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Analysis of broiler chicken meat supply chain in Sukoharjo Regency, Central Java

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ABSTRACT

Introduction: The broiler chicken industry plays a vital role in fulfilling the animal protein needs of the people in Sukoharjo Regency, Central Java. Despite high production levels, challenges in the supply chain remain, particularly in pricing disparities between producers and consumers. The purpose of this study was to analyze the supply chain of broiler chicken meat in Sukoharjo Regency, Central Java. **Methods**: A descriptive analytical method was employed, utilizing both primary and secondary data. The analysis uses FSCN (Food Supply Chain Network) framework and performance metrics such as marketing margins and farmer's share. Data were collected through interviews with 40 farmers and 12 supply chain institutions, supplemented by secondary data from local agencies. **Results**: Three supply chain channels were identified: Channel 1 (Farmers → Partner Companies → Brokers → Wholesalers → Retailers → Consumers), Channel 2 (Farmers → Partner Companies → Brokers → Wholesalers → Consumers), and Channel 3 (Farmers → Partner Companies → Brokers → Retailers → Consumers). Results showed that Channel 2 had the lowest total marketing margin (IDR 11,973/kg) and the highest farmer's share (61.76%), indicating greater efficiency. Key challenges included price volatility, fragmented coordination, and limited government support. **Conclusion**: Based on farmer's share and marketing margin analysis, channel 2 is the most efficient channel. The study recommends comprehensive upgrading strategies, including improving feed quality (product), adopting digital data management (process), and implementing livestock insurance (functional) to enhance supply chain resilience.

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INTRODUCTION

The number of Indonesia's population has increased significantly. According to BPS data (2023), the total population of Indonesia in 2021 was 272.68 million people, then increased to 275.77 million people in 2022. The increase in population has an impact on the food needs of the community, which has increased. People consume food to meet the nutritional needs of the body. One of the ingredients needed by the body is protein. According to FAO (2023), there are two types of protein, namely vegetable protein and animal protein. Vegetable protein is protein that comes from plants, such as fruits, vegetables, and nuts, while animal protein is protein that comes from animals, such as fish, chicken, and cows.

Broiler chicken meat is one of the animal commodities that is favored by the public for consumption because the protein content is quite beneficial for the body. According to Sangadji *et al.,* (2019), it is argued that the protein contained in high quality chicken meat is easy to digest, easily absorbed, and contains a complete amount of essential amino acids in large quantities compared to other animals other than poultry. According to BPS data (2023), Central Java Province is the province that produces the most broiler chicken meat. This dominance is reflected in the significant yearly increase in production, where broiler chicken meat production rose from 604,218 tons in 2020 to 621,718 tons in 2021, and reached 742,948 tons in 2022. The production rate of broiler chicken meat is increasing due to the consumer demand that tends to increase. The consumption of Broiler chicken meat by the community will continue to increase every year considering several factors, one of which is the increase in population (Aryani & Jember, 2019).

Sukoharjo Regency in Central Java promotes Broiler chicken meat as a key source of animal protein. Although broiler chicken meat is a leading livestock commodity, its yearly production fluctuates (Murti *et al.,* 2020). According to BPS data (2023), broiler chicken meat production in Sukoharjo Regency varies annually. Recorded data shows a fluctuating trend: production stood at 9,134 tons in 2018, dropped to 8,011 tons in 2019, slightly increased to 8,107 tons in 2020,

fell back to 8,011 tons in 2021, and rose again to 8,261 tons in 2022. This fluctuation indicates instability in local supply. The Ministry of Agriculture (2019) states that broiler chicken farms face issues like raw material supply problems, unequal market structure, and suboptimal business partnerships. A system is required to integrate the production, delivery, storage, distribution, and sales processes to meet consumer demand effectively.

This fluctuating production trend highlights instability within the local supply chain. The Ministry of Agriculture (2019) states that broiler chicken farms face issues like raw material supply problems, unequal market structure, and suboptimal business partnerships. A system is required to integrate the production, delivery, storage, distribution, and sales processes to meet consumer demand effectively.

In 2021, the main issue for consumers buying broiler chicken meat is its price (Maulana *et al., 2021)*. The price increase is due to public demand and inappropriate stock inventory. The rise in Broiler chicken meat prices can create significant issues in the supply chain, notably the large price disparity between breeders and consumers. Farmers already have a contract with the core company that has agreed on the price of harvest and inputs, if the price of chicken meat increases, the farmer will not benefit from the increase in the selling price because it is bound by the agreed price contract, while the chain institution can get greater profits from higher sales. This price difference results in an uneven distribution of profits to each supply chain actor (Panjaitan *et al.,* 2019).

Several previous studies have discussed the broiler chicken industry from different perspectives. (Diwan *et al.,* 2015) highlighted its agribusiness potential, Sangadji *et al.,* (2019) focused on meat quality, and Maulana *et al.,* (2021) examined price instability. Other studies, such as Panjaitan (2019) and Guritno and Harsasi (2019), emphasized the need for an efficient supply chain. However, these studies have not specifically analyzed the supply chain structure, performance, and upgrading strategies using an integrated approach like the FSCN framework, particularly in Sukoharjo Regency. This study aims to fill these gaps by analyzing the broiler chicken meat supply chain in Sukoharjo Regency using the FSCN framework and performance indicators, while also formulating practical upgrading strategies to improve supply chain efficiency and farmer welfare.

A supply chain can be said to be effective and efficient will benefit business actors and end consumers, because the supply chain is well connected to each other (Guritno and Harsasi, 2019). Supply chain analysis research is essential to assess the condition and performance of the Broiler chicken meat supply chain, forming the basis for alternative improvement efforts. The objectives of this study are explicitly formulated to provide a comprehensive understanding and improvement strategy for the broiler chicken meat supply chain in Sukoharjo Regency. Specifically, this study aims to identify and describe the structure and institutional arrangements of the broiler chicken meat supply chain in the research area. Furthermore, the study seeks to analyze the performance of the supply chain by measuring the marketing margin at each supply chain actor and calculating the farmer's share to assess marketing efficiency. Based on this performance analysis, the research aims to determine the most efficient marketing channel for broiler chicken meat in Sukoharjo Regency. Finally, this study intends to formulate concrete upgrading strategies to improve the performance of the supply chain, which includes product upgrading, process upgrading, and functional upgrading, in order to enhance supply chain efficiency and farmer welfare.

METHODS

The basic method used in the study is the analytical descriptive research method. The descriptive method is a method that studies the state of an object, thought system, or group of current events from a group of people. According to Widodo and Rofiqoh (2020), analytical descriptive research takes problems or focuses on problems as they are when the research is carried out, the results of the research are then processed and analyzed to draw conclusions.

The location determination method in this study was carried out deliberately or *purposively*. According to Igga *et al.,* (2019), the method of deliberately determining the location is the determination of the sample area that is taken intentionally based on certain considerations. Polokarto District, Bendosari District, and Nguter District were selected as the research locations due to their significant populations of broiler chickens in Sukoharjo Regency.

This study sampled 40 Broiler chicken farmers. Determination of the number of farmer samples in each sub-district using the *proportional random sampling*. Polokarto District has 29 farmers, Bendosari District has 7 farmers, and Nguter District has 4 farmers. A sample of broiler chicken farmers will be selected using the method of simple random sampling. According to Priadana & Sunarsi (2021) *simple random sampling* It is a selection of sample size where each member of the population has the same opportunity to be selected as a sample member.

Method of determining a sample of respondents through marketing agency channels by snowball *sampling.* Lenaini (2021) defines *snowball sampling* as a method where respondents recruit other participants, often used to describe social or communication patterns. The number of respondents from this marketing agency is 50% of the total number of chain institutions obtained by 12 chain institutions consisting of partner companies, brokers, wholesalers, and retailers.

Primary data was obtained from the results of direct interviews with respondents and secondary data used came from journals, books, references related to this research topic, and agencies. Agencies related to this study are the Central Statistics Agency of Sukoharjo Regency and the Sukoharjo Regency Agriculture Office. Data collection techniques in this study were carried out through observation, interviews, recording, and documentation. The observation conducted was non-participant observation, where the researcher directly observed the conditions of broiler chicken farms, the facilities used, and the distribution process along the supply chain without actively participating in the activities. This allowed the researcher to understand the actual conditions of farming practices and supply chain operations. Interviews were conducted using a structured and semi-structured approach. Structured interviews were applied to obtain quantitative data such as production amounts, prices, and marketing margins, while semi-structured interviews were used to explore qualitative aspects such as challenges faced by farmers, the role of partner companies, and perceptions of supply chain efficiency.

Data analysis methods

1. Supply chain analysis

This study employs the Food Supply Chain Network (FCSN) framework, as modified by Vorst (2006), for supply chain analysis. FSCN describes the condition of the supply chain and provides information on supply chain objectives, structure, management, resources, and business processes of the broiler chicken meat supply chain. According to Utami *et al.,* (2022), every part of the FCSN framework will be analyzed descriptively, except for the supply chain performance which will be analyzed quantitatively.

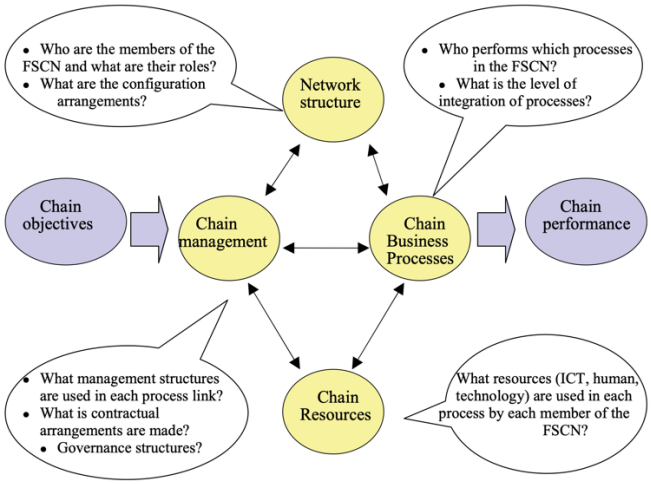


Figure 1. Supply chain analysis framework food supply chain network (FCSN) analysis
Source: (Vorst, 2006)

2. Supply chain performance analysis

Performance analysis of the broiler chicken meat supply chain measures and evaluates its efficiency (Hidayat *et al.,* 2017). This study analyzes the performance of the broiler chicken meat supply chain using Porter's value chain theory, focusing on the efficiency approach with marketing margin and farmer's share. The value chain of suppliers and distributors includes margins that are important to be separated in understanding the origin of the source of costs, because suppliers and distributors in the value chain get a margin that is part of the total cost borne by the buyer (Pranata & Marianti, 2017).

1) Marketing Margin

Marketing margins are calculated based on the subtraction of the selling price by the purchase price in each chain channel pattern. Marketing margins can also be calculated through the costs incurred by each member of the supply chain and the profits obtained by each member of the supply chain as a contribution given. The following is the formula for calculating marketing margin (Jumiati, 2013).

$$Mi = Psi - Pb \text{ or } Mi = Ci + \pi i$$
$$Psi - Psb = Ci + \pi i$$
$$PI = Psi - Pbi - Ci$$
$$MT = \Sigma Mi$$

Information:

Mi = Margin at the i th breed chicken meat marketing institution
Psi = Selling price at the i th breed chicken meat marketing institution (Rp/kg)
Pbi = Purchase price at the i th breed chicken meat marketing institution (Rp/kg)

P_i = Profits obtained by the i th breed chicken meat marketing institution (Rp/kg)
MT = Total marketing margin for broiler chicken meat (Rp/kg)
Ci = Cost of the first level broiler chicken meat marketing institution (Rp/Kg)
I = 1,2,3..... (n)

The value of marketing costs and profits will affect the marketing margin. The higher the marketing margin, the more inefficient the chain channel system is. Likewise, the higher the marketing margin, the smaller the share received by producers (farmer's share) (Apurwanti *et al.,* 2020).

2) Farmer Share

The value of the farmer's share is the opposite of the value of the marketing margin. The greater the value of the farmer's share, the smaller the marketing margin value. Farmer's share is formulated as follows (Asmarantaka, 2014):

$$Fs = x\ 100\% \frac{Pf}{Pr}$$

Information:
Pr = price at the consumer level (Rp/kg)
Pf = price at the farmer level (Rp/kg)
Fs = percentage of price received by the farmer (%)

Farmer's share is considered efficient if Broiler chicken farmers receive over 60% of the consumer price. Then, if the selling price of producers is less than 60% of the price at the consumer level, then the marketing of Broiler chicken meat has not been said to be efficient. The farmer's share value decreases as the marketing margin increases (Pangemanan *et al.,* 2022).

3. Supply chain upgrading

The upgrading of Broiler chicken meat supply chain in this study refers to the results of supply chain analysis with FSCN and measurement of supply chain performance by adding chain added value. According to Li *et al.,* (2010), the results of the FSCN can find some common problems in the supply chain, such as problems with performance indicators, network structure, and some data in the supply chain network. The concept of good supply chain management includes the integration of business processes from the end user to the initial supplier that provides products, services, and information to provide added value for consumers and other stakeholders (Munawir *et al.,* 2018; Lambert & Cooper, 2000). According to Kaplinsky & Morris (2002) in Wicaksana (2022), there are three forms of upgrading, namely in terms of product upgrading, process upgrading, and functional upgrading along the value chain of an agribusiness commodity.

RESULTS AND DISCUSSION

General conditions of broiler chicken farms in Sukoharjo Regency

Broiler chicken farming in Sukoharjo Regency operates using a core plasma partnership model. This partnership pattern is carried out between the partner company who plays the role of the core, then the farmer who plays the role of plasma (Febrianto *et al.,* 2023). Each company employs several breeders who raise broiler chickens until they are ready for processing. There are several companies operating in Sukoharjo Regency, including PT. Gema Usaha Ternak, CV. Bengawan, CV. Unggas Makmur Indonesia, and PT. Nusantara Unggas Jaya. Breeders raise Broiler chickens according to company standards.

General conditions of supply chain

The general condition of the supply chain is analyzed with the FSCN approach which consists of supply chain objectives, supply chain management, supply chain structure, supply chain resources, and supply chain business processes.

1. Chain goals

Supply chain targets are goals set for the Broiler chicken meat supply chain. The Broiler chicken meat supply chain in Sukoharjo Regency focuses on both market targeting and development goals.

A. Target market

The primary target market for broiler chicken meat in Sukoharjo Regency is the local market within Sukoharjo Regency. Broiler chicken meat from Sukoharjo Regency is sold only in traditional markets. Modern markets in Sukoharjo Regency primarily offer Broiler chicken meat, although the supply is limited. As a result, consumers often need to visit traditional markets to obtain chicken meat.

B. Development goals

Development goals are goals that are to be achieved by developing something common in the supply chain. This form of development can be in the form of creating coordination, collaboration, and the use of technology that can

improve supply chain performance. The primary objective of the broiler chicken meat supply chain is to enhance production levels and reduce the risk of failure, particularly for farmers. Broiler chicken farming faces challenges such as disease risk and frequent climate changes. Strengthened by the statement of Junaedi *et al.,* (2024) which stated that air temperatures above the optimal range will affect feed patterns and livestock activities, which is characterized by a decrease in appetite in chickens, resulting in broiler chickens becoming stressed. Based on this, many farmers choose to use closed cages equipped with modern technology. The Broiler chicken meat supply chain's success depends on effective communication and collaboration. All members of the supply chain strive to maintain consumer satisfaction, by maintaining the quality of the meat marketed.

2. Supply chain structure

The institutional structure of the Broiler chicken meat supply chain is examined by analyzing its constituent members and their respective roles within the supply chain.

A. Supply chain institutional structure

The organizational framework of the broiler chicken meat supply chain in Sukoharjo Regency can be examined by analyzing the participating chain members. The Broiler chicken meat supply chain in Sukoharjo Regency consists of breeders, partner companies, brokers, wholesalers, and retailers.

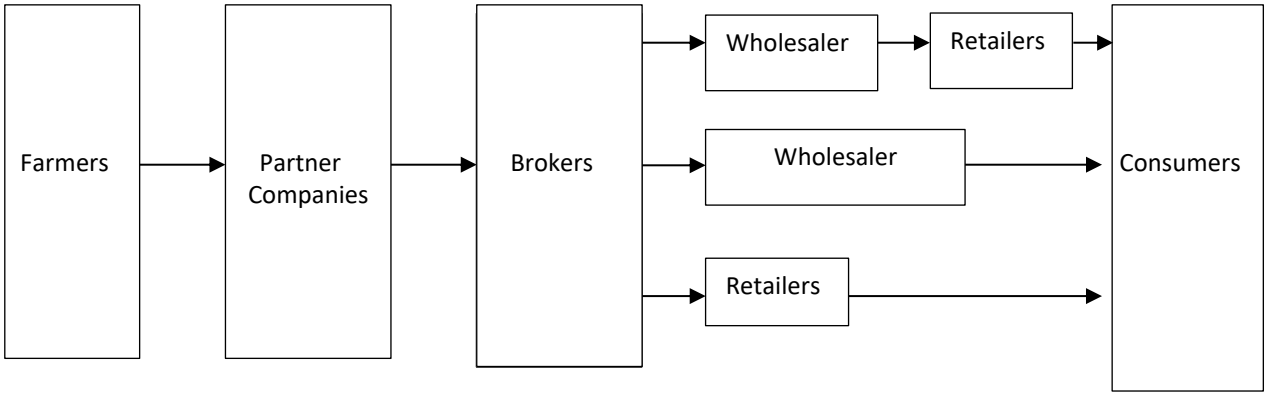


Figure 2. Structure of the chicken meat supply chain in Sukoharjo Regency
Source: Primary Data, (2024)

Based on the results of the field study, there are three distinct marketing channels observed in the distribution process:

Channel 1 = Farmers – partner companies – brokers – wholesalers – retailers – consumers.
Channel 2 = Farmers – partner companies – brokers – wholesalers – consumers.
Channel 3 = Farmers – partner companies – brokers – retail traders – consumers.

The existence of these three channels reflects the complexity and flexibility of the supply chain structure in Sukoharjo Regency. Each channel represents an alternative route through which broiler chicken meat reaches consumers, depending on market conditions, actor relationships, and logistical considerations.

Channel 1 is the most complete and involves the highest number of intermediaries. In this channel, products flow through wholesalers and retailers before reaching consumers. This structure is common in traditional markets where products undergo sorting, storage, and retailing processes to serve small-scale consumers. Channel 2 presents a more efficient distribution route where wholesalers sell directly to consumers, often to large buyers such as food service businesses or bulk consumers. This reduces the number of intermediaries and can lower distribution costs. Channel 3 allows for a more direct connection between brokers and retail traders, enabling products to be sold quickly to end consumers through traditional market stalls. This channel is often chosen to meet immediate consumer demand in local markets.

The presence of three channels is influenced by several factors, including differences in consumer segments, the marketing capacity of each actor, trust and cooperation between intermediaries, and logistical efficiency. The main divergence point in the structure occurs after the broker level, where products may flow to wholesalers or directly to retailers depending on market needs.

In this structure, the partner companies and brokers serve as central connecting actors between the upstream (farmers) and downstream (wholesalers, retailers, consumers) segments of the supply chain. Partner companies coordinate production, supply inputs, and set purchase agreements with farmers, while brokers facilitate market linkages by connecting products to wholesalers and retailers.

B. The role of supply chain members

Supply chain members handle marketing tasks like sales, storage, processing, and transportation. They also sort, bear risks, finance, and provide market information, though not all members do every task.

Table 1. Marketing Functions of Broiler Chicken Meat Supply Chain Members in Sukoharjo Regency Across Each Distribution Channel

Channels and Supply Chain Members	Marketing Functions								
	Exchange		Physical				Facilities		
	Buy	Sell	Save	If	Transport	Sorting	Risk	Cost	Market Info
Channel I									
Farmers	P	P	X	X	X	P	P	P	P
Partner Companies	P	P	X	X	X	X	P	P	P
Brokers	P	P	X	X	X	X	P	X	P
Wholesalers	P	P	P	X	X	X	P	P	P
Retailers	P	P	P	P	P	X	P	P	P
Channel II									
Farmers	P	P	X	X	X	P	P	P	P
Partner Companies	P	P	X	X	X	X	P	P	P
Brokers	P	P	X	X	X	X	P	X	P
Wholesalers	P	P	P	P	P	X	P	P	P
Channel III									
Farmers	P	P	X	X	X	P	P	P	P
Partner Companies	P	P	X	X	X	X	P	P	P
Broker	P	P	X	X	P	X	P	P	P
Retailers	P	P	P	P	P	X	P	P	P
P : Performing Marketing Functions									
X : Not Performing Marketing Function									

Source: Primary data analysis, 2024

Table 1 illustrates the marketing functions performed by each actor in the broiler chicken meat supply chain across different distribution channels in Sukoharjo Regency. The marketing functions include exchange functions (buying and selling), physical functions (storage, transportation, sorting), and facilitating functions (risk-bearing, cost management, and market information sharing).

In Channel I**,** which involves farmers, partner companies, brokers, wholesalers, retailers, and consumers, the marketing functions are more evenly distributed. Farmers and partner companies primarily perform exchange functions such as buying and selling, along with basic physical functions like storage. Brokers also engage in exchange functions but do not perform physical functions such as transportation and sorting. Wholesalers and retailers play a more comprehensive role, performing both exchange and physical functions, with retailers being the most complete in terms of marketing activities, including sorting, storage, transportation, and providing market information.

In Channel II**,** the structure is shorter as retailers are excluded. Similar to Channel I, farmers and partner companies primarily perform exchange functions. Brokers also focus on buying, selling, and providing market information but do not engage in physical functions. Wholesalers in this channel carry out nearly all key functions, including storage, transportation, sorting, risk management, and providing market information, reflecting their central role in product distribution to consumers.

In Channel III**,** products move from farmers to brokers and directly to retail traders. Farmers and partner companies continue to perform basic exchange functions. Notably, brokers in this channel perform additional physical functions, including transportation and risk management, which are absent in Channels I and II. Retailers, similar to Channel I, perform a wide range of functions, including storage, transportation, sorting, and risk management.

The differences across channels indicate that the division of marketing functions depends on the structure and length of the distribution channel**.** In longer channels, like Channel I, marketing functions are more segmented among various actors. In shorter channels, such as Channels II and III, downstream actors like wholesalers or retailers take on more responsibilities to ensure the product reaches consumers efficiently.

3. Supply chain management

The broiler chicken meat supply chain management in Sukoharjo Regency includes partner selection, contract systems between members, and government support.

A. Partner selection

The selection of partners is important to consider because the success of a business is also determined by the performance of partners. According to Sukri & Pathiassana (2022), responsible and well-performing partners are needed to support the supply chain to achieve its goal, which is to meet consumer satisfaction. Research indicates that Broiler chicken farmers partner with companies due to a sense of trust. Trust develops due to mutual need and benefit between farmers and partner companies, leading farmers to cooperate by selling live broiler chickens from their farms. Partner companies work with anyone willing to pay for the harvest in cash, without special criteria for brokers. The broker does not set criteria for conducting cooperation with wholesalers and retailers. Brokers only rely on a sense of trust and willingness to be satisfied, because they have become regular customers either long-term or short-term.

B. Supply chain contracting system

A contractual agreement is a contract that contains everything that has been agreed between parties who partner or cooperate either formally or informally. This is in line with the opinion of Rasoki and Nurmalia (2021), contractual agreements function in the long term to provide limits and responsibilities that must be carried out by each partner. Agreements made between farmers and partner companies on all chain channels, are carried out through formal contracts in writing that can be accounted for under applicable law.

The farmer's agreement with the partner company regulates the selling price, payment system, and cost of sapronak. Marketing agencies in all broiler chicken meat supply chains make agreements informally through oral communication. The agreement between each marketing agency is related to price, delivery time, quantity, and payment system.

C. Government support

The Sukoharjo Regency government has done little to enhance supply chain management. The government has established a broiler chicken farming group in Sukoharjo Regency since 2019. However, it turns out that this livestock group has become inactive again due to the pandemic and less active members. Government support related to the supply chain is provided by partner companies with the import of animal feed. This is in accordance with the opinion of Sritiasni *et al.,* (2021), the limited availability of feed with a livestock population, causing Indonesia to have to import feed from other countries. The government imports animal feed to lower prices and reduce production costs for farmers and partner companies.

4. Chain resources

Supply chain resources are essential for supporting business activities within the broiler chicken meat supply chain in Sukoharjo Regency. Chain resources include physical resources, technological resources, human resources, and capital resources.

A. Physical resources

Farmers have broiler chicken cages of various sizes and setups, as well as feeding and watering equipment. The physical resources owned by partner companies include offices, warehouses, chicken coops, scales, and transportation. Meanwhile, the physical resources owned by brokers and wholesalers are in the form of means of transportation, slaughterhouses, *portable* cages, and scales. The physical resources that retailers have are the only stalls in the market.

B. Technology resources

The technological tools used by farmers in the broiler supply chain are used during both the growing and post-harvest stages. These include blowers, water pumps and generators. The technological resources used by wholesalers and retailers are automated lathes. The use of information technology is used by all actors in the supply chain in the form of mobile phones and the Internet. Cell phones and the Internet are used as a means of communication between each actor in the supply chain. The technology is also used to find information related to the current condition of broiler chickens in general, both prices and renewable breeder chicken farming methods.

C. Human resources

Human resources are one of the most important aspects because people play the role of the main actors that drive the supply chain. The human resources used by the breeders are a worker and managed by themselves, which means that the owner of the farmer is also a worker. The work includes daily care of individual chickens, cage maintenance and post-harvest, while during harvest the owner hires daily labor. The human resources owned by partner companies and brokers are labor as drivers to help deliver inputs for partner companies and collect farmers' crops for brokers. The human resources employed by wholesalers and retailers are not much, as retailers only sell products directly to the end consumer. Traders are assisted by family labor in slaughtering and cleaning chickens, while they can do it themselves in collecting and selling chickens from farmers.

D. Capital

The capital resources of all members of the supply chain are their own. Farmers do not borrow from formal financial institutions because of the complexity of the application process and the fear of collateral requirements and the inability to repay the loan. Farmers only spend initial capital on barns and equipment. Capital for marketing institutions (partner companies - retailers) does not require external loans, because the turnover of sales capital is fast and smooth enough not to be an obstacle in the business.

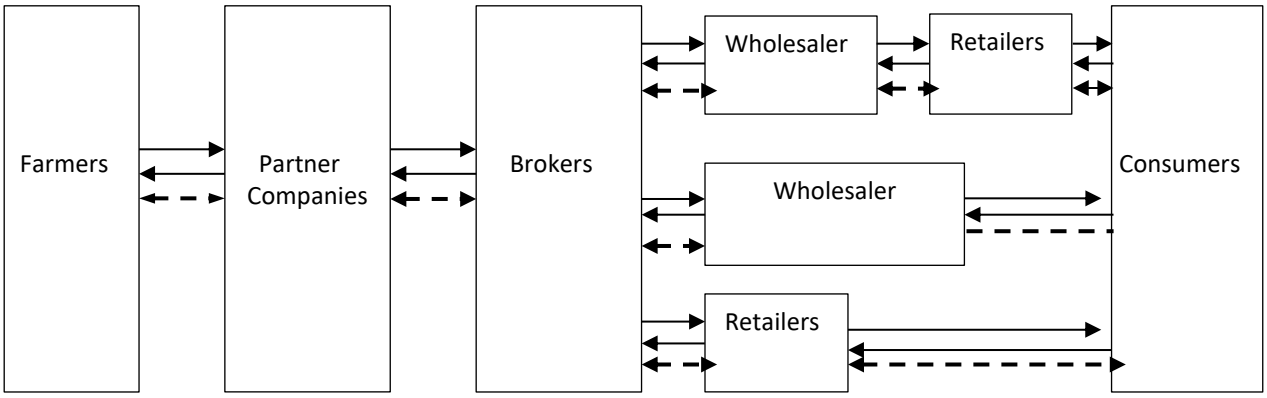
5. Supply chain business process

The business chain process describes the entire process along the supply chain of broiler chicken meat in Sukoharjo Regency. The things discussed in the chain business process include distribution patterns and risk aspects along with risk mitigation.

A. Distribution patterns

The distribution pattern in the Broiler Chicken Eggs supply chain explains how product flows, financial flows, and information flows occur between each member of the supply chain.

1) Product Flows



Note: : Product flow
: Financial flow
: Information flow

Figure 3. Supply chain of broiler chicken meat products in Sukoharjo Regency
Source: Primary data, (2024)

The product flow in the broiler chicken supply chain moves from farmers to end consumers through several intermediaries. Farmers raise chickens under contract with partner companies, which coordinate harvesting once the chickens reach market weight. The harvested chickens are then distributed by brokers to either wholesalers or retailers, depending on the marketing channel. In Channel 1, brokers sell to wholesalers who then supply retailers before reaching consumers. In Channel 2, wholesalers directly sell to consumers, while in Channel 3, brokers deliver chickens straight to retail traders for final sale. Throughout this process, the product undergoes physical changes, including slaughtering and cleaning, especially at the wholesaler and retailer levels.

Product flows change in form, ownership, location, and time. Products in this supply chain are in the form of live broiler chickens into fresh broiler chicken meat ready for sale. The flow of this product starts with chicken farmers, who grow the chickens for ±35 days and then check if the weight of the chicken meets the criteria. If it is appropriate, the farmer contacts the partner company to carry out the harvesting process. Partner companies contact brokers to find traders willing to remarket the animal products. In product channels 1 and 2, the process of harvesting broiler chickens is carried out by farmers with direct wholesalers, while in product channel 3, brokers take their own chicken harvest to farmers. Farmers catch, weigh and load the birds into portable cages on pickup trucks.

The next process in product channels 1 and 3 is for brokers and wholesalers to deliver the live chickens to retailers for further processing before being sold to consumers. This is in contrast to product channel 2, where wholesalers process the live chickens themselves. The process of slaughtering chickens at wholesalers and retailers is still manual per chicken. After that, retailers will market in the morning at kiosks or traditional markets, while wholesalers will deliver to industrial consumers.

2) Financial Flows

Financial flows flow from consumers to producers. As Husnarti and Handayani (2021) argue, financial flows are also unidirectional, but unlike product flows. There are two types of financial flows in the whole supply chain of broiler chicken meat in Sukoharjo Regency, namely direct payments and forward payments. Both payments were made in cash and transfer according to the agreement. This type of direct payment is made by consumers, wholesalers, retailers and brokers. The type of futures payment is made by the partner company to the farmer, usually the payment is paid after 2 weeks.

3) Information Flows

The flow of information distribution is a very important component to pay attention to in order to achieve the goals of the supply chain. According to Khairunnisa *et al.,* (2022), the good distribution of information among supply chain actors can create a good and transparent relationship so that it can increase trust and commitment in carrying out cooperative relationships. The flow of information is reciprocal from partner farmers to end consumers and vice versa.

The flow of information in the broiler chicken supply chain is bidirectional and involves the exchange of key data related to production, demand, prices, and delivery schedules. Farmers provide partner companies with updates on livestock growth, mortality rates, and readiness for harvest. In turn, partner companies inform farmers about input availability, technical guidelines, and harvesting timelines. Brokers receive product availability information from partner companies and communicate market prices, buyer demand, and delivery requirements to wholesalers and retailers. Downstream actors, such as wholesalers and retailers, relay consumer preferences, sales volumes, and price trends back to brokers and upstream actors.

B. Risk Mitigation Aspects

Risks in the broiler chicken supply chain in Sukoharjo Regency occur in each member of the broiler chicken supply chain. Each member of the supply chain has its own method to prevent losses.

Table 2. Risks and mitigation of broiler chicken meat supply chain members

Actors	Risk Aspects	Risks faced	Risk Mitigation
Famer's	Business and finance	Crop failure	Conduct direct supervision and action if there are sick livestock.
	Price and market	Rising electricity costs	Using electronic devices that save electricity.
	Production	Livestock deaths due to disease and climate	Giving vaccines, vitamins, and medicines. In addition, supervision of the temperature of the cage is also carried out.
Partner Companies	Business and finance	Crop failure from partner farmers	Providing extension workers to farmers which is carried out regularly to maximize crop yields.
	Price and market	Increase in sapronak prices	Preparing sapronak stock once a season to prevent when the price of sapronak suddenly increases.
Broker	Business and finance	Crop failure from partner farmers	Not offering a small yield to wholesalers, but offering those yields to retail traders
	Price and market	Increase in fuel oil (BBM) prices	Increasing the selling price of chicken to cover transportation costs
Wholesalers	Business and finance	Business competition	Establish strong relationships with retailers, retailers and consumers
	Price and market	Increase in fuel oil (BBM) prices	Increasing the selling price of chicken to cover transportation costs
	Production	Lack of stock availability	Looking for crops from independent or non-partnership Broiler chicken farmers.
Retailers	Business and finance	Declining consumer interest	Lowering the selling price of products even though the profit is small
	Production	Lack of stock availability	Looking for crops from independent or non-partnership Broiler chicken farmers.

Source : Primary Data, 2023

Table 2 presents the key risks and mitigation strategies faced by actors in the broiler chicken meat supply chain. Farmers face production risks such as livestock mortality due to disease and climate, mitigated through vaccination and temperature control. They also respond to crop failure with close supervision and reduce electricity costs using energy-

efficient devices. Partner companies manage crop failure risks by deploying extension workers and address rising sapronak prices through seasonal stockpiling. Brokers handle crop shortfalls by selling to retail traders and adjust chicken prices to offset fuel cost increases. Wholesalers mitigate business competition by building strong relationships with buyers and address stock shortages by sourcing from independent farmers. Retailers respond to declining consumer demand by lowering prices and manage limited stock similarly by turning to non-partnered suppliers. These strategies highlight the need for improved coordination and institutional support to enhance supply chain resilience.

Supply chain performances

The performance of broiler chicken supply chain in Sukoharjo Regency is measured by marketing efficiency. The calculation of marketing efficiency can be used to determine the performance of the supply chain because there are marketing activities by each member of the supply chain in marketing their products to the next member of the supply chain. Marketing efficiency is analyzed by marketing margin and farmer's share.

A. Marketing margin

The marketing margin of each member of the supply chain can be obtained from the difference between the selling price of the product and the purchase price of the product. Marketing margins reflect the costs incurred and the profits earned by each member of the supply chain (Melinda *et al.,* 2024). The following is a table analyzing the marketing margin of broiler chicken meat in Sukoharjo Regency.

Table 3. Analysis of marketing margins of broiler chicken meat in Sukoharjo Regency.

It	Description	Channels		
		1 (Rp/kg)	2 (Rp/kg)	3 (Rp/kg)
1	Peternak			
	Selling Price	18,850	18,527	18,800
	Marketing Costs			
	Workforce	39	40	41
	Tax	17	18	21
	Total Marketing Costs	56	57	62
2	Partner Companies			
	Purchase Price	18,850	18,527	18,800
	Selling Price	19,900	19,500	19,600
	Marketing Costs	-	-	-
	Total Marketing Costs	-	-	-
	Advantage	1,050	973	800
	Margin	1,050	973	800
3	Broker			
	Purchase Price	19,900	19,500	19,600
	Selling Price	21,000	20,800	24,000
	Marketing Costs			
	Transportation	-	-	136
	Workforce	-	-	64
	Tax	-	-	9
	Total Marketing Costs	-	-	209
	Advantage	1,100	1,300	4,191
	Margin	1,100	1,300	4,400
4	Wholesalers			
	Purchase Price	21,000	20,800	-
	Selling Price	24,000	30,500	-
	Marketing Costs			
	Transportation	188	500	-
	Workforce	43	63	-
	Pemotongan	-	313	-
	Storage	-	375	-
	Electricity	-	94	-
	Tax	25	38	-
	Total Marketing Costs	255	1,381	-
	Advantage	2,745	8,319	-
	Margin	3,000	9,700	-
5	Retail Merchants			

It	Description	Channels 1 (Rp/kg)	2 (Rp/kg)	3 (Rp/kg)
	Purchase Price	24,000	-	24,000
	Selling Price	32,500	-	31,000
	Marketing Costs			
	Transportation	-	-	-
	Workforce	250	-	200
	Pemotongan	375	-	400
	Storage	625	-	600
	Electricity	125	-	100
	Tax	163	-	140
	Total Marketing Costs	1,538	-	1,440
	Advantage	6,963	-	5,560
	Margin	8,500	-	7.000
6	User			
	Purchase Price	32,500	30,500	31,200
Total Marketing Costs		1,848	1,438	1,711
Total Profit		10,758	9,292	10,551
Total Margin		13,650	11,973	12,400

Source: Primary Data Analysis, 2024

Table 3 shows the marketing costs, profits and margins for each marketing institution in each marketing channel. Farmers and partner companies in all chain channels, as well as brokers in channels 1 and 2, have no marketing costs because they directly distribute broiler chickens to the next chain institution. Meanwhile, brokers in channel 3, wholesalers and retailers in each channel have marketing costs that vary in value. The marketing costs consist of cutting, transportation, and storage. The difference in marketing costs will cause a difference in selling prices by chain institutions. This is consistent with the findings of Wowiling *et al.,* (2018), the difference in the amount of marketing costs that must be incurred by chain institutions will cause price differences, as each seeks to profit from the marketing process. The large total profit in Channel 1 is not primarily due to the number of intermediaries involved, but rather because the final selling price at the consumer level is the highest among the three channels, reaching IDR 32,500/kg. This high consumer price enables each actor in the supply chain—partner companies, brokers, wholesalers, and retailers—to obtain a significant margin, which cumulatively results in the highest total profit of IDR 10,758/kg. Therefore, the key driver of the large total profit in Channel 1 is the elevated end-market price, not the structural length of the supply chain. This finding highlights the importance of consumer price in influencing profit accumulation across all actors in the channel. Chain channels 2 and 3 are the shortest among the three channels. According to (Diwan *et al.,* 2015), the factors that cause the higher marketing margin of broiler chickens in breeders with end consumers are the length of the marketing chain of broiler chickens and the amount of costs incurred by the chain institution. Channel 2 gets the lowest marketing margin value because the marketing cost is relatively smaller compared to the marketing cost of channel 3.

B. Farmer's Share

Farmer's share is used as an indicator of marketing efficiency, which is used as a tool to analyze the performance of broiler chicken supply chain in Sukoharjo Regency. The increasing value of Farmer's Share reflects an increasingly efficient supply chain. The following is a table of Farmer's Share of Broiler Chicken Meat Supply Chain Channels in Sukoharjo Regency.

Table 6. Farmer's share on each broiler chicken meat supply chain channel in Sukoharjo Regency

Supply chain channels	Pricing in tier		*Farmer's Share* (%)
	Farmer (Rp/kg)	Consumer (Rp/Kg)	
Channel I	18.850	32.500	58
Channel II	18.527	30.000	61.76
Channel III	18.800	31.200	60.26

Source: Primary data analysis, 2024

The largest share of farmers in the marketing channel of broiler chicken in Sukoharjo Regency is found in channel 2, which is 61.76 percent. The farmer's share in channel 3 is 60.26 percent, while in channel III it is 58 percent. Based on the farmer's share analysis, it can be seen that channels 1 and 2 are the most efficient channels because they have a value of ≥60 percent. According to Sutrisno *et al.,* (2015), a marketing channel is said to be efficient if it meets the indicator, which is the price share received by producers of ≥60 percent. Then, the most efficient channel for farmers is marketing channel 2 with the highest value of farmer share compared to channels 1 and 3.

Supply chain upgrading

Supply chain upgrading aims to improve the performance, quality, and efficiency of the supply chain system. Upgrading the supply chain of broiler chicken meat in Sukoharjo Regency was analyzed using three types of upgrading, namely product upgrading, process upgrading, and functional upgrading. The following is an upgrading of broiler chicken meat supply chain that can be recommended.

1. Product upgrading

Based on the results of FSCN, it can be seen that product upgrading can be carried out on the FSCN element of chain management in the form of a contract agreement between farmers and partner companies. Farmers are not satisfied with the fulfillment of sapronak from partner companies that are considered to supply poor quality animal feed and DOC. Farmers want to improve the quality of DOC and feed from partner companies because there is still a high mortality rate from DOC and poor quality feed that can harm farmers. This is in line with the research conducted by (Widiawati *et al.,* 2020), which states that partner companies should improve the quality of chicken seed (DOC) and feed that meet the Indonesian National Standard (SNI). Farmers can increase the productivity of high quality, value-added broiler chickens and meet market demand.

2. Upgrading process

Based on the results of the FSCN, it can be seen that the upgrading process can be carried out on the FSCN element of chain resources in the form of technological resources used by all chain actors. The technological resources used in the chain are currently classified as less modern, especially in chain institutions in the distribution of products. So far, the distribution system has only been through the WhatsApp communication application. Distribution through WhatsApp is currently classified as less modern and less efficient. Partner companies as the first marketing institution, can replace WhatsApp with website creation. The use of the website as a modern solution, because it can contain all forms of information needed by the broker as a marketing intermediary. The use of the website can also control the cooperation between partner companies and farmers. Currently, farmers only use paper manuals provided by partner companies to fill in daily production data. Based on this, the use of the website can be used to enter production data on a daily basis in real time. An upgrade of the process can also be used by brokers and broiler meat traders. Up to now, brokers and traders have only used traditional notebooks. Based on this, efforts can be made to upgrade the process by adopting an administrative process that adapts application technology through mobile phones or computers. This is in line with the research conducted by Abidin *et al.,*(2015), which states that it is necessary to develop an application or website for the management of cultivation and administrative data to help companies run their businesses.

3. Functional Upgrading

Based on the results of FSCN analysis, it can be seen that functional upgrading can be carried out on FSCN elements of management and chain business processes, which are in the form of government support and risk mitigation aspects. Based on the results of the research, it can be seen that the role of government in the supply chain is very minimal. Functional upgrading efforts are directed at the government, which is expected to contribute to the supply chain by improving farmers' access to affordable and easy sources of finance. This is in line with the findings of Aulya, *et al.,* (2023) who explain that the problems experienced by poultry farmers are generally in the form of difficulty in accessing capital, so that the level of production is relatively low. Based on the results of FSCN, it can be known that one of the aspects of business and financial risk is the occurrence of crop failure, which is a major challenge in the broiler chicken meat supply chain. Due to the high impact of the risks that occur, functional improvement is needed with the hope that the government will play an important role in overcoming the risk of crop failure. The recommendation is to create an insurance program for chicken farmers that can protect against the risk of crop failure that threatens the supply chain. Studies have shown that agricultural and livestock insurance is an effective risk mitigation tool. Some studies emphasize that well-designed livestock insurance programs can stabilize farmer incomes and promote long-term sector sustainability (Meuwissen et.al., 2003; Dick & Wang. 2010).

CONCLUSION

The broiler chicken supply chain in Sukoharjo Regency operates effectively under the Food Supply Chain Network (FSCN) framework, focusing on meeting local market demands. Structurally, the chain consists of three distinct channels supported by sufficient physical, technological, and human resources. While supply chain management is strengthened by contractual agreements between farmers and partner companies, government support remains minimal. Business processes are generally smooth but still constrained by production and market risks. In terms of performance, Channel 2 proves to be the most efficient channel, recording the lowest marketing margin (IDR 11,973/kg) and the highest farmer's share (61.76%). To further enhance efficiency and resilience, this study recommends specific upgrading strategies: product upgrading through improved DOC and feed quality; process upgrading by adopting websites and applications for administrative and marketing activities; and functional upgrading through the provision of capital assistance and livestock insurance programs to mitigate risks.

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