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The role of external information sources in organizational innovation in Nigeria

David Adeyeye[1]*, Adekemi Oluwadare[2] and Omolayo Oluwatope[2]

[1]*Department of Planning, Programmes and Linkages, National Centre for Technology Management (NACETEM), Federal Ministry of Science and Technology, P.M.B. 012, Obafemi Awolowo University (OAU), Ile-Ife, Nigeria*
[2]*Department of Science Policy and Innovation Studies, National Centre for Technology Management (NACETEM), Federal Ministry of Science and Technology, P.M.B. 012, Obafemi Awolowo University (OAU), Ile-Ife, Nigeria*
**Corresponding author. Email: davidadeyeye@gmail.com*

Traditionally, the focus of strategic management studies has been on technological innovation. However, recent studies have shown rising importance of non-technological innovation to firms' productivity, especially in developing country contexts. One limitation in empirical firm innovation analyses this study attempts to resolve, is the role of information sources in driving non-technological (organizational) innovation in a developing country context. Developing countries rely on knowledge from external sources to make up for their deficiencies in R&D capability to drive their innovation efforts. Using pooled, cross-sectional data from two rounds of Nigeria's Innovation Surveys, this study assesses the role of external information sources in organizational innovation practices in Nigeria. A comparative analysis of the manufacturing and service sectors was also undertaken. Using a multivariate probit analysis, our results provide strong evidence of heterogeneity in firms' information sources used in implementing organizational innovation practices in Nigeria. Most information sources which drive organizational innovation practices in manufacturing firms do not have an impact on service firms. The study recommends sector-specific polices to drive organizational innovation in developing countries.

Keywords: information sources, organizational innovation, manufacturing, service, Nigeria

Introduction

The role of innovation in organizational performance has been widely studied, especially technical product and process innovation, otherwise known as technological innovation. Innovation impacts on firms' productivity and performance (Loof and Heshmati 2002; Cainelli, Evangelista, and Savona 2006; van Leeuwen and Klomp 2006; Youtie and Roper 2008; Hall 2011; Adeyeye, Jegede, and Akinwale 2013). Assessing the role of non-technological innovations in firms' performance has however taken a backstage in most innovation literature. This is not surprising because non-technological innovations, though reflected in firms' practices, are not easy to measure on a large scale. Also, non-technological innovations are not directly implemented in the market, despite their ability to impact on the marketability of products (Som et al. 2012). In recent times, attention has been gradually shifting to the importance of non-technological innovations, one of which is changes in organizational methods and practices. This is important for two reasons. First, it has been found that organizational innovation positively impacts firms' performance (Belderbos, Carreeb, and Lokshinb 2004; Evangelista and Vezzani 2010; Mothe and Nguyen Thi 2010; Tuan et al. 2016). Second, some changes are required in a firm's organizational and management structures to facilitate the successful introduction of an innovation (Schumpeter 1934).

In undertaking this study, we identified a gap in literature because most studies on non-technological innovation either seek to analyze its complementarity with technological innovations, or to assess its impact on firm performance (Battisti and Stoneman 2010; Mothe and Nguyen Thi 2010; Ebersberger et al. 2011; Hervas-Oliver, Sempere-Ripoll, and Boronat-Moll 2014). There seems to be limited empirical studies on the knowledge sources that drive changes in organizational methods and practices, especially in developing country context. The only studies to our knowledge to date are that of Mothe and Nguyen-Thi (2013) and Preto and Guerreiro (2015) which were undertaken in developed country (Luxembourg and Portugal) context.

The need for assessing the impact of information sources exploited by firms is very important in the study of innovation. This assessment is particularly important in developing countries because most rely on knowledge from external sources to make up for their deficiencies in R&D capability to drive their innovation efforts. In addition, they lack the capability to undertake in-house R&D; hence, they resort to exploiting knowledge from embodied technologies and open sources (Oluwatope et al. 2016). More so, firms in this context battle with challenges that make it harder for firms, especially innovative ones to implement new products. These challenges range from weak policy environment, inadequate physical infrastructure, weak linkage between industry and academia, among others. Given that firm-level innovation usually occurs within a systemic interaction with a plethora of actors, the kind of information provided by different sources therefore determines the type of innovations implemented by the firms (Amara and Landry 2005; Belderbos, Carreeb, and Lokshinb 2004; Gomez, Salazar, and Vargas 2016; Crescenzi and Gagliardi 2018). These information sources also help firms to overcome internal resource limitations. Based on the foregoing, it can be inferred that the capacity of firms to implement successful innovations is dependent on their ability to successfully exploit the right information sources or to know the combination of knowledge sources to exploit (Lauren and Salter 2006; Oluwatope et al. 2016).

Studies in economics and strategic management have shown that the factors that determine innovation performance are sector-specific (Castellacci 2008; Vega-Jurado, Gutiérrez-Gracia, and Fernández-de-Lucio 2009; Mothe and Nguyen Thi 2011). Hence, this study will contrast the external information sources used by firms in the Nigerian manufacturing and service sectors. The paper will therefore contribute to existing literature by assessing the nature of information sources exploited by firms in implementing organizational innovation in a developing country context.

Based on the foregoing, the study seeks to address the following questions:

- What is the prevalence of organizational innovation in Nigeria?
- What are the external information sources driving organizational innovation practices among firms in Nigeria?
- Are there differences in external information sources used by firms in both the manufacturing and the service sectors?

The paper proceeds as follows: in the next section, we highlight the main concepts surrounding the notion of organizational innovation and lay the foundation of our study. After that, we describe our data, variables and some descriptive results before explaining the estimation technique and results. The paper ends with a discussion of the results as well as drawing a conclusion and providing policy recommendations.

Understanding the concept of organizational innovation

Analyzing non-technological innovations has not been given attention until recently with scholarly efforts focusing on analyzing the technical changes in firms' products and processes. The technological dimension to innovation, for a long time, took the front stage in innovation research. Both theoretical and empirical research on firm-level innovation focused on new product development and introduction of new technical processes (Som et al. 2012; Cascio and Montealegre 2016; Martin and Leurent 2017). This technological view of innovation has however been criticized on the ground of its narrow approach to studying innovations which is founded on the science, technology and innovation (STI) mode. The STI mode encompasses the creation and utilization of codified scientific and technical knowledge to implement new processes and products. This is further explained by the R&D paradigm of innovation which argues that firms can only innovate through R&D.

However, non-R&D inputs to innovation play a key role in firms' innovation activities as innovation does not only depend on invention processes involving formal R&D (Kline and Rosenberg 1986). Research and Development does not happen in isolation, but within institutional contexts. Technological innovation is dependent not just on the resources allocated to R&D, but also on the organizational structure and factors that support workplace environment (Arundel et al. 2006). It has been well founded in literature (Schmidt and Rammer 2007; Pereira and Romero 2013; Egbetokun et al. 2017) that there is a multi-dimensional view to innovation – technological and non-technological. This is strongly supported with the widening definition of innovation to cover non-technological processes beyond the popularized product and process innovations. In the third edition of the Oslo Manual published by the OECD and Eurostat, innovation is defined as 'the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations' (OECD 2005).

The definition of innovation clearly delineates the role of non-technological aspects, which directly affect the business operations in a firm. One major form of non-technological innovation is organizational innovation. Organizational innovation is 'the implementation of a new organizational method in the firm's business practices, workplace organization or external relations' (OECD 2005). It is also defined as 'the introduction of new organizational business management methods in the workplace and/or the relationship between a company and external agents' (Hamel 2006).

Organizational innovation is classified into three (OECD 2005). These are changes in business practices, workplace organization or in the firm's external relations (see more in Table 1). Business practices include the introduction of supply chain management systems or quality-management systems; workplace organization includes the use of organizational models that allow for employee autonomy in decision-making; and firm external relations include new ways to collaborate with external partners like customers or scientific institutions, as well as subcontracting or outsourcing for the first time (OECD 2005). Organizational innovations contribute to firm performance by reducing transaction and input costs, improving workplace satisfaction, and providing access to non-tradable assets such as non-codified external knowledge (OECD 2005).

Many attempts have been undertaken to classify organizational innovation. For example, Armbruster et al. (2008) classified it into structural and procedural innovations or intra-organizational and inter-organizational classifications. While structural organizational innovation depicts changes in command lines, information flow, etc. procedural organizational innovations deal with changes in routines and operations of organizations. Procedural organizational innovations thus imply the implementation of new procedures, processes or patterns of behaviour within the firm. Another classification is based on the nature of the relationship of the firm. An inter-organizational innovation comprises of new structures or procedures beyond the company's boundaries. This implies that the firm does not operate in isolation, but within a network, and the firm thus relates with external actors who are within the same knowledge and innovation space (Som et al. 2012). This allows firms to leverage on external networks to gain knowledge and technologies which are not internally available. Examples of this include formalized expert knowledge through consultants or from knowledge institutions and embodied knowledge. Intra-organizational innovation includes departmental or hierarchical restructuring and teamwork

Table 1: Description of organizational innovation used in this study.

S/N	Organizational innovation practices	Remark
1.	Business practices	Involves the implementation of new methods for organizing routines and procedures for the conduct of work. These include, for example, the implementation of new practices to improve learning and knowledge sharing within the firm.
2.	Workplace Organisation	Involves the implementation of new methods for distributing responsibilities and decision making among employees for the division of work within and between firm activities (and organizational units), as well as new concepts for the structuring of activities, such as the integration of different business activities.
3.	External relations	Involves the implementation of new ways of organizing relations with other firms or public institutions, such as the establishment of new types of collaborations with research organizations or customers, new methods of integration with suppliers, and the outsourcing or subcontracting for the first time of business activities in production, procuring, distribution, recruiting and ancillary services.

Source: OECD (2005)

methods implemented within the organization. Examples of intra-organizational innovations include new organizational processes with other organizations, suppliers or customers. Similarly, Black and Lynch (2005) view organizational innovation as workforce training or shared rewards (incentives such as profit sharing or stock options).

A recent development in literature is the rise of empirical studies on complementarity of innovation. Many studies have considered the complementarity of organizational innovation to technological innovation (Battisti and Stoneman 2010; Mothe and Nguyen Thi 2010; Ebersberger et al. 2011; Doran 2012; Sapprasert and Clausen 2012; Hervas-Oliver, Sempere-Ripoll, and Boronat-Moll 2014). Using the CIS 2006 data of firms among Irish firms, Doran (2012) concluded that there exists a strict complementarity for new to the market, product and organizational innovations as well as new to the firm product and process innovations. The author opined that strict complementarities are necessary conditions for a firm's competitive advantage. Also, Hervas-Oliver, Sempere-Ripoll, and Boronat-Moll (2014) found a similar outcome in a study of Spanish firms, i.e. the development of organizational innovations such as introduction of innovative business practices increases the propensity to introduce process innovation. That is, process innovation performance is improved by the synchronous co-adoption of organizational innovation. Service firms being highly motivated by value creation (Moller, Rajala, and Westerlund 2008) and service management, tend to focus on marketing innovation so as to increase market performance (Chapman, Soosay, and Kandampully 2003). Similarly, Schmidt and Rammer (2007) argue that non-technological innovation can augment technological innovation, supporting this with the evidence that firms which combine organizational innovation with product and process innovation achieve higher profit margins. Furthermore, many studies have examined the direct impact of organizational innovation on firm performance. For instance, Tidd, Bessant, and Pavitt (2005) and Lam (2005) found a correlation between changes in the organization of manufacturing and work processes and firms' competitiveness and economic performance. Similarly, results from the Portuguese innovation study shows that 'organizational innovation expands the development of product and process innovation, promotes the increase of productivity and economic growth, and is a driver of competitive advantage' (Preto and Guerreiro 2015). In the Nigerian context also, Egbetokun et al. (2012b) found organizational changes to be the most prevalent type of innovation activities among firms in the Nigerian Wire and Cable industry.

Role of information sources in organizational innovation

In studying innovation performance of firms, the role of knowledge sources has been established. Studies on innovation have evolved from the narrow, linear, R&D-driven effort to a more complex, dynamic, iterative and interactive process. While the former has been regarded as the science, technology and innovation (STI) mode; the latter is referred to as the doing, using and interacting (DUI) mode (Jensen et al. 2007; Parrilli and Alcalde Heras 2016). The main difference between the two modes of learning is the source of knowledge. In STI mode, firms leverage on formal R&D activities to implement new products and processes (Amara and Landry 2005) while the DUI mode emphasizes other forms of learning through imitation, adaptation and reverse engineering. Due to the lack of internal R&D capacity within firms in developing countries, the DUI mode places emphasis on the utilization of a variety of sources of information, ideas and actors for innovation. These sources, normally external to the firm, provide the firm with capabilities that are not necessarily available to them as a result of internal constraints and limitations (Harris et al. 2013). These sources vary from market to institutional sources and industry associations, trade and technical publications, conferences among others.

Market sources of information include customers, suppliers, competitors, while institutional sources include universities, research institutes. In the process of innovation, Yam et al. (2011) argued that the quality of the sources of information enhances firms' capabilities to develop innovations. Basit and Medase (2019) analyzed the impact of knowledge sourced from customers in both public and private sectors and competitors in German firms. While customers in the public sector serve as a positive source

Table 2: Sectoral responses of sample used in the study.

Year	Manufacturing	Service	Response rate (%)	ISIC
2008	521	207	49.0	3.1
2011	371	260	40.4	4.0

of information for firm-level innovation, knowledge sourced from private customers and from competitors have a significant negative effect on innovation activities. Sources of innovation and the ability of a firm to cooperate with industry players differ between firms and industries, and this difference could be a function of available human capital. Different sources provide a distinct type of knowledge that may add different values to innovation efforts of firms. In developing countries, where firms face competing challenges, weak R&D capability and resource constraints, the ability to innovate depend largely on their ability to explore and optimize value from external knowledge sources, especially market and industry sources (Oyelaran-Oyeyinka and Lal 2005; Lee et al. 2016; Oluwatope et al. 2016; Segarra-Ciprés and Bou-Llusar 2018). This field of study, known as open innovation, was developed and popularized by Chesbrough (2003). Studies have shown that implementation of innovations by a specific firm is a function of the broad number of knowledge sources available to the firm in addition to the depth of exploitation of those sources (Amara and Landry 2005; Lauren and Salter 2006; Oluwatope et al. 2016; Asimakopoulos, Revilla, and Slavova 2019). Knowledge sources which are external to the firm play significant roles in driving innovation performance. Building on the concept of openness and breadth and depth developed by Katila and Ahuja (2002), Lauren and Salter (2006) found out that both search depth and breadth impact firms' innovative performance in an inverse U-shaped manner. Also, Asimakopoulos, Revilla, and Slavova (2019) found an inverted U-shaped relationship between the efficiency of firms' innovative activities and external knowledge sources. This implies that firms draw benefit from searching external sources of knowledge until it reaches a threshold where deeper or broader search leads to diminishing returns. Similar result was also found in the case of firms in Nigerian manufacturing sector (Oluwatope et al. 2016).

In analyzing the role of external information sources in organizational innovation, our literature search, as noted earlier, reveals a gap. There are limited empirical studies in this regard. Damanpour, Sanchez-Henriquez, and Chiu (2018) further affirms that research on external knowledge sources and innovation has been largely limited to technological innovations. As noted above, the two studies we found in literature by Mothe and Nguyen-Thi (2013) and Preto and Guerreiro (2015) were undertaken in developed country context, Luxembourg and Portugal, respectively. Mothe and Nguyen-Thi (2013) found out that codified sources such as patents play a more significant role than market sources among manufacturing firms. In contrast, institutional knowledge centres like universities provide information that drives organizational innovations among service firms. This paper will therefore assess the impact of a variety of external information sources such as market, knowledge or other sources such as industry association on organizational innovation and practices. It is of particular significance to assess the role of external information sources in organizational innovation, because 'non-technological innovation trumps technological innovation in Nigeria' (Egbetokun 2014).

Data, measures and descriptives

Data and sampling

The data presented in this paper is a pooled, cross-sectional data of two innovation surveys, 2008 and 2011 in Nigeria's service and manufacturing sectors. The surveys were Nigeria's component of the NEPAD African Science, Technology and Innovation Indicators (ASTII) Initiative. The survey instrument is an adaptation of the Community Innovation Survey (CIS) questionnaire built on the innovation measurement framework laid out in the third edition of the OECD Oslo Manual. The questionnaire therefore collects information on the innovation investments of firms, types of innovations, sources of information for innovation, effects of innovation and obstacles to firm innovation in addition to other socio-economic characteristics of the firm.

The 2008 survey covered a reference period 2005–2007 while the 2011 survey covered the period 2008–2010. The samples for the innovation surveys follow a systematic sampling of enterprises in manufacturing and service sectors using a multistage sampling technique. Firms were sampled into both surveys from a harmonized database of the National Bureau of Statistics business register and the Stock Market Trade List (Adeyeye et al. 2019; Egbetokun et al. 2019). A total sample of 1500 and 1560 were selected for data administration in the 2008 and 2011 surveys respectively. These were randomly selected using the proportional probability sampling (PPS)

Table 3: Organizational innovation practices by Nigerian firms.

		Frequency **(%)**	
		Manufacturing	Services
1.	Workplace Organization	55.5	67.9
2.	Business practices	52.9	62.5
3.	External relations	32.9	48.6

approach and the criterion of employee size of a minimum of 10. The response information is shown in Table 2.

In Table 3, we present the prevalence of organizational innovation practices in the manufacturing and service industries in Nigeria. The Table shows that organizational innovation practices are more prevalent among service firms. Our result supports previous findings by Preto and Guerreiro (2015) which assessed the prevalence and determinants of organizational innovation among firms in Portugal. This is because non-technological innovation has been found to be the main driver of innovation activities among firms in the service sector (Moller, Rajala, and Westerlund 2008; OECD 2009; Adeyeye, Jegede, and Akinwale 2013). The possible explanation is that, in order to achieve their innovation objectives, service firms, which produce intangible goods, implement non-technological innovations (Chapman, Soosay, and Kandampully 2003; Moller, Rajala, and Westerlund 2008). We however, observed some similarity in the pattern of organizational innovation practices in both sectors. We observed that workplace organization is the most common organizational innovation practice in both sectors while external relation is the least.

The prevalence of information sources used by firms in Nigeria is shown in Table 4. The result reveals that the most prevalent form of sources exploited for innovation are market sources such as customers, suppliers and competitors. The result also reveals that firms rarely rely on knowledge from institutional sources such as universities, government research institutes, among others. This is shown by the fact that firms in Nigeria use information from institutional sources to a 'low' level. This supports most studies which show a wide gap in the relationship between industry and academia. This is even worse in developing countries such as Nigeria where previous studies reveal a disconnect between research output in universities and the needs of the business sector (Siyanbola et al. 2012; Akinwale 2016; Oyelaran-Oyeyinka and Adebowale 2017).

Our result further shows that firms in our sample are medium-sized, having an average of 179 employees. Similarly, about 39% of staff in our sample are graduates, that is, those with a minimum of Bachelor's degree or its equivalent. Also, the average age of the firms in the sample is 17 years (Table 5).

Measures

Estimation procedure

The multivariate probit (MVP) model was used to analyze the effect of dichotomous dependent variables (business practices, work responsibilities, decision making and external relations) on a matrix of covariates that is a mixture of discrete and continuous variables. MVP was introduced by Ashford and Snowden (1970), and it is particularly suitable for the analysis of correlated binary data. The response variable is multivariate, correlated and discrete.

Dependent variable

For the dependent variables, we employ the proxies aimed at implementing a new organizational method which were indicated by a new or significantly improved business practices, work responsibilities and decision making and external relations. The dependent variables were coded as a binary response variable; 0 being 'No' and 1 being 'Yes'.

Independent variables

Access to, and exploitation of information sources by firms is influenced by factors such as external environment, managerial experiences and future expectations of managers (Lauren and Salter 2006). In the Nigerian Innovation Survey, respondents were asked to identify the importance of ten knowledge (information) sources (one internal and nine external) employed in their innovation activities. The external sources were merged into six for the purpose of this study. They are customers, suppliers, competitors, consultants, institutional and other sources. Institutional source was obtained by merging information sourced from knowledge institutions such as universities/other higher institutions, public research centres and others. The last information source is referred to as 'other sources.' This was constructed as a combination of knowledge gained from sources such as professional and industry associations, conferences and trade fairs and technical publications. Firms were asked to indicate (on a 4-point Likert-type scale) how important each of the above knowledge/information source was to their innovation activities. Firms that selected high were allocated 3; medium, 2; low, 1; while not used was 0. For the purpose of this paper, we are interested in the various sources of information used by firms and not on the intensity, therefore, firms were retained in the analysis as long as they use a particular knowledge source, either to a low, medium or high degree.

Control variables

As possible determinants of the type and heterogeneity of information sources used in introducing organizational innovation by firms, our proposed analytical model considers various variables as controls. The variables are as follows: graduate staff, age of the firm, size, and whether they belong to a group. In controlling for size, we use the logarithm of the total number of employees in the firms. This is to examine whether the effect of firm size is contingent on the industrial sector to which the firm belongs. The study also included a binary variable indicating whether a firm belongs to a larger group (Subsid). Firms belonging to a group are assigned '1', otherwise, '0'. Being in a group offers firms the advantage of accessing information and other knowledge resources in the innovation process (Kang and Park 2012). We also controlled for the quality of human capital constructed as the ratio of employees with a minimum of university degree or its equivalent. Studies have implied that having employees with high level academic qualification increases the chances of implementing innovation (Vinding 2000; de Jong and Freel 2012). The dummy variable 'service' takes the value of 1 for service firms and 0 for manufacturing.

Table 4: Sources of information for innovation among Nigerian firms, 2008 and 2011 pooled data,

Knowledge used	Percentage			
	Not used	Low	Medium	High
Customers	26.0	8.5	26.5	39.0
Suppliers	28.2	10.1	27.1	34.6
Competitors	34.4	15.5	25.2	24.9
Consultants, commercial labs or private R&D institutes	53.8	16.9	18.0	11.3
Institutional sources	60.0	13.5	16.9	9.6
Other sources	33.1	11.1	29.2	26.6

Results and discussion

The results of the MVP analyses for manufacturing and service firms are presented in Tables 6 and 7, respectively. The Tables show the impact of different sources of information on different organizational innovation practices.

In the manufacturing sector, the analyses show that the three organizational innovation practices are positively and significantly influenced by at least one of the information sources, except for competitors and institutional sources. Clients, suppliers and other sources of information such as industry associations, conferences and trade fairs and technical publications, have a positive impact on external relations. This implies that manufacturing firms that can exploit information from their clients/customers, suppliers and industry associations have a higher chance of implementing new ways of organizing relations with other firms or public institutions. According to Halstead et al. (1994), the main reason for setting up businesses is to create a customer base and sell the organization's output to them. Customers are therefore an important source of both information and revenue; they provide an important source of information that can help add value to the products and services of firms. They do this by providing information on unmet needs, with which firms can then develop innovative products or new ways of meeting those needs. These can be through new delivery channels, outsourcing, subcontracting, among others. In addition, the main reason driving the objects of firms in delivering superior quality of products is to satisfy the needs of the customer. Hence, firms that attract brand loyalty tend to implement feedback procedures from their customers that will enhance the provision of quality products and services.

Since the foundation of firms is centred on commitment to quality, firms can create new business practices or even change their culture to create total quality. Therefore, firms may introduce new business practices including new training methods, streamline communication process, and improve teamwork in order to satisfy customer demands and needs. Firms further recognize the need to change the business strategies in order to meet customer expectations. For example, Christopher and Towill (2000) argued that agility becomes an important consideration for firms when service and customer value enhancement are the primary drivers to have market advantage. Hence, the customer is central to any innovative strategies pursued by the firm at any point in the supply chain (Naylor, Naim, and Berry 1999).

Workplace organization is positively influenced by information sourced from consultants, while suppliers and other sources which include industry associations, conferences and trade fairs and technical publications, have a positive impact on business practices. The role of industry associations as important source of information for innovation is well documented (Romijn and Albaladejo 2002). For instance, within the African context, Goedhuys, Janz, and Mohnen (2006) found out that industry associations served as a veritable information source for innovation of firms and consequently their performance. They found in a study of manufacturing firms in Tanzania, that firms that are members of business associations have a significantly higher productivity. This is because membership of these bodies opens them up to opportunities available in a network. Similarly, in Nigeria, Egbetokun, Adeniyi, and Siyanbola (2012a, 2012b) found out in a study of innovation among wire and cable firms that innovativeness in the sub-sector is driven primarily by industry association. They posit that, industry associations are gradually playing a central role in organizational innovation because they enforce quality control among

Table 5: Descriptive of variables.

Variable	Obs	Mean	S.D.	Min	Max	P50
Client	1081	1.681	1.214	0	3	2
Suppliers	1101	1.785	1.212	0	3	2
Competitors	1087	1.407	1.195	0	3	2
Consultants	1071	0.868	1.074	0	3	0
Institutional sources	1082	0.762	1.048	0	3	0
Other sources	1102	1.493	1.202	0	3	2
Graduate Staff	507	39.122	26.459	0	99	34
Size	631	179.667	1100	10	17,000	20
Subsid	1359	0.205	0.404	0	1	0
Service	1359	0.345	0.476	0	1	0
Age	1004	17.394	15.223	1	150	13

Table 6: Multivariate probit analysis for organizational innovation among manufacturing firms,

	Business Practices	Workplace Organization	External Relations
Clients	0.017	0.293	0.374*
Suppliers	0.528***	0.143	0.316*
Competitors	0.197	0.154	0.047
Consultants	0.063	0.291**	−0.074
Institutional sources	−0.242	0.011	−0.055
Other sources e.g. industry association	0.391***	−0.011	0.338***
Graduate staff	−0.002	0.004	0.014***
Size	0.265*	0.173	0.052
Sect	0.044	−0.000	−0.007
Subsid	0.198	−0.156	0.209
Age	−0.196	0.246	0.007
Obs		136	
Prob > chi2		0.0007	
Log likelihood		−170.33099	

Notes: *, ** and *** indicate significance at the level of 10%, 5% and 1%.

members in their production processes and provide ready source of useful information for innovation for their members.

Regarding the control variables, firm size has a significant impact on business practices among manufacturing firms, implying that bigger firms are more likely to introduce new business practices. This is supported by Preto and Guerreiro (2015) in the case of Portuguese firms. This can be explained by the fact that larger firms have resource advantages and are therefore able to draw on this to introduce new business practices. In addition, Som et al. (2012) posits that the bigger a firm is, the more benefits that it can draw from the implementation of organizational innovation; thus, indicating that there are size-related constraints to organizational innovation. In addition, the qualification of employees was found to have a positive impact on external relations. This implies that firms with skilled employees or those with higher level of education with a minimum of Bachelor's degree are able to introduce new external relations. This is expected as many studies provide evidence of a direct link between skilled employees and innovation (Vinding 2000; de Jong and Freel 2012; Oyelaran-Oyeyinka and Adebowale 2012; Ukpabio, Adeyeye, and Oluwatope 2016).

The result of the MVP model among service firms is presented in Table 7. Our result shows a marked difference from that of the manufacturing sector. For service firms, only information sourced from consultants is positively related with an organizational innovation practice, in this case external relations. This means that information stemming from consultants enables firms to introduce new methods of organizing relations with other firms and institutions.

It is however quite surprising and rather unexpected that all other information sources do not significantly influence any of the organizational innovation practices in the firms. This reflects the position of Tether (2003) that the breadth and diversity of activities in services makes it difficult to generalize the findings from empirical research. Our findings imply that there are clearly other information sources apart from those in this model (likely internal sources), which impact upon organizational innovation practices in the Nigerian service sector. In examining the sources and aims of innovation in services in thirteen (13) western European countries, Tether (2003) showed that 51% of the firms mainly developed their own innovation, making use of internal knowledge sources. This confirms previous studies that the innovation process in services is driven primarily by internal forces (Sundbo and Gallouj 2000). As can be seen from Table 7, being a subsidiary has a significant impact on workplace organization. A service firm which is part of a subsidiary is more likely to implement new methods of organizing and structuring work activities within the firm than one which is not a part of a group. Mothe and Nguyen-Thi's (2013) analyses of firm-level data from the 2008 Luxembourg CIS show that internal knowledge is the most important information source for organizational innovation among service firms.

Conclusion

The role and impact of non-technological innovation in firm performance has not been duly recognized until recently. Most studies have focused on changes in technological products and processes. However, there is a gradual recognition of the role of non-technological innovation in firms' performance. This paper therefore contributes to rising literature in the developing country context by providing empirical analysis of this innovation type. Using a cross-sectional, combined data from two rounds of innovation surveys in Nigeria, this paper explains the various types of information sources used by firms in Nigeria and investigates the sectoral differences or otherwise. We also assessed the information sources used by firms in implementing new organizational innovation practices: business practices, workplace organization and external relations.

First, we found that manufacturing firms rely on market sources for knowledge for innovation. These market sources include, most importantly, clients, suppliers and consultants. Expectedly, we found a disconnect between the firms' (both manufacturing and service) quest for implementing organizational innovation practices and institutional knowledge sources. This is evidently an outcome of the weak interactions between industry and academia (universities and public research institutes) in Nigeria.

Table 7: Multivariate probit analysis for organizational innovation among service firms.

	Business Practices	Workplace Organization	External Relations
Clients	0.318	−0.312	−0.051
Suppliers	0.229	−0.024	−0.002
Competitors	−0.023	0.086	0.235
Consultants	0.189	0.260	0.316**
Institutional sources	0.108	0.134	0.120
Other sources e.g. industry association	0.304	0.184	0.081
Graduate Staff	−0.009	−0.007	−0.002
Size	−0.164	−0.256	−0.074
Sect	−0.009	0.000	−0.016
Subsid	0.753	1.142*	0.483
Age	−0.035	0.083	0.296
Obs		91	
Prob > chi2		0.0747	
Log likelihood		−123.45891	

Notes: * and ** indicate significance at the level of 10% and 5% respectively.

Second, while all information sources except competitors and institutional sources have a significant impact on at least one innovation practice in manufacturing firms, consultants are the singular determining factor of just one organizational innovation practice, in this case external relations, in the service sector. Being part of a group is an important determinant of workplace organization among service firms.

Thirdly, we found sectoral differences in the impact of information sources on organizational innovation practices among firms in manufacturing and service sectors. This supports the hypothesis that information sources used by firms for their organizational innovation practices vary considerably according to firms' sector of operation. These findings have major implications for policy and future research.

Implications of the study and directions for future research

Our main aim in this study is to assess the kind of external information sources exploited by firm and its impact on organizational innovation, a non-technological innovation, using the case of manufacturing and service sectors in Nigeria. Our major finding is that information sources driving organizational innovation are sector and context-dependent. Hence, for policymakers and strategic managers to effectively implement organizational innovation, there is the need to correctly identify and focus on exploiting the right information sources that can guarantee return on investment. This is usually referred to as the 'tunnel' approach – a means by which firms identify and intensively exploit a certain information source in their innovation efforts. This approach is particularly useful in developing countries such as Nigeria where firms face resource and capability constraints and much more in their innovation activities (Oluwatope et al. 2016; Adeyeye et al. 2018). Hence, identifying and exploiting the appropriate information sources will allow firms to concentrate their scarce resources on information sources that can guarantee success rather than maintaining broad and expensive information sources. Therefore, public policies and instruments should consider sector-specificity if they are to achieve their intended purposes.

This study represents the first that investigates the influence of external information sources on organizational innovation in a developing country context, especially in Sub-Saharan Africa. Based on this, there is a need to undertake similar studies in different contexts in developing countries so as to have a broad view and understanding of the subject matter. In addition, there is a need for studies in strategic management in developing countries to understand the impact of organizational innovation on firms' productivity. While numerous studies have investigated the impact of technological innovations on firm productivity, there are few empirical, sector-disaggregated studies in a developing country context on the role of non-technological innovations, especially organizational innovations, on firm productivity.

Disclosure statement

No potential conflict of interest was reported by the authors.

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