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## HOW DO FOOD PROCESSING FIRMS IN KENYA LEARN? EMPIRICAL INSIGHTS FROM POTATO PROCESSING IN NAIROBI

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### Abstract

**How food processing firms learn in their quest to build their capabilities is central for their success. This question is paramount because while research has shown the importance of learning to capability building in developing countries, there is thin empirical evidence detailing how this learning is done at the firm level. As a response to this gap in literature, this paper draws on rich empirical evidence on Kenya's food processing sector. It explores how varied learning mechanisms pertaining to a variety of intrafirm and extrafirm relations demonstrate effort behind Nairobi's food processing firms' capability building. The paper is based on an in-depth case study of six successful potato processing firms drawn from the Nairobi Metropolitan Area. The fieldwork comprised three rounds of data collection with the first running from December 2013 to January 2014. The second ran from October to November 2014 while the third round ran from August to November 2016. Our findings indicate that knowledge and skills brought by firm owners and employees was the most widely used learning mechanism, followed by training and lastly intensive inter-firm interactions. Learning from technical staff and expatriates, research and development, and government institutions was also observed but mainly in well-resourced firms compared to the less-resourced ones. The less-resourced firms relied mainly on a local network of firms in which they were embedded. We recommend that the nascent collaboration efforts observed among the firms and some key government institutions should be amplified and extended to include the small and less resourced firms.**

**Key words:** food processing; firm learning; learning mechanisms; technological capability building; Kenya

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## Background

Food-processing is an important segment of manufacturing and makes a significant contribution to the economies of many African nations. For example, the sector's share of the manufacturing output was estimated as 60 per cent, 40 per cent and 34 per cent for Zambia, Kenya and Tanzania respectively for varied periods between 2012 and 2015 (Charles et al., 2017). This paper explores learning mechanisms in such food processing firms. Building on ideas going back to Alice Amsden's (2001) work that learning is critical in the building of firm capabilities and that local firms are key agents for local and regional learning and development to occur. These capabilities in turn enable the firm to innovate and increase its competitiveness (Amsden, 2001). While such importance of learning in the building of capabilities is generally recognised and acknowledged, the knowledge about the firm-level activities that entail the learning mechanisms in firms particularly in developing countries is relatively sparse. Hansen & Lema (2019) for instance note that the literature acknowledges the significance of various types of learning sources as firms in strengthening their technological capabilities, what is less known is how these mechanisms evolve over time as the firms build their capabilities. This paper contributes by filling this gap by drawing on insights from food processing firms in Kenya.

In Kenya, food processing is the most important manufacturing subsector in the economy. It accounts for more than half of the manufacturing value added and has been credited for being the stepping stone in the country's industrialisation process (GoK, 2007, 2019; McCormick & Atieno, 2002). Additionally, the sector makes a significant

contribution to the country's exports, gross domestic product (GDP), foreign exchange earnings, and employment. In 2013, agro-processing in Kenya was a USD 3.25 billion market. About 40% of this was manufacturing value add and its contribution to the country's employment and exports was 2.4% and 8.5% respectively (World Bank, 2015). Despite this importance, the subsector has historically struggled with competitiveness. The firms in the sector have been deemed inward looking and facing stagnation. Their product quality has limited them to the local market and many therefore did not venture into the export market (GoK, 2013; McCormick & Atieno, 2002). Besides, their productivity levels were low attributed to problems with raw materials, backward technologies compounded by weak managerial and technical skills (Atieno, 2012; GoK, 2013). Yet these firms are operating in a highly competitive environment, competing with imported products some of which are of better quality and also appeal to many consumers. It is a main idea of this paper that to cope in this environment, learning is essential as a way through which firms can build their capabilities. It is however important to acknowledge that learning can be a costly and risky process whose outcomes are uncertain (Staritz & Whitfield, 2019).

The paper mainly draws on the technological capability literature (Bell, 1984; Bell & Figueiredo, 2012; Dantas & Bell, 2009; Hansen & Lema, 2019) for insights on how firms in Kenya are building their capabilities through learning and what lessons can be drawn from their experiences. This literature argues that technical change leads to technological development which is the process by which individual enterprises acquire technical skills and technology to manage and

implement technology. The process of technological development through which firms acquire additional technical skills and knowledge is also called technological capability development and learning is at its core. Learning in this case entails all processes or mechanisms through which firms increase their technological capabilities to enable them to manage and implement technical change which has a bearing on competitiveness. By drawing on rich data gathered from the food processing sector in Kenya, we make an empirical contribution to this literature.

In the African context, it has been documented that while government interventions have been used to address industrialisation and underperformance, most of these initiatives have ignored or oversimplified the micro-level process of learning and technological effort required for manufacturing enterprises to become efficient (Goedhuys, 2007; Lall & Wangwe, 1998; Wangwe, 1995). Yet the African experience has shown that increased investments in technology may contribute to improved competitiveness. It has been suggested that firms which have invested in technology and made technological improvements on a continual process achieve competitiveness. Such improvements could be in the production process to keep the costs at competitive levels or to improve product quality (Lall & Wangwe, 1998). In this broad equation, literature has often focused on learning outcomes (Lall & Wangwe, 1998; Wangwe, 1995). What have been less addressed are the specific learning mechanisms and routines that firms draw upon (Egbetokun, 2015; Gachanja et al., 2020; Goedhuys, 2007; Sobanke et al., 2014). In other words, how do the domestically owned African firms achieve learning? Our contribution to the literature on technological capability

building lies in answering that question. In this paper therefore we seek to provide insights into how Kenyan firms are learning in their quest to build their technological capabilities by focusing on the dynamics of the firm internally and in its relation to other firms.

This paper is based on an in-depth study of six successful Kenyan food processing firms drawn from the potato processing subsector in the Nairobi Metropolitan Area. Potato processing represents a fast growing subsector (Abong' et al., 2010; Fortenbacher, 2016; GoK, 2016b; Kaguongo et al., 2014; Kamau et al., 2019) occasioned by among others, changing eating habits of the Kenyan urban dwellers. The analysis draws on extensive fieldwork data where each firm was visited at least three times during the study period. The rest of the paper is organised as follows: the next section covers the literature review followed by the study's methodology. The research findings and discussions are presented next while the study's conclusions and implications come last.

## Literature review

Learning as a critical component in capability accumulation in firms draws on the technological capabilities framework which in turn has its foundations in the evolution theory of the firm. The evolution theory questions the appropriateness of neoclassical conceptualisation that developing countries passively receive and adopt technology from the first world to attain competitiveness (Lundvall et al., 2009). It questioned the assertion that all what was required of developing countries was to simply open up to technology inflows in line with existing comparative advantages. Scholars have argued that the assumption that firms operate with full information of all possible technologies and

that these can be used without any further effort may not be true. It is now widely recognised that transfer and adoption of technologies must take account of their tacit elements. In addition, there are learning costs associated with this processes and constant innovation is required (Bell & Figueiredo, 2012; Lall & Wangwe, 1998; Wangwe, 1995). This therefore calls to attention the role of learning in the accumulation of technological capabilities among firms in developing countries (Bell & Pavitt, 1993; Figueiredo, 2014; Lall, 1992). The initial application of the technological capabilities framework was done in Latin America (Bell & Pavitt, 1993; Figueiredo, 2014; Lall, 1992) before moving to other parts of the developing world including Africa (Goedhuys, 2007; Kabecha, 1999; Marcelle, 2005; Oyelaran-Oyeyinka & Lal, 2006; Wangwe, 1995).

The technological capabilities framework has two key elements. The first is the individual components that constitute the technological capabilities. The second is the various learning mechanisms through which firms use to build their technological capabilities. Starting with the first element of individual components, Lall, (1992) is credited for pioneering categorisation of technological capabilities. This categorisation uses two classificatory principles: functions, capabilities perform and their degree of complexity. Based on the functions we have three capabilities namely investment, production and linkage capabilities. Later categorisations such as the Bogota Manual 2001 (Jaramillo et al., 2001) have included the innovation capability in addition to the three. Based on the degree of complexity, several levels can be derived from each of these four capabilities. This varies with various contexts, but they commonly range from basic, to intermediate to advanced

technological capability levels. These levels in turn determine whether a firm can engage in routine, adaptive, replicative or innovative and high risky actions. It has been argued that the differences in the complexity of technological capabilities is a good indicator of the diverse industrial performance observed among countries (Morrison et al., 2008).

The second element of the technological capability framework is learning. Learning refers to the various processes by which skills and knowledge are acquired by individuals or perhaps an organisation (Bell, 1984). Under technological change, learning refers to the processes by which individual enterprises acquire technical skills and technical knowledge. In the context of technological development, particularly as it is concerned with industrialising economies, the rising productivity observed in infant industries has always been described as learning (Bell, 1984). Learning in the context of technological capabilities therefore entails all ways in which a firm increases its capability to manage technology and to implement technical change. Learning processes permit the firm to accumulate technological capabilities which are the resources needed to generate and manage change, including skills, knowledge, experiences and organizational systems (Bell & Pavitt, 1995). Some scholars have gone to an extend of defining capabilities as outcomes of the learning process (Egbetokun, 2015).

At the firm level, Dodgson, (1993) identifies three themes in the study of organisational learning. The first is the goals of learning, that is what drives an organisation to learn and what are the expected outcomes. The second theme is concerned with the learning processes that

organisation goes through. The last theme is how learning can be promoted or impeded. One of the most common assumption is that learning leads to useful outcomes. Even though it may not always be the case, it is generally thought that learning has positive consequences to the firm. At a firm level, learning therefore becomes a purposive quest to achieve, retain and even improve their competitiveness particularly in uncertain technical and market circumstances (Dodgson, 1993, p. 379). Changes in the competitive environment as well as technological environment are good impetus for firms to learn.

Given this background, we define technological learning as the way organisations such as industrial firms accumulate technological capabilities (Malerba, 1992; Oyeleran-Oyeyinka, 2004). In turn, technological capability is defined as the level of knowledge, skills and experience acquired by firms to organise and innovate production and marketing functions. It has been noted that much of the technological knowledge required by small and medium firms in Africa is incremental and is often acquired through 'elementary learning' (Oyeleran-Oyeyinka, 2004, p. 94). There are however exceptions within firms that have moved up in the supply chain.

With that in mind, a question to ponder at this point is what is already known about the nature of learning and capability acquisition in firms? Oyeleran-Oyeyinka, (2004) offers a good summary. First, learning is a major source of incremental technical change. Second, a firm is characterised by a certain level of technical and organisational knowledge. Third, a firm draws on a variety of knowledge sources (suppliers, subcontractors, machinery suppliers) that may be within its locale and/or often outside

the national boundary. Our paper pays attention to the varied knowledge sources in analysing the various mechanisms food processing firms used to build their capabilities. Fourth, there are different modes of learning including research and development and learning-by-doing. Five, learning processes intertwine with specific sources of technological and productive knowledge such as apprenticeships, equipment manufacturers and others. Finally, learning does not take place in a vacuum and firms do not innovate in isolation. External actors with which firms interact are crucial to learning in firms. Learning processes are linked to trajectories of incremental technical change through the accumulated stock of knowledge in firms (Oyeleran-Oyeyinka, 2004, p. 95). To stress the point about firm linkages, Johnson (1992) states that all learning is done by some form of interaction and is shaped by institutions. It is a social process, and seldom done individually, without support of, or isolated from, interpersonal relations.

Learning among firms can therefore be attributed both to their internal or external processes. Examples of internal processes include the knowledge and skills brought into the firm by the entrepreneur(s) and workforce, which they obtained through earlier experience. These then build into an adequate stock of technically qualified manpower (Bell, 1984; Romijn & Albaladejo, 2002, p. 1054; Wamalwa et al., 2019). Internally, firms can also build up their capabilities over time through formal and informal internal training. Also learning-by-doing through involvement in R&D both as an organized activity and as informal technological efforts closely allied to production, directed at incremental problem solving and experimentation on the shop floors.

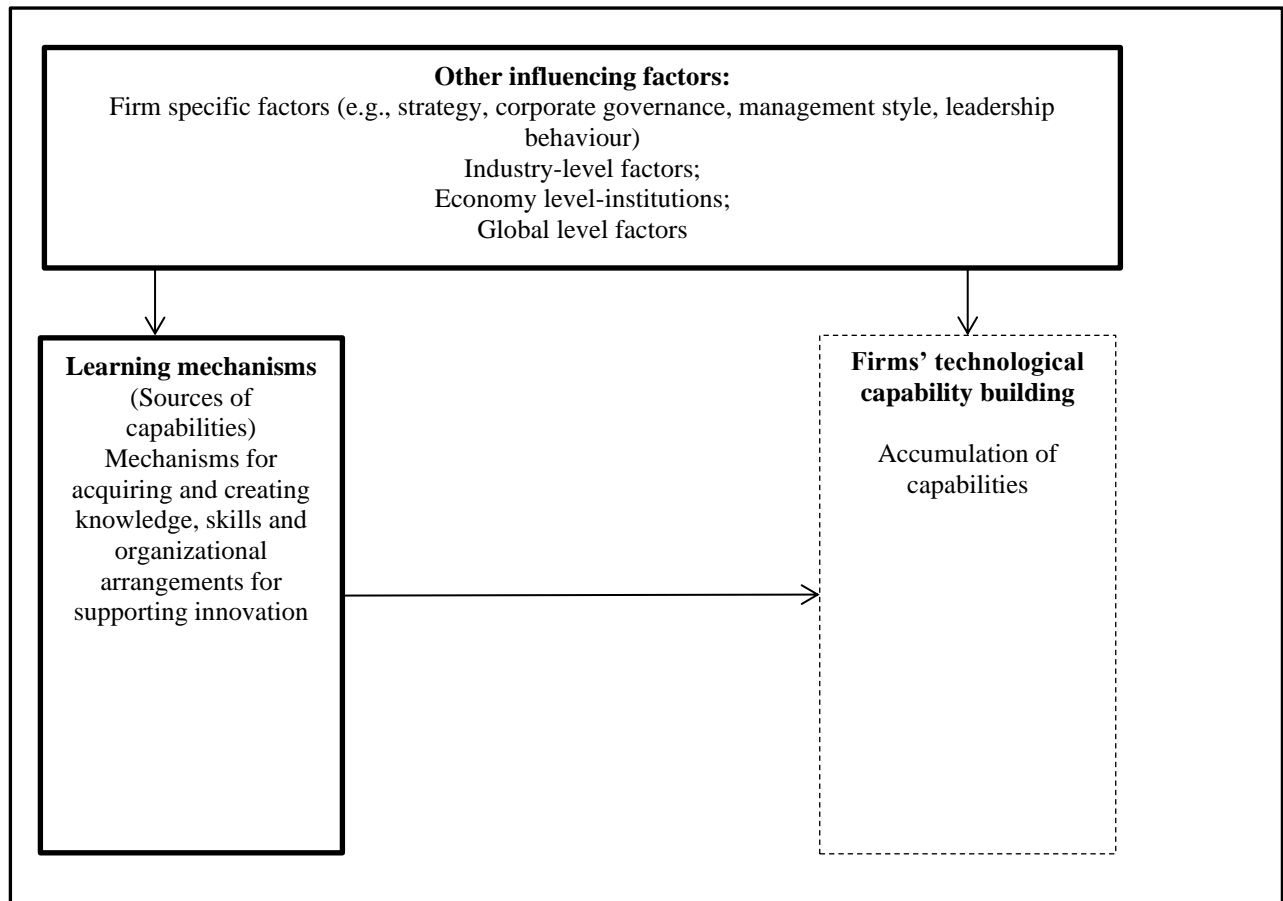
Externally, firms can learn through interaction with suppliers, customers, public assistance agencies, industry associations, foundations, and the like. These avenues can provide missing external inputs into the learning process which the firm itself cannot (easily) provide (Bell, 1984; Romijn & Albaladejo, 2002, p. 1054). Through these avenues, firms can gather information about technology and markets. They may also find opportunities for external staff training, secure parts and components, consulting services and research and development grants (Romijn & Albaladejo, 2002, p. 1055). This is also called an innovation system and it has been said that the generation and utilization of knowledge depend on the frequency and density of the firm's interactions with such a system and its openness to external knowledge (Yam et al., 2011). Such interactions are referred to as searching and depending on the nature of a given innovation system, the capacity to enrich the firm may already be present or it may need to be created in the first place. In most developing economies, this capacity is limited (Bell, 1984). There also is a relatively large literature on how local firms that are part of global (or regional) value chains, may or may not learn from buyers, and is related to sub-topics of value capture and industrial upgrading (see e.g. (Morrison et al., 2008; Staritz & Whitfield, 2019).

The process of building capabilities therefore appreciates that no single firm is self-sufficient or work in a vacuum without being intertwined with positive or negative influences. Consequently, firms must look beyond themselves for complementary knowledge and capabilities to innovate. But since this is often frustrated by poorly developed markets which are sometimes biased against small firms (Goedhuys, 2007). Kamau et al., (2019) for instance

found that many local owned food processing firms in Kenya faced significant entry and market barriers in their quest to access the domestic modern retail sector in the country. To address the poorly developed markets challenge, many firms often need to embed and form linkages with multiple actors within the innovation system (Goedhuys, 2007). Such linkages can either take the form of formal or informal. Formal linkages are preceded by the signing of an official contract between the collaborating firms such as joint research and development and technology agreements (Egbetokun, 2015). Informal linkages on the other hand entail exchanges and collaboration without any prior formal agreements (Egbetokun, 2015; Gachanja et al., 2020; Goedhuys, 2007; Jegede, 2020; Kabecha, 1999; Sobanke et al., 2014). Examples include interpersonal meetings, exchanges at conferences and workshops. In the context of developing countries, this distinction is useful as it has implications on the empirical analysis since most firms operate in resource poor environments coupled with weak legal systems and financial challenges. Because of this, costly formal interactions are rare as compared to the informal interactions which are easier to manage (Pyka, 1997). Whereas the formal interactions imply cost, the informal interactions thrive on trust and provide access to complementary tacit knowledge (Murphy, 2002; Vrgovic et al., 2014).

This is summarised in a slightly modified analytical framework outlined in figure 1 below that was originally developed by Bell & Figueiredo, (2012).

**Figure 1: The Learning Framework**



Source: Adapted from Figueiredo 2012; 2014

While in the original framework there was a discussion of firm performance arising from the build-up of technological capabilities, this paper just focusses on the learning mechanisms that support the development of the capabilities. This study focuses on firm learning because it has been established that similar studies rarely focus on these learning processes (Egbetokun, 2015; Gachanja et al., 2020; Goedhuys, 2007; Sobanke et al., 2014). Many such studies concentrate on the outcomes of the capability accumulation instead (Figueiredo, 2003; Lall, 1992; Lall & Wangwe, 1998). Furthermore, most of such studies have focussed on the most innovative firms which are at the

technological frontier. On the contrary, most firms in Kenya are far from the technological frontier. Instead of making their own technology, they purchase it and invest effort in learning how to use it. Many of these firms are also dislocated from the main international sources of technology, research and development, universities, and the main international markets they wish to supply. In our discussion of the learning mechanisms, we categorised into two interrelated ways as seen in the literature review. First, we identified whether they are internal or external to the firm. Secondly, where applicable, we categorised learning mechanisms as either formal or informal.

**1.**



## Methodology

This paper adopts a case study approach. In deciding whether to use a case study design or not, Yin (2014) offers important insights. First is the scope of a study whereby case studies are suited in studying an empirical phenomenon in depth and within its real-world context particularly when the boundaries between the phenomenon and the context are not clear. Another consideration relates to the nature of questions posed. Case studies are better suited in circumstances where how questions which need exploration are posed. Additionally, as Wangwe (1995) has argued, studies of industrialisation or trade in Africa have not paid attention to the firm level activities and processes which influence the path followed by firms and how such firms have been coping in a changing world's technological and market conditions. As a result, this is an area where standard propositions and factors have not yet been identified. In such situations therefore, case study research designs are better approaches. Based on some of these considerations therefore, we adopted a case study approach.

This is not to imply that this approach may not have its limitations given the minimal number of cases studied. Instead, like Oyeleran-Oyeyinka (2004) posited, this limitation is compensated by the very deep analysis by the case studies which reveal detailed enterprise-level information. As a result, no attempt is made to generalise based on the findings from the six case study firms. It is therefore not our intention to produce statistically significant results. Instead we aim at bringing to light insights into the process of learning among firms in their quest to improve their technological capabilities.

The six food processing firms were selected from the snacks subsector. All of them process potato crisps and were drawn from Kiambu and Nairobi counties. These two counties are part of the former Nairobi Metropolitan Area which has a high concentration of diverse firm population. Government records indicate that over half of all formal medium and large enterprises are to be found in Nairobi and its environs (GoK, 2006). To qualify for inclusion, each firm had to meet two important firm success criteria. The first one was firm age. It was preferable that each firm was five years in 2012. The second criteria was the firm size whereby only firms that had five employees and above were included. These two criteria were important to the study because longevity and firm growth are critical in determining the success of a firm. On longevity, many firms in Kenya die off soon after being established. Regarding firm size, many firms are micro enterprises with less than five employees (GoK, 2016a).

The first round of data collection commenced in December 2013 and ended in January 2014. Structured interviews using the Community Innovation Survey questionnaire adapted to the local context was used to capture general firm data with a particular focus on innovation activities which would form a base of analysing the learning mechanisms. The subsequent data collection was less structured and qualitative in nature. This was accomplished in two phases with the first one running between October and November 2014. The second phase ran between August and November 2016. At the end of the study period, each firm had been visited at least three times.

## Findings and discussion

### *The six case study firms*

The six case study firms varied considerably in terms of basic parameters/characteristics as shown in Table 1. In line with the first inclusion criteria on firm age, five out of six firms were at least five years in 2012. The only exception was firm F which was formally registered in 2012 but had been running informally since 2007. It was running informally because the owners were working full time for another snacks company. They then resigned and went into full operation in 2012. So, this was the youngest firm but it was selected because it displayed immense potential particularly looking at the turnover compared to the others of similar size. Firm A was the oldest

at age 39 in 2012 followed by firm B at age 22.

Regarding firm size, all firms had at least five employees. Firms D and E had five employees each. Firms C and F had eight and ten employees respectively while firm B had 34 employees. Firm A had the highest number of employees at 240. In addition to firm age and size, each firm was asked to state its turnover for the year 2012. Firm D had the lowest turnover figure at seven hundred thousand Kenya shillings while firm A had the highest annual turnover at over seven hundred and thirty-five million Kenya shillings. This information is captured in Table 1. As per these basic characteristics, all the six firms were successful.

**Table 1: Basic Firm Characteristics**

<b>Firm</b>	<b>Established</b>	<b>Age</b>	<b>Employees</b>	<b>Turnover in 2012 in KES</b>
A	1973	46	240	735,672,142
B	1990	29	34	144,000,000
C	2003	16	8	6,600,000
D	2004	15	5	700,000
E	1994	25	5	960,000
F	2012	7	10	7,000,000

*Source: Field notes, 2013-2016*

### *The learning mechanisms*

Turning to the issue of learning mechanisms observed among the firms in their quest to build their technological capabilities, we found that knowledge and skills brought by owners and workforce; training; inter-firm

interactions; and a grouping referred here as subsidiary mechanisms which were observed in a few of the case study firms. These subsidiary mechanisms included expatriate and technical personnel; research and development; and use of private and public research institutions.

*Knowledge and skills brought by owners and workforce*

We begin this discussion with the knowledge and skills brought into the firm by firm owners together with their workforce obtained through earlier experience which as we have established from literature (Bell, 1984; Romijn & Albaladejo, 2002) forms a critical stock of technical manpower that the firms can draw on to build their capabilities. This is an internal learning mechanism which is very pronounced particularly among firms in developing country contexts who due to resource constraints tend to rely most on the skills, experience and vision of owners (Wamalwa et al., 2019) and employees to build their capabilities. It has been observed for instance that owners or employees who have previously worked in larger enterprises contribute immensely to the capability building process (Sobanke et al., 2014). In our study, all the six firms are family owned and the owners play a pivotal role in the direction of the enterprises. Depending on the ability of the firms, each then recruits additional staff to help in running the enterprises. Additionally, depending on the ability of the firms, they can recruit staff of various skill levels to handle technical and managerial responsibilities. In this regard, firms C, D, E and F rely on secondary and primary school leavers to take care of production tasks. The firm owners in turn handle most of the administrative and management responsibilities. The exception is firm C that employs an accountant to take charge of finances and a marketer to handle marketing. This is because of the four firms; it is better resourced and so it could hire a considerable pool of professional employees.

In comparison, firms A and B have even better developed human resources arrangements. This is attributed to better financial resource endowments since of all the six case study firms, these two are better resourced. Firm B has two main departments: production and management. The directors take charge of the management department and have employed an accountant and a marketing team to take charge of related responsibilities. They have also employed a production manager to supervise the production department which has staff most of who are form four leavers. At firm A, family members constitute top management and handle various aspects of management including strategy, vision, marketing, and technical direction. Of the firm's 240 employees, almost half are university graduates. All the employees are local apart from three expatriates. One is the technical director, another oversees research and development while the last one oversees sales.

Of the six firms, firm A has the highest concentration of technical staff with ten (10) food technologists and five engineers who take charge of the technical and other supporting departments. At the base of the production function are machine attendants who are high school leavers. Those who come in with diploma certificates are hired as machine operators while those come in with university degrees are recruited as technical operators. The production department also has cooks most of whom are very mature and have learnt and built experience on the job. Many of these technical staff constitute the quality and production departments. However, the firm also has engineering; sales and marketing; accounts; IT; administration; stores and logistics; and human resources departments.

The findings on the contribution of knowledge and skills brought into the firm by owners and workforce in this study reveal two main observations, which have been flagged in the literature on capability building among firms in developing countries. First, this is a particularly important learning mechanism relied upon by all the firms due to resources constraints. Secondly, since the nature of resource constraints observed in the firms is a function of a continuum, better resourced firms hire better trained and skilled workforce who in turn have a chance to improve the productivity in a firm. A good example is firm A which in addition to having many technical staff could afford three expatriates. In comparison, those firms that are less endowed rely mainly on the owners' experience and expertise plus employees many of who have basic education.

### *Training*

Training is another important internal learning mechanism witnessed among all the case study firms but manifesting itself in various forms. The most common form of training observed among all the six case study firms was internal on-the-job training that particularly targeted the production staff. Newly recruited staff would be trained especially in the production processes at the firm. In firms C, D, E, and F, the owners took charge of this training responsibility. On top of this, firms C and F also reported periodically engaging external production staff from better resourced competing firms to train their employees on new techniques based on specific needs. Firms B and A went a notch higher with training. In addition to internal on-job training, they trained their staff externally. Through a government scheme, firm B reported training its production on shop floor safety.

At firm A, two production staff interviewed reported having attended training in the Netherlands on latest production technologies as part of a benchmarking exercise at the firm. Other staff at the firm have also benefited from training organised by local business associations.

These findings on training are also in line with what has been observed in literature. Oyeleran-Oyeyinka, (2004) for instance established that learning-by-doing was quite prevalent among firms irrespective of the educational level of the owners. This learning was critical in enabling the enterprises respond to competition pressure consequently pushing firms to acquire new technical and managerial skills. But as we have seen from the findings, the intensity of the training varied among firms. Better resourced firms adopted more formal training techniques including benchmarking opportunities abroad to see how firms considered to be at the technological frontier are plying their trade. The less endowed ones, struggling to manage a firm with few qualified and experienced staff, relied more on informal training sessions.

### *Inter-firm interactions*

Turning to inter-firm interactions, two forms could be distinguished among the six firms. These are horizontal and vertical relationships. Among the horizontal relationships the interaction within individual firms as well as part of business associations could be observed. The owners of firms D, E and F gained their skills and experience working with local well-established snacks manufacturers before moving out to start their own enterprises. Their firms therefore, gained from a skill transfer from other firms in the industry in a horizontal relationship. Through their experience at the firms, they learned the

production processes and the snack's processing ecosystem in Nairobi. Some of the knowledge gained from this is tacit and can only be gained based on actual involvement in the industry over a period of years. The exception is the owner of firm C who came from a slightly different sector, the horticultural industry. This intense spillover of knowledge has been observed among firms operating under financial constraints who have to turn to non-market mechanisms to share information, knowledge, investment and risks (Egbetokun, 2015; Goedhuys, 2007; Jegede, 2020; Sobanke et al., 2014). The result is that the firms become active and embedded in local networks of firms out of which they gain knowledge on markets and products quality.

Because they could afford membership, firms B and A engaged and gained from horizontal relationships with other firms in the industry through local business associations. For example, firm A reported benefiting from trainings organised by the Kenya Association of Manufacturers (KAM) and Kenya Federation of Employers (FKE). In one such training, the content focussed on labour relations within the industry. Similarly, firm B reported lobbying the local government for infrastructure development through a neighbourhood association. Apart from local business associations, firm A is also a member of European Snacks Manufacturers Association (ESA) which has provided it with an opportunity to attend trade fairs in Europe. Such events have been important benchmarking events for the firm's employees and management. Attending such events have also given the firm a chance to better understand the European market given that it is exporting to the UK. The findings on business associations brings to the fore the discussion on formal

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and informal learning mechanisms. As has been noted in literature (Egbetokun, 2015), better resourced firms are more predisposed to engage in formal collaboration with a knowledge source which sometimes entail signing a legally binding contract. Because such collaborations are costly in nature, the less endowed firms cannot benefit from them and instead rely on more informal forms of collaborations. This has been demonstrated in this study.

With regards to vertical relationships, the relationship between firms and their suppliers and buyers were the most pronounced among the firms. We start with supplier relationships. The most important suppliers that were critical in the learning process of the firms are equipment suppliers. Each firm made effort to invest in a technology that matches its ability. This in turn had a bearing on various product parameters such as volume and quality. Technology transfer from equipment suppliers therefore becomes a significant learning mechanism. But firms A and B reaped most from this mechanism compared to the rest since they had better capacity to procure requisite and modern equipment. During the fieldwork period, we witnessed technicians from a South African supplier training local staff on operating recently procured packaging equipment. During the same period, the Research and Development Manager was due to travel to China for training on how use an optical scanner that the firm was planning to purchase and deploy.

In this way, equipment suppliers become an important component of this learning mechanism. Because it could afford it, firm A could tap into technology transfer from international suppliers who are at the technological frontier. Firm B also benefitted from this interaction but to a

lesser extent. However, due to cost considerations firms C, D, E and F rely on local *jua kali* fabricators most of the time. While such equipment may serve the intended purpose, compared to what is procured internationally, their quality is significantly lower.

We now turn to relationships with buyers. Though there were variations, the most important buyers were retailers such as supermarkets, wholesalers, kiosks, and convenience stores. Firms A and B dominated the larger and diversified supermarkets plus the smaller retail chains space while firms C, D, E and F favoured the smaller individual supermarkets predominantly found in residential estates. In addition, the firms also sold to wholesalers, kiosks and convenience stores. Each of these retail options imposed varied product quality standards that had to be met by the firms. For example, the fact that Firm B was unable to provide modern packaging, it could not access one of the leading supermarket chain in Kenya. The concerted effort to comply with such demands therefore provides an opportunity for a firm to learn and in turn improve its competitive position. As the larger diversified chains impose more stringent standards and demand for larger supply volumes coupled with longer credit periods, firms C, D, E and F turn to smaller individual supermarkets. These barriers imposed on local food processors by the domestic modern retailers have also recently been pinpointed by Kamau et al. (2019).

Our findings on suppliers and buyers once again reveal the nature of collaboration between the firms and other economic agents in their ecosystem in their quest to build their capabilities. These collaborations reveal the character of African firms many of which because of

resource constraints turn to informal collaboration mechanisms relying a lot on trust arising from history of successful, repeat interactions trusting their long term customers and suppliers (Vrgovic et al., 2014).

#### *Subsidiary learning mechanisms*

To finalise the discussion on learning mechanisms, we lump together various mechanisms that were observed in only a few instances. We refer to these as subsidiary learning mechanisms. These include expatriate and technical personnel which primarily benefited firm A. The technical personnel and expatriates come with high level knowledge which is at the disposal of the firm. This knowledge is in turn transferred to the local staff. In the case of firm A, there were deliberate efforts to have firm employees shadow the expatriates to facilitate skills transfer. In this group of subsidiary learning mechanisms, we also have research and development, consultants or private research and development institutions and government or public research institutes.

All the six firms engaged in some form of research and development, but only firm A had a formal research and development department. Firms B, C, D, E and F engaged in ad hoc research activities which in most cases entailed trying to emulate competing products and production processes. This finding has been reported in other studies such as (Jegade, 2020) which noted that African firms particularly those in clusters have a tendency to volunteer information and technical information amongst their peers. However, (Gachanja et al., 2020) notes there is unresolved tension arising from the need to strike a balance between sharing knowledge while at the same time guarding against leakages to competitors within the national innovation system

especially in contexts of weak property rights protection regimes.

Regarding the use of research institutions, we established that of the six firms, only firm A actively engaged stakeholders drawn from private as well as public research institutions. We learnt that the firm's chairman was a member of Kenya Bureau of Standards (KEBS) technical committee on spices. In this way, the firm can contribute knowledge but also learn about latest developments in the industry. Similarly, the firm has been working with the Kenya Agricultural and Livestock Research Organisation (KARLO) a public agency and the International Potato Centre (IPC) a non-governmental organisation to ensure that farmers can access the right potato seeds suitable for crisp processing. This arrangement benefits potato processors because using the right and fresh potato for processing ensures a quality final product. This in turn can increase a firm's competitiveness. The farmers also benefit since they are contracted by the processors. They are therefore guaranteed a market at competitive prices regardless of market conditions. The government facilitates funding and technical support via various donors.

Without trying to generalise since these findings are from very few case study firms, the fact that some of these very critical mechanisms such as interaction with research institutions were observed in only a few firms could be speaking to what has been found in literature. For instance, it has been noted that many developing countries lack strong research centres, sufficient infrastructure, entrepreneurial universities and independent investors (Egbetokun, 2015; Gachanja et al., 2020; Kabecha, 1999; Sleuwaegen & Goedhuys, 2003; Sobanke et al., 2014; Vrgovic et al., 2014).

As a result, there are very weak interactions between these important agents of the innovation system with the firms denying firms an opportunity to learn from them optimally. Nevertheless, the finding from firm A's active engagement with the KEBS and KARLO could be an indicator that there are nascent efforts by a select number of government research institutions to support private enterprise. Such efforts need emulation and augmentation. More importantly, the interactions between such research institutions need to be more inclusive and make deliberate efforts to reach out to the small and poorly resourced firms. This is because there is a tendency not to prioritise such firms as compared to the large and formal enterprises (Goedhuys, 2007).

### **Conclusions and implications**

This paper sought to show the various learning mechanisms food processing firms use in their quest to build their capabilities. Based on the findings from the six case study firms comprising potato processing firms drawn from the Nairobi Metropolitan Area, three main learning mechanisms stand out as some of the most used. Top in the list is the knowledge and skills brought by firm owners and employees followed by training and lastly intensive inter-firm interactions. These three mechanisms span the internal versus external divide on one hand and informal and formal categorisation on the other hand. Other subsidiary learning mechanisms included technical personnel including expatriates, research and development efforts and engaging with research institutions.

Without trying to generalise since this study draws on case studies, these findings reveal several key messages and lessons. First, the experience firm owners and their employees bring to the firm matters a lot

particularly for the small firm with minimal resource endowments. Nevertheless, we saw that better resourced firms can hire and bring into the firm skilled employees, including expatriates, who could boost the skill base beyond what the firm owners have. The second key message relates to training. Whether it takes a formal or informal nature, this mechanism is extremely critical for capability building and as such all firms need to direct considerable efforts towards it. On inter-firm interactions, the key message is that since many firms in developing countries have limited resources to draw on market mechanisms, it is important for them to be embedded in local networks of other firms and other actors in their ecosystem. This offers them a chance to take advantage of these non-market and informal mechanisms to exchange information and knowledge beneficial to the firm at minimal or no cost.

Weak linkages between firms; research institutes and other knowledge production institutions is commonplace in many developing countries. While the findings from this case study seem to give credence to this, it is worth noting the nascent efforts by two research institutions in Kenya. These institutions were actively engaging with firms and other actors to address main concerns affecting the sector such as standards, availability of consistent and quality raw materials and linking firms to their final customers. The existence of these opportunities provides a window for more firms in the economy to seek out and engage with such proactive institutions on various matters critical to their survival and growth. The government can also build on such initiatives to encourage more collaboration between its institutions and firms as part of the much-needed efforts to improve the business environment for the private enterprises which are facing intense

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pressure to be competitive. However, this process needs to be more inclusive. To achieve this, we argue that deliberate efforts must be put in place to bridge the apparent power and social distance between the small and poorly resourced firm and these critical government agencies. Future research initiatives could explore the extent to which such efforts are being realised at the policy level.

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