

“Value creation pays”: a business model canvas approach to improve post-production activities in Senegal’s broiler industry

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ABSTRACT

The chicken production sector of Senegal has witnessed a significant growth after the ban on imported chicken meat was enacted in 2006. Nevertheless, the post-production sector which entails processing, distribution and marketing of chicken meat remains almost undeveloped. This study was carried out with an aim of first assessing activities in the post-production chain in detail, and second, proposing solutions for upgrade dwelling on the Business Model Canvas. As assumed, this study finds very minimal value addition activities in the chain. Moreover, processing, distribution and marketing activities pose significant health threats to consumers. Overall, an expansion of the cold chain and processing of broiler meat into pieces is recommended to ensure food safety and product diversity and accessibility. The business model canvas describes recommendations for improving activities in the chicken meat value chain and focuses on collaboration, sustainability, and scalability. The jobs created at the level of production due to the import ban could be of great importance to the economy of Senegal. For this reason, activities in the post-production chain should be given the needed attention.

Keywords: broiler, post-production, upgrade, Business Model Canvas, Senegal

1 Introduction

The food supply chain comprise a chain of activities detailing how a product is produced and delivered to the end users (Nosratabadi, Mosavi, & Lakner, 2020). In the chain are actors such as processors, distributors, wholesalers and retailers, each with a specific function that leads to some form of value addition. In this regard, supply chains are considered as simultaneously accompanied by a value chain (Nosratabadi et al., 2020). Simply defined, a value chain describes the full range of activities that firms do to bring a product from its conception to its end use and beyond. At each level of the chain, some form of value addition is expected which according to Teece (2010), and Jacobides, Knudsen, & Augier (2006) is denoted by intangible assets such as brand, ideas, people, and innovation. Trienekens (2011) also identifies quality, costs, delivery times, delivery flexibility, and innovativeness as factors which contribute to value addition. “Value creation” is an important concept and the foundation for a thriving business. First, by adding value, firms can charge a price higher than they used to resulting in greater profits, even though it comes at a cost. Second, value creation allows product differentiation from that of competitors. Third, it encourages loyalty and strong long-term relationships with customers. Therefore, without value creation a firm’s ability to retain customers as well as its survival will be threatened. Business models spell out the position of firms in the value chain (Mosleh & Nosratabadi, 2015) and describe the way these enterprises operate to deliver products in a customer segment that enables them to return value.

In Senegal, beyond the year 2007, all the chicken meat consumed is produced domestically due to a ban on frozen poultry meat imports by the government in 2006 (Killebrew et al., 2010 pg1). This ban was necessitated by the outbreak of Avian Influenza virus in some exporting countries. Before the ban, imports accounted for 34% of the total chicken meat consumed in the year 2005 (Zamani, Pelikan & Schott, 2021 pg 12). Since 2006, the production industry of Senegal particularly witnessed significant growth with large and small-scale production across the country, depending on imported technologies (Arnoldus et al., 2020). Besides fish which is the most consumed (Quaas et al., 2016), chicken meat is relatively cheaper in Senegal compared to other meat sources such as duck, guinea fowl, mutton, and beef. In part, the relatively low price of chicken is due to the production industry’s ability to attain productivity and efficiency. In addition, the rise in awareness of the healthfulness of chicken meat (low-fat content, ease of digestion, etc.) and the increasing Senegalese population are some factors that account for growth of the poultry industry. In addition, chicken is culturally desired in West Africa. Consequently, per capita consumption of chicken meat has more than doubled, increasing from 1.8 kg in 1996 to 4.1 kg in 2018 (Zamani, Pelikan & Schott, 2021 pg 12). From this perspective, the long-term opportunity of chicken production in Senegal looks promising.

Although the production system in the country is fairly professional and efficient with a 45 day cycle per production and a high feed conversion rate in accordance with global standards (Arnoldus et al., 2020), processing, packaging, storage, and marketing of chicken in Senegal remain nearly undeveloped (Boimah & Weible, 2021). Furthermore, hygienic methods in processing and marketing of chicken are limited while products on offer often fall short of the required quality for human consumption (Boimah & Weible, 2021). The study of Boimah & Weible (2021) shows that domestic chicken is generally preferred to imported chicken because it is perceived as fresher and tastier, however, consumers criticize the shortfalls in processing and marketing which pose risks to consumers (Boimah & Weible, 2021; Killebrew, Gugerty, & Plotnick, 2010). These aspects call for a detailed look into the processing and delivery activities of domestic chicken meat. This study therefore aims to assess in detail post-production activities in the chicken meat value chain and to make proposals that can contribute to the sector’s upgrade. We dwell on the Business Model Canvas (BMC)(Osterwalder & Pigneur, 2010) to make proposals for the post-production chain by focusing on collaboration, upgrading, sustainability, and scalability. We adopt the BMC approach for numerous reasons. First, it gives entrepreneurs a wide snapshot of every aspect of their business and helps them assess their strategies and existing gaps (Munna, 2021; Osterwalder & Pigneur, 2010; Teece, 2010). Second, it provides firms with a comprehensive framework for developing or improving upon their business strategies while serving as a useful guide for value creation (Pölling et al., 2017) and a guide for ensuring sustainability in the food supply chain (Nosratabadi et al., 2020; Monastyrnaya, Le Bris, Yannouc & Petit, 2017). Third, it helps firms to identify and capitalize on customer segments and niche markets for profit maximization (Osterwalder & Pigneur, 2010). With a broad objective of ensuring sustainable livestock production in Africa, the Food and Agriculture Organization of the United Nations (FAO) recently adopted the BMC as a guide for enhancing activities along poultry value chains (see FAO, 2022a, 2022b). Our study contributes to the literature on how

developing countries can add more value to primary products while collaborating with other actors to capture new market opportunities.

The rest of the paper is organized into four main sections. The second section describes the type of data, sources, and methods used in gathering data, and the method of analysis. The third section is sub-divided into two: the first part presents findings of the field visits and data collected while the second proposes ways of improving the post-production poultry value chain using the BMC as a foundation. The fourth and final section presents the conclusions of the study.

2 Materials and methods

The study dwells on primary data collected through qualitative interviews conducted between January and April, 2021 in Dakar and Thiès, Senegal. Semi-structured questionnaires developed by the authors were used for the data collection and the interviews were conducted in cooperation with a local partner in both French and Wolof (a local language). The questionnaires were intensively discussed prior to the interviews. Overall, primary data was collected from a total of 9 actors: 2 retailers of chicken products; 2 supermarkets, 1 supérette (grocery store or small supermarket), and 2 middlemen/retailers popularly referred to as “*les banabanas*” and 2 processors. The interviews were recorded, transcribed and translated into English. Content analysis was used to analyze the primary data collected. Firstly, the data was manually coded into manageable content categories based on the trend of responses of the actors interviewed. Secondly, the data was analyzed and conclusions were drawn. In addition to the interviews, visits were made to poultry farms, processors (abattoirs), supermarkets, cold stores, and traditional open markets to observe activities. Based on the findings, we use the Business Model Canvas (BMC) framework to suggest recommendations for upgrading post-production activities in the value chain.

A number of business models are identified in the literature including lean start-up model, design thinking, and experimental lab (Curley & Formica, 2013). However, the BMC is one of the most popular models used to guide entrepreneurs. Proposed by Osterwalder & Pigneur (2010), the BMC is a strategic management template used for developing new business models and documenting existing ones. It is aimed at aiding firms in creating, delivering, and capturing value (Slávik & Bednár, 2014; Baden-Fuller & Morgan, 2010; Osterwalder & Pigneur, 2010; Teece, 2010; Mullins & Komisar, 2009). In other words, the BMC offers entrepreneurs a broad snapshot of every aspect of their business – from value proposition and customer segments to operations and financials. The nine basic building blocks for developing a business model canvas (Osterwalder & Pigneur, 2010) are described in Figure 1.

According to Osterwalder & Pigneur (2010), successful businesses are built around four main areas: customers, offer, infrastructure, and financial viability, and for agricultural products, these four areas are relevant all through the value chain from production to the end market. After a systematic review of the literature, Nosratabadi et al. (2020) also identify innovations in value proposition, value creation, and value delivery processes of business models as winning strategies, especially in the food industry. Upgrading activities in the value chain thus require innovations and the adoption of new approaches with which to interact with customers and suppliers in unprecedented ways (Gambardella & McGahan, 2010; Osterwalder & Pigneur, 2010).

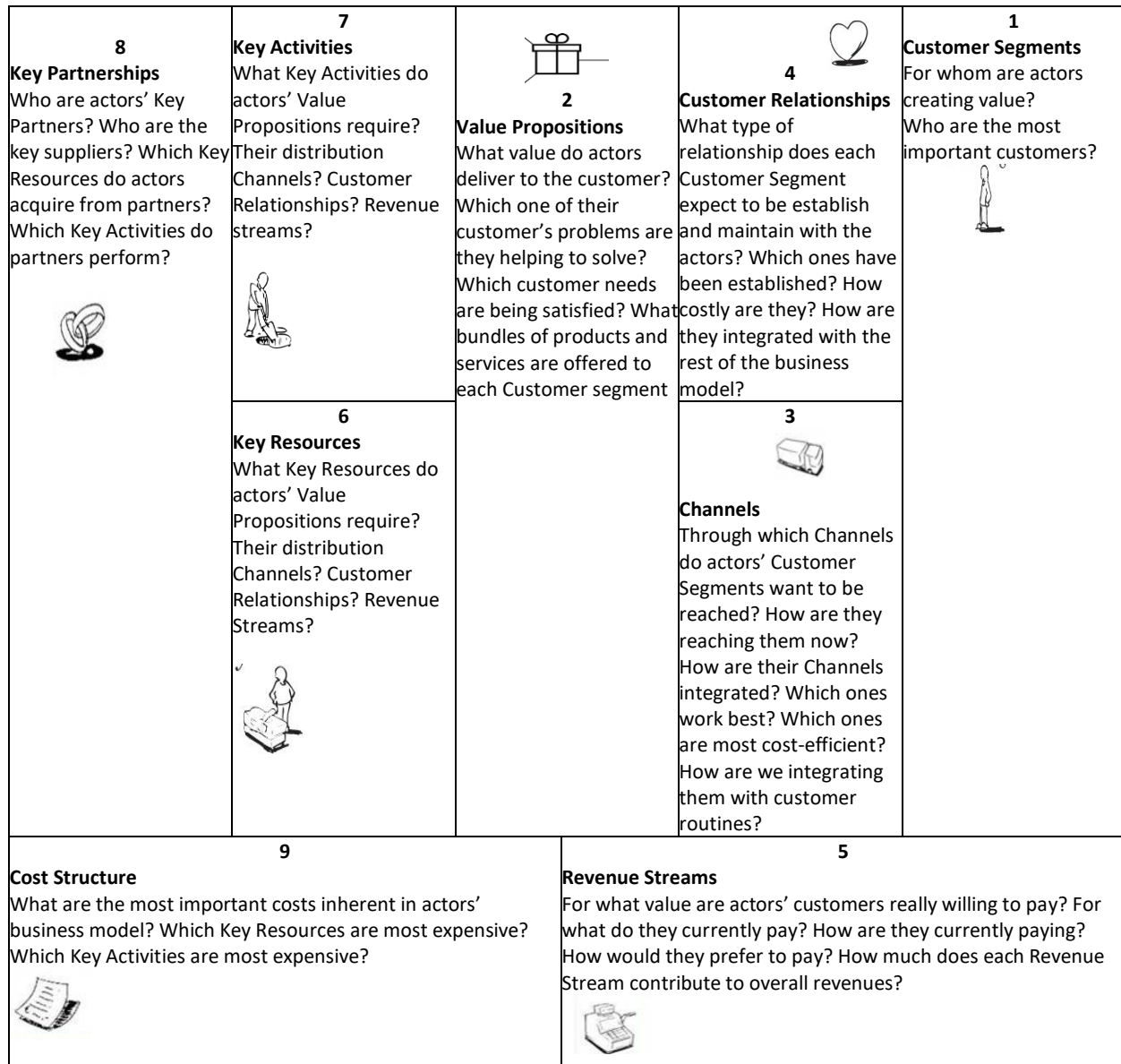


Figure 1. The Business Model Canvas template. Source: Osterwalder & Pigneur (2010)

3 Results

The results are presented in two sections. The first section presents the status quo of the Senegalese post-production broiler value chain, and the second section proposes options for upgrade. These suggested interventions are expected to support the emergence of a competitive industry.

3.1 Description of post-production activities in the poultry value chain

3.1.1 Processing

The study shows that processing of chicken is very limited in Senegal. Processed chicken remain whole dressed with just few traders offering cut portions (breast, wings, back, etc.) to their customers. After buying live chickens from “les banabanas”, customers have two options: (i) pay a “déplumeuse” - people specialized in slaughtering, plucking, evisceration, and cleaning, or (ii) go through the process of slaughtering and dressing by themselves at home. Modern automated equipment has strict procedures that ensure hygienic processing of meat which reduces contamination. Nevertheless, very few poultry farms are equipped with machinery for slaughtering and packaging. The majority of farms which offer dressed chickens do manual slaughtering and dressing with bare hands. These finding is confirmed by Arnoldus et al. (2020) who showed that about 70 % of broilers are sold as live fowls. For the remaining 30% which are processed, manual processing dominates. Nevertheless, manual processing involving plucking, evisceration, and washing has a high probability of introducing bacteria such as *Salmonella spp.*, *Staphylococcus aureus*, *Listeria monocytogenes*, and *Campylobacter spp* into the meat (da Silva, 2013). Moreover, manual processing takes a longer time compared to automated processing, and due to the high tropical temperatures of above 25°C the meat quality begins to go down before it is stored in a refrigerator or transported to customers. In addition, there is a likelihood of cross-contamination with bacteria between farm workers and carcasses which can be transferred to consumers. Furthermore, only a small proportion of processed chickens come in cut portions as whole dressed chickens dominate.

3.1.2 Transportation and distribution

After processing, carcasses must be kept refrigerated until they are sold out to retailers and catering businesses. This reduces the multiplication of bacteria and other pathogens (Gonçalves-Tenório et al., 2018). However, this study shows that processed chicken meat in Senegal is largely transported to market centers by vehicles without refrigerators exposing the meat to bacteria and other pathogens.

3.1.3 Marketing

Several channels are used in the marketing of chicken in Senegal. Large and medium-scale producers usually sell processed whole chickens to the hotel and catering industry and to traders (les banabanas). Small-scale producers who dominate the industry also sell processed chickens to some catering businesses and sell live and processed chickens to traders (les banabanas) and to households. Nevertheless, contract arrangements remain informal among producers and the other actors. Some customers buy from the farm-gate while others arrange with producers to deliver products. Sale of live chicken is therefore dominant in the traditional open markets and in communities across the country. Before the ban, the situation was different as imported chicken were highly processed, mainly into cut parts, were well packaged with labels bearing important information including production and expiry dates. With frozen imports, consumers had the option to buy preferred parts in desired quantities (Boimah & Weible, 2021).

Dressed whole chickens sold in open markets are exhibited on bare tables without any form of packaging, refrigeration or chilling from morning till evening. The raw meat is exposed to warm tropical temperatures. Being a highly perishable product, bacteria and other foodborne pathogens begin to grow in the meat. In addition, meat left unrefrigerated for over two hours begin to decompose, losing its quality and taste. To delay decomposition and to prevent flies from settling on the raw meat, traders often apply chemicals. One popular chemical in use is formalin which is used in embalming dead bodies and which has been classified as highly carcinogenic to humans by the World Health Organisation (WHO) (Suwanaruang, 2018). This brings the safety of chicken meat consumed in Senegal into question. According to the World Health Organization, food safety, nutrition and food security are inseparably linked. A lack of safe food creates a “vicious cycle of disease and malnutrition” which overburdens public health services, disrupts social and economic progress and reduces quality of life. On the other hand, chicken retailed in Senegalese supermarkets on the other hand are packaged with labels bearing dates of production and expiry, and are kept frozen. Nevertheless, the majority of consumers perceive chicken sold in traditional markets as fresher and cheaper (Boimah & Weible, 2021).

Furthermore, there is often a scarcity of chicken during festive seasons due to high demand leading to higher prices in these periods. As mentioned by participants in a consumer study conducted by Boimah & Weible (2021) chicken meat was more available for Senegalese households before the import ban even in times of demand peaks. To give an overview of the current state of the Senegalese poultry sector, a SWOT analysis (strengths, weaknesses, opportunities and threats) (Figure 2) is presented in figure 2.

Strengths	<ul style="list-style-type: none"> • An expanding poultry (chicken) production sector • Chicken is cheaper compared to other animal protein sources such as beef, mutton, duck, guinea fowl, and rabbit 	<ul style="list-style-type: none"> • Few automated slaughter houses • Live chicken trade dominates the market • Value-addition to poultry meat is low • Poor sanitary standards in processing and handling of carcasses • Poor marketing conditions (lack of good freezers to store processed chicken) • Supply shortages during festive seasons leading to higher prices • Lack of central collection points that will allow small-scale farmers to organize into supply groups or small cooperatives • Limited access to credit for value chain actors which limits investment in the sector. 	Weaknesses
Opportunities	<ul style="list-style-type: none"> • Decreasing fish stocks in Senegal’s high seas is paving way for chicken to become the most demanded animal protein • Increasing awareness of chicken as a healthy meat product • Increasing per capita consumption of chicken • High population growth rate (year-on-year average of 2.77% between 2009-2020) • Increasing urban population • Gradual increase in incomes of consumers • A protected domestic poultry sector (import ban on frozen chicken meat) 	<ul style="list-style-type: none"> • A reverse of the trade policy can leave domestic chicken uncompetitive based on the level of processing of imported chicken meat • Cheap imported frozen chicken meat smuggled into the country. 	Threats

Figure 2. SWOT Analysis. Source: Own analysis (2021)

3.2 The Business Model Canvas (BMC) approach to upgrading the value chain

Chicken meat is the second most consumed animal protein source after fish in Senegal (Arnoldus et al., 2020). However, the continuous decline of fish stocks resulting from changing climatic conditions and over-fishing due to high demand, shows that chicken meat might become the most popular animal protein source in the near future (Arnoldus et al., 2020). Access to quality, safe and diverse chicken products is therefore crucial for the Senegalese population. To achieve this goal, an upgrade of post-production activities along the value chain is necessary. The following section presents proposals for upgrading post-production activities in the chicken meat value chain dwelling on the nine segments of the business model canvas.

3.2.1 Customer segments

To satisfy customers and improve revenue generation, it is important to offer differentiated products to the different types of customers (les banabanas, hotels, catering businesses, supermarkets, cold stores, and consumers. This can be done effectively by identifying the needs of each of these customers. The requirement of commercial customers (hotels, restaurants and food businesses, etc.) for instance may differ from that of households. Also, there may be a segment which would prefer organic to conventionally grown chickens.

3.2.2 Value propositions to ensure a product competitive industry

In industrialized nations, whether for the domestic market or for exports, chicken is highly processed into cut parts. Senegalese consumers mention these highly processed chicken as more convenient and time saving (Boimah & Weible, 2021). Chicken in cut portions is especially important for poorer households with very low purchasing power that cannot afford to buy chicken in its whole form. Even though poultry meat imports into Senegal are banned, value-added products including sausages, nuggets, and patties are still imported. The domestic processing sector can also process such high value-added products. Besides, organic chicken can be separated from conventionally raised chicken to create a niche market for organic products. While some customers are satisfied with frozen chicken, others would prefer to have the chilled versions. It is important to offer differentiated products in order to improve revenue generation. Furthermore, all processors should package their products with a brand label showing detailed information on the chicken products to ensure product traceability.

3.2.3 Channels

Communication, distribution, and sales channels make up a firm's interface with its customers (Osterwalder & Pigneur, 2010). Instead of producers selling directly to consumers and traders, the channel of distribution can be improved with the introduction of a distinct actor in the chain – “processor/distributor”. This has the potential of creating more jobs in the chain. It is also essential for processors to provide adequate product information to their customers. This can be done for example through effective product labelling. Also, temperature control of chicken products in the distribution chain must be ensured because safe and quality products are vital to the health of consumers. Marketing of chicken meat in open markets requires significant improvements. Refrigerators and deep freezers are necessary to keep chicken meat fresh and safe. In this case, there would be no need to display raw meat on bare tables, exposing it to bacteria, pathogens and to decomposition. Moreover, it would not be necessary to use harmful chemicals on the meat to keep it attractive to consumers. In addition to open markets, cold stores and supermarkets, alternative sales channels have to be evaluated, such as at-home-delivery services maintaining the cold chain from processing to consumption.

3.2.4 Customer relationships

Customer relationship is a vital building block in the BMC. A common statement used in the business environment is “the customer is king”. Managing a healthy relationship with customers helps marketers gain an insight into the behaviour of customers and gives them the opportunity to modify their activities as well as to co-create. Although no substantial data was collected on the relationship of actors with their customers, feedback from customers are relevant and is a solid base to aid processors and retailers to continually improve upon their products and services. These relationships can be implemented through the various social media platforms, telephone chats, and by word-of-mouth. This contributes to loyalty and customer retention, and is identified as an important asset for firms to take advantage of in increasing sales and profits.

3.2.5 Revenue streams

A successful delivery of the need of each customer segment would imply different pricing mechanisms such as fixed pricing, bargaining, etc. Likewise, different products will have different prices, e.g., organic versus conventional chicken, and whole versus cuts. Effective segmentation of customers will ensure a constant flow of revenue to the firm.

3.2.6 Key resources

The key resources model is concerned with the most important assets required to make a business model work. In the case of post-production activities in broiler meat, upgrades along the value chain comprise mostly of investments in techniques, equipment and logistics. For example, modern high-tech processing machinery is required for slaughtering, plucking, evisceration, cleaning and cutting into portions to reduce human contamination. Access to viable transport facilities such as vans or trucks with refrigerators with adequate temperature controls of at least 4°C is key to ensuring the safety of fresh meat. Traders in the markets need refrigerators for chilling meat to serve customers who prefer fresh meat and deep freezers to keep the meat

frozen so that it does not spoil if sales are slow. With deep freezers, chicken meat would not have to be displayed on bare tables which exposes it to bacteria, pathogens and to decomposition. Moreover, there would be no need to use harmful chemicals on the meat to keep it attractive to consumers. Upgrading in these regards may require good access to business credits.

3.2.7 Key activities

Excellent processing of chicken meat and the addition of high value-added products (sausages, nuggets, etc.), packaging and labelling, and effective distribution with an unbroken cold chain and customer feedback are the key activities required for success (Figure 3).

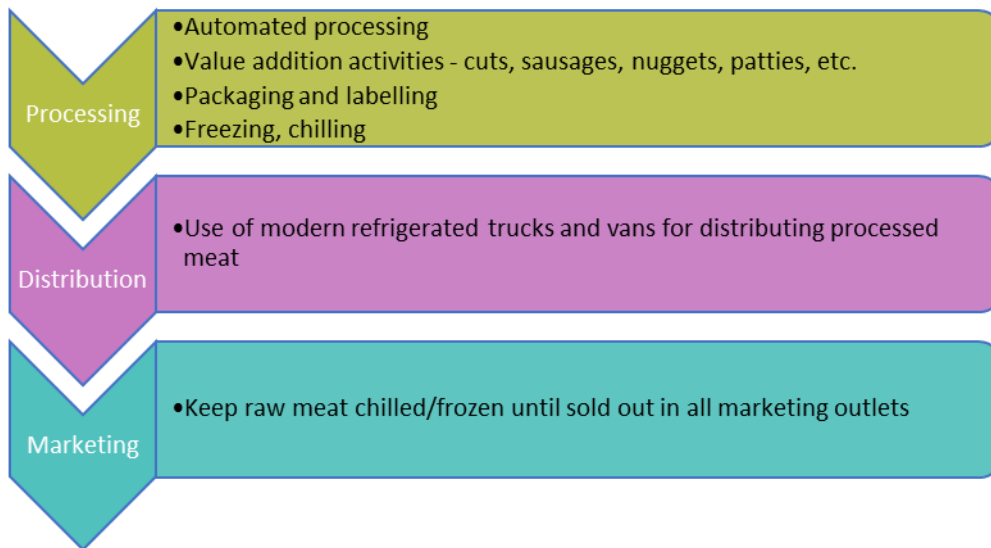


Figure 3. Key activities in the post-production chain. Source: Authors' illustration

3.2.8 Key partnerships to foster sustainability and scalability

Partners are as important as customers in a business model. Effective and successful partnerships have the potential to optimize businesses, reduce risk, and ensure reliable supply of resources. To make their enterprises thrive, processors must have good relationships with their partners (e.g., suppliers of packaging materials). These partnerships must be built on a trust that is unreserved, unequivocal and unambiguous. Both horizontal and vertical integration of small-holder producer-marketers contribute to the sector's competitiveness (Carvalho et al., 2015; Figueiredo, 2006). Based on this, farmer cooperatives are strongly encouraged. Cooperatives can ensure a fair access to markets where the numerous small producers come together to supply processors with live fowls at an agreed price, ensuring profits for all producers. Access to an assured market is important for regular income generation and poverty reduction. Besides, these associations can liaise with suppliers of inputs such as day-old chicks, medicines, feed, veterinary services, etc. on behalf of producers. It is appropriate to have formal contract arrangements and negotiations with business partners. In the case of the post-production poultry value chain in Senegal, processors and distributors of processed chicken must ensure that there is a formal contract agreement between themselves and their customers (retailers). This also necessitates a functioning legal system before which contractual disputes can be resolved.

3.2.9 Cost structure

Upgrading activities in the value chain can be confronted with challenges including costs, especially in the case where existing assets need to be replaced when adopting a new business model. Adding value to chicken (including packaging and labelling) will definitely come at a cost to the processor. Moreover, acquiring good vans

with refrigerators for the distribution of processed products also is a set cost. As already mentioned, these investments require a functioning business credit system in Senegal. Apart from investments into the technical infrastructure, hiring personnel would be another cost factor. Last but not least, processing demands more electricity and space (for vans, fridges and deep freezers). These items definitely add to the cost structure. Nevertheless, as output and sales expand, firms benefit from economies of scale to break even and make profits.

3.3 Ensuring an effective post-production broiler meat value chain

In this section, we present an overview of how the post-production broiler value chain can work effectively. First and foremost, the capital intensity of activities required for an upgraded post-production chain implies financial investments. Both local and foreign individuals and business entities could be encouraged to invest in processing, distribution and marketing of chicken meat. An option would be that the government of Senegal attracts international companies by offering them business operating convenience, business facilities, and tax and regulatory advantages. These investors could either buy fowls directly from producers for processing or secure them through contract-farming arrangements (Figure 4). Based on the individual financial capacity of these processors, some form of pre-finance of producers in the form of input supplies (day-old chicks, feed, drugs, etc.), training and skills development could be very beneficial. Firstly, it could contribute to an expansion in the operation of producers in terms of scale of production, productivity, and efficiency which leads to an increased supply of chicken meat at lower consumer prices. This would render chicken meat more accessible to poorer households and promote food and nutrition security in Senegal. Secondly, it can ensure a sustainable supply of fowls for processing, allowing investors to operate at a full capacity. Processors and distributors can then look beyond the domestic market to supply processed chicken meat to neighbouring West African nations (Gambia, Guinea, Guinea-Bissau, Mauritania, Mali, etc.).

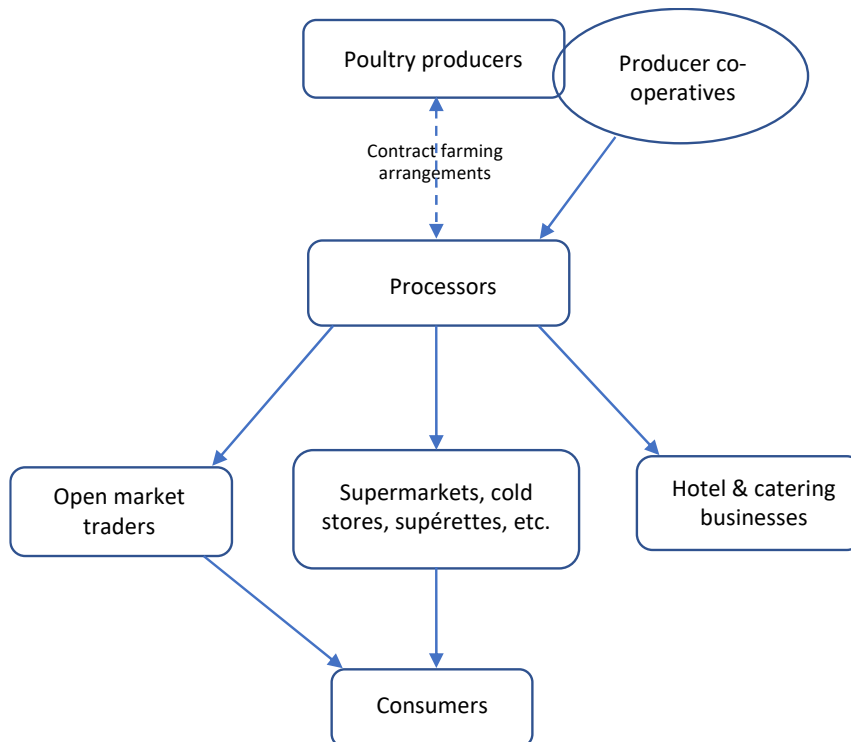


Figure 4. A simple illustration of value addition & partnerships in the chain. Source: Authors’ own illustration

4 Conclusions

After banning imports of frozen poultry meat in 2006, the Senegalese domestic poultry industry developed rapidly to meet consumers' demand for poultry meat. Furthermore, increasing urbanization and population are boosting the demand for chicken meat in the country. However, our study shows that only the chicken production industry witnessed growth and some form of advancement in the use of improved technologies while the post-production chain remains largely underdeveloped. Processing and cold storage are not so common. Moreover, sale of chicken meat in open markets in the absence of cooling facilities is often compensated by treating the chicken with chemicals such as formalin hence exposing consumers to health risks. The large majority of chicken are sold live and in few cases in slaughtered whole dressed form.

Dwelling on the business model canvas (Osterwalder & Pigneur, 2010), we provide suggestions for improvement. Processing and marketing activities must complement the growing success of poultry producers. Moreover, a functioning poultry value chain – from production to consumption – would enhance the sector's resilience and contribute to its independence. Further, an upgrade of activities at the level of processing and marketing could improve profits of actors. Besides, a continuous cold chain is of highest importance in offering consumers with safe and healthy meat. In addition to food safety, the marketing of chicken parts (chilled or frozen) is a more convenient product and would allow poorer families to have greater access to affordable chicken meat.

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