



Technological Capabilities in Informal Sectors: A case of the Bakery Industry in Southwestern Nigeria

Sanjo M. Efunwole*, Olawale O. Adejuwon and Joshua B. Akarakiri

Obafemi Awolowo University, Ile-Ife, Nigeria

*Corresponding author

Email: efunsanjo@gmail.com

Article information

ABSTRACT

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The informal sector employs the largest share of labour in developing countries and it is considered to be a fertile ground for growing the technological capabilities needed for economic development. This study examined technological capabilities in the bread baking industry in Nigeria with a view to inform policy formulation. Data were collected on three constructs of technological capability namely; investment, production and linkage capabilities of the industry through questionnaire administration on 200 bakers. The results reveal strong production capabilities in the sector, albeit in using traditional production technologies. Investment and linkage capabilities were however shown to be weak. The former was due to the restriction of source of funding to personal savings, family members and cooperatives. Linkages with knowledge institutions such as universities, polytechnics and R&D institutions were also found to be very weak. These weaknesses may be the leading cause of being unable to purchase and use modern technologies in the sector effectively. The study concluded that the sector may be caught in the trap of being restricted to low-tech based production equipment. Recommendations include availing the industry access to innovative financial instruments to enhance access to funds and professional help in conducting feasibility studies to identify and acquire relevant modern technologies. In addition, setting up platforms for linkages with knowledge intensive institutions may enhance production capabilities in using new production processes and ease transition to utilizing modern technologies.

Keywords:

Technological Capability, Informal Sector, Baking industry, Southwestern Nigeria

1.0. Introduction

Technological capability may be defined as the technological knowledge and skills required by firms to identify, appraise, utilize and develop technologies and techniques relevant to remain competitive and innovative. It is the ability to assimilate, use, adapt, and change existing technology and/or advance a foreign technology through an endogenous process of learning (Kim, 1997; Adeoti, 2002). Technological capabilities are now widely accepted and have spawned many empirical studies since the late 1970s. The diverse components of capability acquisition was identified to include; - human capabilities which include skills, experience and knowledge vested in people; and institutional resources such as internal procedures, routines as well as organizational structure of firms and the external linkages with other firms and institutions (Romijn, 1996). Technological capability has also been diversely defined in three broad ways: as an input to economic activities; an output of economic activities; and as both an input and output. The technological capability of firms has been regarded as an important strategic resource enabling firms to achieve competitive advantage within their industry (Duysters and Hagedoorn, 2000; Henderson and Cockburn, 1994; Kim, 2000 and Nelson, 1991).

Firms with higher technological capabilities can innovate in response to market demand and thereby place themselves in a better position to create more value than its competitors and thereby achieve meaningful returns on investment (ROI). To remain competitive in an industry, a firm must ensure its labour productivity and effectiveness in maximizing her resources. Productivity in developing countries may be low due to infrastructural constraints, but more importantly, it is low due to the low level of technological capabilities of firms (Amsden, 2001; Khan, 2009).

1.1 Focus of the Study

Significant attention has been paid to the importance of technological capabilities in developed countries (Lall, 1992; Bell and Pavitt, 1993) and in more recent times in the formal sector of developing countries (Awoyemi, 2018). However, considerably less attention has been given to empirical evidence concerning the level and impact of technological capabilities on the

performance of industries in informal sectors in developing countries. The informal sector employs the largest share of labour in developing countries and it is considered to be a fertile ground for growing the technological capabilities needed for economic development. Through technology spillovers, these capabilities can be used as inputs in the development and growth of many industries (Andersen, 2015). The focus of this study therefore, is to examine the technological capabilities in an informal sector in order to inform policy on the state of capabilities in such a sector and how these capabilities may be enhanced.

The study was undertaken in the bakery industry in Nigeria for many reasons. First, the growth of the bakery industry seems not to have kept pace with global trends. The quality of products offered by bakeries in Nigeria have been attracting criticism (Ajayi and Olawale, 2007; Ojinaka, 2011; Ohimain, 2014). These studies have identified problems bedeviling the industry such as poor quality of bakery products, packaging, and delivery practices, high prices, shortage of skilled manpower, and the difficulties in finding recipes that exclude the use of potassium bromate, which the National Agency for Food and Drug Administration and Control (NAFDAC) has banned for health reasons. The industry has also been unable to compliment the efforts of the Federal government in the search of alternative substitutes for imported wheat. A study in this sector may therefore shed some light on policy mechanisms and management practices that may be applicable in enhancing technological capabilities in informal sectors in developing countries.

2.0. Literature Review

Technological capability is defined as the resources needed to generate and manage improvements in processes and production organisation, products, equipment and engineering projects. They are accumulated and embodied in individuals (skills, knowledge, and experience) and organizational systems (Bell and Pavitt, 1995). As an input, technological capability is the resource (or knowledge assets) needed to generate and manage production-based and innovative activities (Figueiredo, 2007).

As an output, technological capability was defined in terms of its elements by authors such as Girvan

(1981) and Enos (1992). These elements consist of the existence of people with the requisite scientific knowledge and training in the particular area of concern; the possession by these people of a basic operational experience, and; the existence of an organization where these individuals can pool together knowledge and experience in production and innovative activities. Bell and Pavitt (1995) noted that technology is associated not only with production but also to other areas of supporting activities such as investment activities, procurement of capital goods, raw materials supplies, and product distribution. The taxonomy of technological capability applies across the full range of a firm's activities and are usually grouped into four general types, with their characteristic components, as follows;

(a) Investment capability: involves those skills, knowledge and resources required before, and during investment process. They include capabilities to assess the feasibility and profitability of a project and to define its detailed specifications, as the technology requires, selection of its best sourcing, the negotiation of its purchase (costs and terms) and the recruitment and training of the skilled personnel required. These will enable firms to expand workshop facilities, procure and install standard equipment as well as search for, evaluate and select technology and its sources for new production projects.

(b) Production capability: involve those skills and knowledge necessary for the efficient operation of a plant with a given technology and its improvement over time. The sub-set of these capabilities include process, product, industrial design, engineering and resources which are needed to use existing plant and processes efficiently to make established products. These capabilities enable firms to monitor raw material inputs, schedule production, control output quality, and maintain and replace machinery. It also allows firms to adapt, coordinate and generally deal with day to day problems at different production stages and departments, including product innovations related to basic research activities. They are different but can be inter-related, partly overlapping, and often strongly interdependent (Lall, 1992).

(c) Innovative and adaptive capability: are skills, knowledge and resources which enable firms to assimilate, change and create technology via activities such as capital stretching, adapting production processes and modifying products.

(d) Linkage capability: This is when linkages are established among enterprises and with suppliers or tertiary institutions like universities, research institutions and polytechnics among others. This kind of technological capability is weak in Nigeria and sub-Saharan African enterprises (Abdullahi and Ajoku, 2001). The research institutes do little to establish working relationships with local companies, while the local firms on their part think poorly of institutes' abilities and expect little from them. This attitude, of course, cannot engender a symbiotic relationship between firms and research institutes.

It has been observed (Abdullahi and Ajoku, 2001) that the inability of African countries to build production and investment capabilities explains the current failure to progress beyond the import substitution stage. Having failed these stages, African countries were unable to acquire both the investment and innovation capabilities required to graduate from primary export of labour intensive, light industrial products while importing capital goods. Oyelaran-Oyeyinka (1997) uses technological capability to rate nations that are industrialized. The author observed most African countries fall into the class of non-industrialized and technologically dependent nations. Production and investment capabilities may be important in enabling the firm to modify or scale-up production. A firm with no technological capabilities at all would be rigidly unable to any changes in its environment, and would not survive long.

3.0. Methodology

The study was carried out in four selected states in Southwestern Nigeria; namely Lagos, Oyo, Osun and Ondo. The four states were purposively selected based on the preponderance of baking firms in the area (NBD, 2016). Primary data were collected using one set of questionnaire and interviews. The study population consisted of the registered bakeries in the Nigerian Business Directory (2016). Eighty respondents were selected in Lagos State while forty each were selected from the remaining three States making a total of two

hundred (200) respondents. Effort was made to ensure that the questionnaire was relevant to the research objectives of the study. The reliability and validity of the questionnaire was tested to remove ambiguities. Comments made at the pre-test stage were adequately considered to ensure relevance to the aims and objectives of the study and that the questions were easily understood. The reliability of the questionnaire was tested using Cronbach's Alpha method to assess the consistency of the entire scale. For this study, Cronbach's Alpha scores of 0.76 were obtained for the entire scale. According to Pallant (2004), reliability scores greater than 0.70 are acceptable. All questions had an alpha value above the standard guideline (0.70). This implies that the scales were suitable for analysis. These results therefore, confirmed that the instrument used for this study had satisfactory construct validity (Pallant, 2004). Data collected were analyzed using descriptive and inferential statistics.

4.0. Results and Discussion

Table 1 shows the basic characteristics and profiles of the bakery firms in the study area. Ninety-seven of the bakeries are owner-operated while master bakers leased and operated 103 bakeries. The high number of master bakers may be due to financial handicap which may lead to lease holding system in the industry. About half (50.5%) of the bakeries sampled had staff strength of above 15. About 20.5% of bakeries had 10-14 staff, 14% had staff strength between 5-9 workers and 6.5% had staff less than 5. Therefore, majority (71%) of the bakeries had staff strength of 10 and above. Majority (88%) of the bakeries were owned by Nigerians while two percent were owned jointly by Nigerians and foreign nationals. The firms monthly sales turnover as indicated in the table show that 25.4% made sales turnover up to ₦99,999 per month, while 38.9%, 15.9% and 19.9% made monthly sales turnover of between ₦100,000 – ₦499,999, ₦500,000 – ₦999,999 and over ₦1,000,000 respectively. This implies that majority (74.6%) of the firms made monthly sales turnover of ₦100,000 and above. Table 4 shows the level of investment of respondents at the start of the business. Majority (89%) started their bakery business with an initial capital ranging between ₦400,000 and ₦1million. These results indicate that the firms under study were SMEs.

Table 1: Characteristics and Profiles of the Bakery

Variable	Frequency (N=200)	Percentage (%)
Position in the Bakery		
Owner	97	6.5
Master Baker	103	93.5
Total	200	100
Staff Strength		
Less than 5		
5-9	28	14.0
10-14	41	20.5
15 & Above	101	50.5
Ownership Structure of the Firm		
Fully owned by Nigerian Individual(s)	177	88.5
Joint Venture between Nigerian and Foreign Individual(s)	4	2.0
No Adequate Knowledge of it	19	9.5
Sales Turnover		
Up to ₦99,999	32	25.4
₦100,000- ₦499,999	49	38.9
₦500,000- ₦999,999	20	15.9
Over ₦1,000,000	25	19.8

Oyelaran-Oyeyinka (2003), reported that Small and Medium Scale Enterprises (SMEs) in Africa started their business with initial capital of less than ₦1million. Only eight percent started their businesses with initial capital in excess of ₦1million and above. However, 2.5% of the bakery firms had initial capital of less than ₦400,000. In total, 92% had invested less than ₦1million in the bakery business. Thus, it can be inferred that the firms sampled are small sized enterprises.

Table 2 presents the sources of investment funds of the respondents. Personal savings accounted for 61.5% of invested funds and 10.5% of the respondents sourced for funds from family members. About 12% of the respondents sourced for funds from cooperative societies, 11% sourced money from private lenders while 2.5% got bank loans. This may not be unconnected with high interest rates on loan for business ventures since most ventures got funds from outside the formal banking system. This finding was in line with Oyelaran-Oyeyinka (2003), who discovered that Small and Medium Scale Enterprises (SMEs) in Africa rely largely on personal savings, not only to grow but to innovate. Also, Onwumere et al. (2012) reported that majority of bakers in Southeastern States of Nigeria sourced for funds for

start-up capital of their bakeries through personal sources. In a similar vein, Olayinka (2014) reported that sourcing investment funds for informal businesses in a selected food cluster in Southwestern Nigeria was largely through personal savings and cooperative societies. From the foregoing, there are possibilities that the operators in the sector may not be able to carry out meaningful investment activities without explicit investment that can strengthen their capabilities. Otherwise, the income level of the bakers may not improve, due to low level of investment (Beccattini *et al.*, 2009; UNIDO, 2009).

Most (77.5%) respondents indicated that they carried out feasibility studies before the commencement of their bakery business while 45 (22.5%) indicated that they did not. However, for the former, their feasibility studies were on the location of their firms and not the type of detailed feasibility studies required by banks to access loans. This information was confirmed through oral interviews.

Table 2: Investment Capabilities of Bakery Owners

S/N	Capabilities	Mean Rating
I	Ability to carry out feasibility studies	3.77
II	Ability to recognize or purchase the materials and equipment needed for the work	4.20
III	Ability to recognize, select and purchase advanced equipment needed for production	4.01

Key: None=1, Fair=2, Good=3, Very Good=4, Excellent=5

Table 2 presents the mean rating of the factors that show the investment capabilities of the respondents. Three factors were considered and rated on a scale of 1-5 (where 1 = poor and 5 = excellent). Ability to carry out feasibility studies was rated very good (3.77) and ability to recognize or purchase the materials and equipment needed for production was also rated very good (4.20). Ability to recognize, select and purchase advanced equipment needed for baking was also rated very good (4.01). Observations revealed that majority of the bakeries visited were using the traditional method of production especially the kind of oven adopted. Many were still using clay ovens and

some a combination of clay and hybrid ovens. Very few made use of electrical ovens. There were some who adopted hybrid ovens and later abandoned it for clay ovens. The reason behind this was epileptic power supply and lack of skilled manpower who can handle equipment repair and maintenance of electric ovens. This implies that traditional methods of production are prevalent in the sector.

Table 3 depicts the mean rating of the production capability on a 5-point Likert scale. The results showed strong production capability among the firms in the study area. Ability to carry out quality control (4.41), firms' capability for equipment trouble-shooting for routine and breakdown maintenance (4.07), plant layout for cost saving (4.14) and inventory control, were all rated very good (4.15). So were ability to improve on the production process (4.17), ability to imitate (3.26), ability to improve on existing products (4.18) and ability to introduce new products (4.08). Fenny and Roger (2001) noted that in order to survive and gain competitive victory, firms must be able to innovate through strong technological capabilities. While the ability to recognize, select and purchase advanced equipment needed for the production was rated very good (4.01), and the ability to recruit skilled personnel was also rated very good (4.06) the ability to prepare, design and set up a modern equipment facility (3.98) was rated good. In addition, ability to carry out quality assurance on products had the highest rating (4.41) followed by the ability to improve on existing products (4.17) which were both rated very good.

Table 4 shows the mean ratings of linkage capability of bakers with customers' and stakeholders in the industry. Linkages with customers (4.63) and suppliers (4.48) were rated very strong. However, linkages with universities/polytechnics (3.07), financial institutions (3.38), flour mill research units (3.54), competitors (3.54) and government research institutes were all rated weak (3.02). The results agree with earlier findings of Oyelaran-Oyeyinka (2004) that business owners in Nigeria have a very low level of linkages with government establishments. This may also be due to lack of financial assistance from these institutes.

Table 3: Firm's Production Capability

S/N	Capabilities	Mean Rating
I	Ability to carry out quality control	4.41
II	Ability for troubleshooting, carry out preventive, routine and breakdown maintenance	4.07
III	Ability design and implement plant layout for cost saving	
IV	Ability for inventory control	4.15
V	Ability to improve the production process	4.17
VI	Ability to imitate new products	3.26
VII	Ability to improve on the existing products	4.18
VIII	Ability to introduce new products	4.08
IX	Ability to recruit skilled personnel needed	4.06
X	Ability to prepare, design and set up modern equipment	3.98
XII	Ability of the firm in detailed engineering/ technology roadmap	3.81

Key: Poor= 1, Fair=2, Good=3, Very Good=4, Excellent =5

Table 4: Linkage Capability of Bakeries with Customers and other Stakeholders

S/N	Linkages	Mean Rating
I	Customer	4.63
II	Suppliers	4.48
III	Universities/Polytechnic	3.07
IV	Government Research Institute	3.02
V	Financial Institution	3.38
VI	Flour Mill Research Unit	3.54
VII	Competitors	3.73

Key: No linkage 1, Very weak linkage 2, Weak linkage 3, Strong linkage 4, Very strong linkage 5

5.0. Summary and Conclusion

The aim of this paper was to examine technological capabilities in an informal sector. Out of the three technological capabilities (investment, production and linkages) examined in the baking industry, only in one was the sector competent in. The baking firms were strong in production capabilities. Observations however revealed that machinery and equipment used in the sector were mostly traditional. It may be concluded that the firms had gained competence in using low-tech based equipment. The bakeries were however weak in investment and linkage capabilities. What this result indicates is that acquiring and upgrading to modern technologies may be difficult. The firms are hampered by access to funds and restricted to

raising funds through personal savings, family and cooperatives. This may restrict access to acquiring modern technology. Linkages to knowledge intensive institutions such as universities, polytechnics and R&D were also weak. This may hamper efforts to assimilate and use new technology as linkages with these institutions may enhance ability for problem solving, using new technologies and inputs.

From the foregoing, it can be concluded that technological capabilities in the sector are very weak and the sector is caught in the trap of being restricted to low-tech based production equipment. It is therefore doubtful that the industry can respond easily to policy changes which will demand that the industry move to higher technological paradigms. Mechanisms to avail the industry access to innovative financial instruments and professional help in conducting more relevant feasibility studies may go a long way in improving technological capabilities in the sector. In addition, setting up platforms for constant linkages with knowledge intensive institutions may help to enhance production capabilities by helping in solving production problems that may be encountered in using new production processes and providing know-how through training and technology transfer initiatives to ease the transition to modern technologies.

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