not improve their closeness to being normal, thus we ignored the transformation and utilised their true values in our analyses. The high positive skewness obtained with firm ownership is to be expected, as 80% of our sample have similar ownership.

The predominance of SMEs in Nigeria is again brought forward here. The average firm size in our sample was found to be about 73.² The subsector is relatively young as shown in the fact that mean firm age is below two decades. However, the range of the age is somewhat wide. According to Chukwualu (2007), the first cable manufacturing firm in the country was started in 1966. Our field survey revealed that the youngest firm in the subsector started operations less than five years ago. Notwithstanding, the firms do not differ in their innovative activities on the basis of this wide age range. This laudable situation is clearly not unconnected, as we gathered, to the cooperative learning and problem solving that exists within the industry association, CAMAN.

The figures in Table 3 further show that firms in the subsector engage in linkages very often and with a broad range of actors within the NIS. The mean values for the incidence of collaboration as well as its breadth are high. However, the resource and knowledge flows from these interactions may not be as intense. For instance, while the range of actors from which the various departments claim to obtain information for their innovative efforts is high, the importance attached to these sources by the firms appears ridiculously low (mean = 6.3; range = 33). Also, while a good number of departments might be gaining specific advantages from being located close to actors, the spectrum of

actors from which such advantages are obtained is rather low (mean = 3.93; range = 12). While all of these may have to do with the location of the firm and its management, the poor synergy that exists in the nation's NIS³ is also obvious.

Table 3 Descriptive statistics of all variables

<i>Variables</i>	<i>N</i>	<i>Skewness</i>	<i>Mean</i>	<i>Std. deviation</i>
Product innovation	15	0.135	8.60	6.37
Process innovation	15	0.636	5.20	5.20
Firm size	15	-0.332	73.80	29.85
Firm age	15	-0.011	16.20	11.85
Organisational structure	15	0.455	4.80	1.01
Ownership structure	15	1.672	1.80	1.66
Training of the CEO	6	0.000	18.00	9.86
Experience of the CEO	9	0.857	11.67	2.50
Clustering	15	0.991	11.00	6.21
Incidence of collaboration	15	-2.405	0.87	0.35
Breadth of collaboration	15	-0.276	5.67	3.81
Breadth of knowledge sources	15	0.284	8.13	5.85
Depth of knowledge sources	15	0.163	6.27	3.99
Incidence of proximity advantage from actors	15	-1.176	0.73	0.46
Breadth of proximity advantage from actors	15	0.286	3.93	3.59
Innovation budget	15	1.176	0.27	0.46

Of the 15 responses that were obtained, only 3 indicated the complete absence of any innovative activities in their department (Table 4). Product and process innovations were almost equally prevalent in our sample, as 80% of all the respondents alluded to product innovation and over 73% alluded to process innovation. It is also clear from Table 4 that all process innovators also executed product innovation, but one of the product innovators did not implement process innovation during the reference period. This association was not found to be due to chance ($\chi^2 = 10.313$; $p < 0.05$). This suggests that product and process innovations go hand in hand. The maturity and standardised nature of the cable and wire manufacturing industry, which make major product changes rare,⁴ may be largely responsible for this. Incremental changes in products would nearly always be accompanied by changes in the production processes.

Table 4 Cross-tabulation of innovation types*

<i>Product innovation performance</i>	<i>No process innovation</i>	<i>Process innovation implemented</i>	<i>Total</i>
No product innovation	3 (20)	0 (0)	3 (20)
Product innovation implemented	1 (6.7)	11 (73.3)	12 (80)
<i>Total</i>	4 (26.7)	11 (73.3)	15 (100)

Note: * Figures in parentheses are percentages of the total sample.

6.3 *The determinants of innovativeness*

The results of the analysis to determine the significant determinants of innovativeness are shown in Table 4. Of the 14 variables that were included, a total of 11 variables turned out to influence innovation capability. Nine factors are significantly associated with each of product and process innovativeness, but only seven of these are commonly associated with both innovation types.

Firstly, the results indicate that processes will change with age but products will not. In other words, as a firm increases in age, it tends to be more capable of process innovations than of product innovations. This, however, cannot be divorced from industry characteristics. In a mature and standardised industry like the one studied here, innovation is defined more by processes; but in more dynamic industries, this might not be so.

The literature has established that the ownership structure of the firm influences the choice of products and processes as well as their subsequent modification (UNU-INTECH, 2004). Along these lines, the results in Table 5 show that a firm's ownership structure is associated with product innovation but not with process innovation. In a way, it appears that joint venture firms would make product changes more often than those with other ownership types. The way in which a firm would be organised would, to a large extent, depend on its owners. However, the information furnished by Table 5 shows that organisational structure is strongly associated with both product and process innovations. The implication of this may not come out clearly from this study as only two distinct – and rather lean – structures were reported.

Additionally, for process innovation, it might not matter much whether the firm collaborates with external actors or not; but if it must, the range of actors that the firm would collaborate with needs to be broad for such collaboration efforts to give rise to more process innovativeness. The opposite of this is true for product innovation. Collaboration efforts as well as the range of actors with which these take place came up as significant.

The variables on firm location and incidence of proximity advantages from actors came up as significantly associated with both product and process innovation. This suggests that a firm will tend to be more innovative when located within or close to a major urban area, as this places it in greater proximity to sources of new knowledge and eases its participation in knowledge and resource flows. Further to that, the range of actors that are close to the firm is significantly associated with process innovation. This is a pointer to the fact that the more sources of knowledge and resource transfers a firm is close to, the higher its capability to implement changes in its processes.

Contrary to expectations, the training and experience of the top decision maker in the firm seems not to make a difference among our sample firms. This is despite the fact that the educational level of a firm owner or the top decision maker, especially a degree from a technical university or engineering programme, stimulates and facilitates problem solving, and global exposure through training, work or study abroad opens up opportunities for networking for knowledge flows and collaboration and creates an awareness of the utility to do so (UNU-INTECH, 2004). While the results here do not deny that fact, they seem to point out that this may not be particularly important in the type of industry and context that we studied.

Table 5 Results of the Spearman rank correlations test

<i>S/N</i>	<i>Determinants of innovativeness</i>	<i>Product innovation</i>	<i>Process innovation</i>
1	Firm size	0.568*	0.536*
2	Firm age	0.325	0.522*
3	Organisational structure	0.557*	0.670**
4	Ownership	0.604*	0.450
5	Training of the CEO	0.201	0.293
6	Experience of the CEO	-0.093	-0.092
7	Clustering	0.711**	0.719**
8	Incidence of collaboration	0.550*	0.506
9	Breadth of collaboration	0.701**	0.765**
10	Breadth of knowledge sources	0.901**	0.724**
11	Depth of knowledge sources	0.781**	0.806**
12	Incidence of proximity advantage from actors	0.670**	0.778**
13	Breadth of proximity advantage from actors	0.254	0.616*
14	Innovation budget	0.476	0.071

Notes: * Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

The size of the firm, which is related to its access to resources and opportunities for knowledge scanning to support the process of innovation, is strategic to both product and process innovations. Specifically, our results point out that, as firms increase in size, their capability to innovate should increase. This is more so because innovation sometimes brings about an increase in employment, which in turn increases the number of personnel available for problem solving and creative thinking.

The sources that a firm draws on for its innovation-related knowledge as well as the importance attached to each of these sources is seen to be significantly associated with the incidence of both product and process innovations. This goes further to underscore the fact that knowledge is important to innovation and that the more capabilities a firm possesses to acquire and assimilate knowledge, the more innovative it would be. The creation of a special innovation budget does not significantly influence the propensity of the firm to innovate.

7 Strategic implications

The results of this study hold a number of useful implications. For policy, it comes out clearly that linkages and collaboration should be important subjects. Again, the necessity of a closely knitted NIS for the enhancement of firm-level innovativeness is illuminated. For firms, this study suggests that it may not be as useful to create dedicated budgets for innovation. Perhaps what is needed is for the firm to align all activities strategically in a manner that promotes innovativeness. Firms also need to be aware that their innovativeness is more responsive to linkages and collaboration. Thus, it is important for them to consciously seek to engage in useful interactions with key actors within the NIS.

8 Conclusions

On a methodological level, this study has demonstrated that it is possible to operationalise and measure innovative performance and its determinants at the departmental level within a firm. However, a number of measurement problems are still left to be addressed. Firstly, because departmental arrangements vary from firm to firm, functions and designations also differ. There were cases where the head of one department was also the head of another, or where one department was subsumed in another. In such cases, information for some departments could be overly subjective.

Secondly, information per department was obtained from the departmental heads, who may think more readily in terms of the firm as a whole than of their individual departments. This is more so in respect of the questions on collaboration and innovative activities.

On an aggregate level, factors relating to firm characteristics were found to be less associated with the capability of firms to innovate, while factors relating to linkages and collaboration as well as external knowledge acquisition were highly associated. This paper makes a case for further industry-level studies on the factors that influence the capability of firms to innovate. The departmental-level approach adopted in this study is a novel one in the literature on innovation. However, this is still an early and imperfect attempt.

This exploratory research threw light on the fact that the training and experience of the top decision maker in the firm, contrary to the general suggestion in the literature, may not be particularly important in mature industries in developing countries. In this regard, this paper pleads for further research using a wider range of industries. Also, deeper insight needs to be obtained on the possible reasons that process innovativeness would increase with age and product innovativeness would not. The nonsignificance of an innovation budget also requires further exploration. Regarding the importance of the organisational structure of the firm to its innovativeness, this study is largely inconclusive. More detailed studies with more robust samples would help in addressing this.

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Notes

- 1 According to Chukwualu (2007), one of the first cable and wire manufacturing firms in Nigeria was founded in 1966 and started production seven years later. Nevertheless, CAMAN was not formed until around the late 1980s/early 1990s, as we found out in an interview with the production manager of one of the member firms.
- 2 Many scholars agree that, in terms of employment, firms with less than 100 employees belong to the SME category (see, for instance, Abereijo *et al.*, 2007).
- 3 See Oyewale (2005) for a thorough characterisation of Nigeria's NIS.
- 4 Cable and wire manufacturing is said to follow a set of largely rigidified standards which have evolved with time and applications such that making product changes in terms of type and composition may not be possible in the foreseeable future, especially in Nigeria (interview with a Production Manager in one of the sample firms). It is in this context that the term 'maturity' is used here.