

sktp-13-03-2023 02\_49\_23-  
214449

*by Rima Azara, Stp, Mp*

---

**Submission date:** 24-Mar-2023 09:43AM (UTC+0700)

**Submission ID:** 2045021401

**File name:** sktp-13-03-2023\_02\_49\_23-214449.pdf (499.53K)

**Word count:** 3544

**Character count:** 18958

PAPER · OPEN ACCESS

## Analysis of The Efficiency of Value Chain on Livestock (Case Study: Chicken Meat)

4

To cite this article: Hana Catur Wahyuni *et al* 2022 *IOP Conf. Ser.: Earth Environ. Sci.* **1104** 012046

View the [article online](#) for updates and enhancements.

You may also like

- [Occurrences of \*Salmonella\* spp. and \*Escherichia coli\* in chicken meat, intestinal contents, and rinse water at slaughtering place from traditional market in Surabaya, Indonesia](#)  
R Yulistiani, D Praseptiangga, Supyani *et al*
- [The total plate count, \*Staphylococcus aureus\*, and pH value of raw chicken meat sold at the traditional markets in Maros regency](#)  
M C Kuncara, F N Yuliati and K I Prahesti
- [Analysis of Household Demand for Chicken Meat in Yogyakarta](#)  
Susi Wuri Ani and Emoiz Antriyandarti



The Electrochemical Society  
Advancing solid state & electrochemical science & technology

243rd ECS Meeting with SOFC-XVIII

**More than 50 symposia are available!**

Present your research and accelerate science

Boston, MA • May 28 – June 2, 2023

[Learn more and submit!](#)

## Analysis of The Efficiency of Value Chain on Livestock (Case Study: Chicken Meat)

Hana Catur Wahyuni<sup>1\*</sup>, Ika Ratna Indriastuti<sup>2</sup>, Rima Azzahra

Universitas Muhammadiyah Sidoarjo, Sidoarjo, Indonesia

Email: hanacatur@umsida.ac.id<sup>1</sup>, ikaratna@umsida.ac.id<sup>2</sup>

**Abstract.** In health, livestock products are a source of animal protein which is important for human health. However, in its development, there is a problem of inefficiency in the value chain of livestock products. This study used a case study on the chicken meat value chain. The research objective was to identify the value chain flow of chicken meat, identify the types of inefficient activities, and measure the level of inefficiency of each of these activities. The research method used is Failure Mode Effect Analysis (FMEA). The research was conducted in two stages. The first stage is carried out through observation to identify value chain flows and types of inefficient activities. The second stage is used to conduct an assessment so that the results of the inefficiency level are obtained. The results showed that there were several actors in the chicken meat value chain, including breeders, chicken distributors, chicken slaughter companies, chicken meat distributors, and chicken meat retailers. Overall, there are 25 inefficient activities in the chicken meat value chain. Activities with a high level of inefficiency occur in the process of slaughtering chickens. Therefore, the process of slaughtering chickens needs to be a priority for improvement in the future

**Keywords:** Livestock; value chain; FMEA; efficiency

### 1. Introduction

Animal husbandry is the motor of development in rural areas. Livestock is also an agribusiness industry that includes upstream and downstream with high economic value. Data from the Ministry of Agriculture shows that livestock has a contribution of 16.35% to GDP in 2018 and absorbs 4.83 million workers (an increase of 2.73% from 2015). In terms of health, livestock products are a source of animal protein which is needed by the body to form antibodies, enzymes, hormones, and repair and maintain body tissues. The level of consumption of livestock products affects the quality of human health so that it affects the level of availability of livestock foodstuffs and the income level of farmers. Chicken meat is one of the livestock products that are widely consumed by the community. To meet nutritional needs, it takes an average consumption of chicken meat of 113, 48 g / day [1]. As the human population grows, the demand for chicken meat is increasing. Therefore, the demand for chicken meat has increased significantly from year to year. However, in the process of fulfilling these needs, there are problems related to the chicken meat value chain. In this context, the chicken value chain is an important element in the food system, especially in policy analysis and intervention [2]. It is feared that the involvement of various parties in the chicken meat value chain, such as breeders, producers, retailers, the government, and third parties [3], is feared to lead to a decrease in efficiency, thereby hindering the productivity growth of the chicken meat industry. In this case, efficiency is necessary so that the profits of each party in the chicken value chain can increase to encourage productivity growth. In this study, the analysis tool to determine the efficiency of each activity in the



supply chain for chicken meat is the FMEA (Failure Mode Effect Analysis) method. This study aims to: (1) identify the systems and actors involved in the chicken meat *value chain*, (2) *identify the activities and their level of efficiency in the chicken meat value chain*.

## 2. Literature Review

The value chain is one aspect of increasing productivity through improving quality, efficiency, and product differentiation [4]. Corrective action in the value chain is carried out by identifying activities that provide business value, determining positions, and eliminating activities that do not provide value to products or services [5]. [6] states that the value chain is also a company development strategy by focusing on value-added activities for customer satisfaction. The value chain structure is adjusted to the company's strategy and traditions so that it differs between companies or between products [7]. Value chain management has a positive impact on companies, especially to monitor developments in costs and prices and encouraging productivity growth through managing product specialization, technology adoption, and efficient knowledge transfer [8]. The importance of value chain analysis has prompted various companies to carry out this analysis. In the agricultural sector, value chains are used to develop an environmentally friendly crop protection strategy by reducing the use of synthetic garden protection products [9]. In the food industry, value chains are used in the preparation of mitigation measures to eliminate processes that result in undetectable food loss [10]. In the context of the value chain, it is often found that activities that are inefficient value slow down business development. One of them, inefficiencies in the use of production inputs occurs because the purchase of raw materials has not been carried out collectively, so there is no discount in the process even though discounts are a form of production cost savings [11]. There are two ways for companies to streamline their value chains, namely by optimizing costs, saving various activities that require high costs, and streamlining various activities by eliminating activities that do not add value to their production process [12].

The implementation of value chain efficiency has been described in several previous studies. [13] researched the beef value chain associated with climate change and semi-arid land investment options in northern Kenya. The results of this study indicate that all beef value chain actors feel the impact of climate change on livestock and investment is needed for fattening or feedlot so that it can improve the quality of the meat produced. [14] uses the value chain concept as a policy instrument for aquaculture, horticulture, and dairy products in Southwest Bangladesh. In determining efficiency in the value chain, efficiency assessments can be carried out using the FMEA method. This method was first developed by NASA in 1963, then expanded to various car manufacturing industries to identify and measure the level of potential defects at the product design stage. Defects that occur in products are a form of inefficient activities. In its development, the use of the FMEA method can be used independently [15;16] or integrated with several other methods, such as Fuzzy [17], HACCP [18] and the QFD and ABC method [19].

## 3. Prepare Your Paper Before Styling

In its implementation, this research uses a case study of the chicken meat value chain in Sidoarjo, East Java, Indonesia. In the process, this research uses 3 stages, namely:

### 3.1 Activity Identification Stage

This stage aims to identify various activities carried out by all actors and business processes in the chicken meat value chain. Identification is carried out through observation at various locations, for example, traditional markets, chicken slaughterhouses, companies, and others. Interviews were conducted with value chain actors who already understand all activities in the chicken value chain.

### 3.2 Data Collection Stage

This stage aims to collect the necessary data in the measurement and analysis process with FMEA. Data collection is done by filling out questionnaires by value chain actors. The questionnaire consists of respondents' assessments of severity, detection, occurrence [20].

### 3.3 Measurement Stage And Efficiency Analysis

This stage aims to measure the efficiency value based on the RPN (Risk priority number) value. The RPN value illustrates the risk of inefficient activities. The higher the RPN value, the less efficient the activity is. The analysis is carried out by compiling recommendations to increase the efficiency of activities in the value chain.

## 4. Result

The value chain for chicken, from breeding to processed products that is ready for consumption by consumers, involves many parties. The parties involved in the value chain in this research area carry out various activities that are interrelated and influence each other. The chicken meat value chain consists of:

- Input supplier. The input suppliers consist of the actors providing chicken seeds, chicken feed, and medicines and vaccines. In this study, it is known that the type of input supplier can come from large, medium, or individual companies according to the size or size of the farms that will be supplied. Other results indicate that some of the actors in chicken breeding have relationships (subsidiary companies) with the actors of chicken farms or producers of processed chicken meat. This is done to ensure the quality of the meat produced.
- Production. Chicken breeders produce chicken meat in the value chain. Production includes the availability of land used for livestock, provision of food, and health checks which function to maintain the quality of chickens.
- Marketing. Marketing is carried out to market live chickens to consumers through traditional markets or live chicken distributors. Marketing for traditional markets is carried out by individuals who buy chickens on farms and sell them to household consumers. Meanwhile, live chicken distributors buy chickens from breeders in large quantities and sell them to chicken processing companies such as sausages, nuggets, meatballs, etc. Live chickens purchased by distributors are chickens of a certain size (flat) in bulk.
- Chicken meat processing. Chicken meat processing is carried out by large or medium-sized companies that will produce products made from chicken meat. This processing involves food additives, labor, and technology. Chicken processing companies will market their products through distributors/retail or directly to household consumers, caterers, hotels/restaurants.
- Distributor / retail. Distributor/retail is an actor in the supply chain that markets processed chicken products to consumers. Distributors have storage warehouses to ensure product availability is demanded by consumers.
- Consumer. In the chicken meat value chain, consumers consist of 3 (three) types, namely household consumers, caterers, hotels/restaurants. These consumers will process chicken/chicken processed products into dishes to be served and consumed by end consumers.

Based on a map of the chicken meat value chain, then identified the activities carried out by each actor as in Table 1.

**Table 1.** Value Chain Activities

| Value chain actors | Activities   | Potentially inefficient              |
|--------------------|--|--------------------------------------|
| Chicken breeding   | Chicks health check (A1)                           | Time and accuracy of the examination |
|                    | Physical examination of chicks (size, weight) (A2) | Time and accuracy of the examination |
|                    | Feeding (A3)                                       | An excessive amount of food          |
|                    | Dosage of drugs, vitamins (A4)                     | Excessive dosage                     |
| chicken farm       | Land availability (B1)                             | Not according to the number of       |

| Value chain actors                        | Activities                                  | Potentially inefficient   |
|---|---|---|
| Traditional market                        | Cage temperature control (B2)               | chickens<br>Temperature incompatibility with an age of chickens |
|   | Feeding (B3)                                | An excessive amount of food                                     |
|   | Cage hygiene control (B4)                   | Not clean   |
|   | Physical examination of chickens (B5)       | Time and accuracy of the examination                            |
|   | Chicken offer (C1)                          | Prices do not match the purchasing power of household consumers |
| Live chicken distributor                  | Waiting for buyers (C2)                     | Location is not strategic                                       |
|   | Chicken health check (C3)                   | Time and accuracy of the examination                            |
|   | Chicken delivery (D1)                       | The mode of transportation is not suitable                      |
| Chicken processing company                | Physical examination of chickens (D2)       | Time and accuracy of the examination                            |
|   | Route selection (D3)                        | The furthest route  |
|   | Physical examination of chickens (E1)       | Time and accuracy of the examination                            |
|   | Chicken Slaughter (E2)                      | Chickens die before being cut                                   |
|   | Removal of chicken feathers (E3)            | The removal of chicken feathers is not clean                    |
| Distributor of processed chicken products | Separation of chicken meat (E4)             | The separation of chicken meat is not clean                     |
|   | Production process (E5)                     | Processing time   |
|   | Processed product storage (E6)              | Time, storage temperature                                       |
|   | Delivery of processed chicken products (F1) | Incorrect mode of transportation                                |
|   | Selection of delivery services (F2)         | Delays in delivery  |
|   | Selection of distribution router (F3)       | The furthest route  |
|   | Processed product storage (F4)              | Time, storage temperature                                       |

Efficiency assessment for each activity in the value chain is as follows:

**Table 2.** Value Chain Assessment

| Activities | Occurrence (O) | Severity (S) | Detection (D) | RPN (inefficiency priority) |
|------------|----------------|--------------|---------------|-----------------------------|
| A1         | 4              | 3            | 4             | 48 (1)                      |
| A2         | 4              | 3            | 3             | 36 (2)                      |
| A3         | 3              | 3            | 2             | 18 (3)                      |
| A4         | 3              | 2            | 2             | 12 (4)                      |
| B1         | 2              | 2            | 2             | 8 (4)                       |
| B2         | 4              | 4            | 4             | 64 (2)                      |
| B3         | 3              | 3            | 3             | 27 (3)                      |
| B4         | 2              | 2            | 2             | 8 (4)                       |
| B5         | 4              | 4            | 5             | 80 (1)                      |
| C1         | 4              | 4            | 3             | 48 (2)                      |
| C2         | 4              | 4            | 4             | 64 (1)                      |
| C3         | 4              | 4            | 3             | 48 (2)                      |
| D1         | 2              | 2            | 2             | 8 (3)                       |

| Activities | Occurrence<br>(O) | Severity<br>(S) | Detection<br>(D) | RPN<br>(inefficiency priority) |
|------------|-------------------|-----------------|------------------|--------------------------------|
| D2         | 4                 | 3               | 4                | 48 (1)                         |
| D3         | 3                 | 3               | 3                | 27 (2)                         |
| E1         | 4                 | 4               | 5                | 80 (1)                         |
| E2         | 2                 | 2               | 3                | 12 (2)                         |
| E3         | 2                 | 2               | 2                | 8 (3)                          |
| E4         | 2                 | 2               | 1                | 4 (4)                          |
| E5         | 2                 | 2               | 1                | 4 (4)                          |
| E6         | 2                 | 2               | 3                | 12 (2)                         |
| F1         | 2                 | 2               | 2                | 8 (3)                          |
| F2         | 2                 | 2               | 3                | 12 (2)                         |
| F3         | 2                 | 2               | 4                | 16 (1)                         |
| F4         | 2                 | 2               | 1                | 4 (4)                          |

In table 1, the O, S, and D assessments of the respondents (people who are experts in the chicken meat value chain) were also assessed. The product of O, S, and D is the RPN value. The results showed that there were 25 potentially inefficient activities carried out by value chain actors. From table 1 it is known that the highest RPN value is found in the physical inspection of chickens on chicken farms and chicken meat processing. This activity has the potential for inefficient activities because it is related to the time and accuracy of the workforce who performs it. This activity requires a high level of expertise, so it requires a special workforce who is familiar with the chicken inspection system. If not, the inspection will take a long time and the results do not guarantee quality. The highest RPN value for each supply chain actor indicates the potential for inefficiency so that improvements must be made to optimize the results in the value chain. Therefore, based on these results, recommendations for improvements to increase efficiency in the chicken meat value chain are:

- Increase the ability of workers in the process of physical health checks for chickens, so that this activity can be carried out accurately and quickly
- In the marketing process, especially for target household consumers, a strategic location is needed to speed up time and price agreements between buyers and sellers.
- It is necessary to adopt technology to ensure that the route was chosen in the distribution process for processed chicken products is the best (shortest, safest, and fastest). The choice of distribution route is related to the quality of the product being sent.

### 5. Conclusion

Efficiency analysis is important to do in the chicken meat value chain. This is to identify various potentially inefficient activities so that they can be avoided. This research shows the complexity of the value chain in chicken meat which involves many parties. The results showed that there were 6 actors involved in the chicken meat value chain, which consisted of input (chicken breeding), producers (chicken breeders), marketing (live chicken sellers/distributors), chicken meat processing (companies / SMEs), distributors/retail for processed chicken and consumer products (household, catering, hotels, restaurants). Of the 6 value chain actors, 25 activities have the potential to result in inefficient chicken value chains. This potential inefficiency can be avoided by increasing the ability of workers to carry out health checks for chickens so that they can carry out their duties quickly and precisely. This section requires the role of government, especially from the element of animal health, socialization and training on animal health are needed to increase the knowledge and expertise of animal inspectors.

### Acknowledgement

We thank the Ministry of Research, Technology and Higher Education for facilitating this research through the 2021 PDUPT research scheme

## References

- [1] C.T. Hessel, S.O. Elias, J.P. Pessoa, L.M. Zanin, and E. Stedefeldt, "Food safety behavior, and handling practices during purchase, preparation, storage, and consumption of chicken meat and eggs," *Food Research International*, Vol 125, pp 1-14, 2019.
- [2] A.K. Famery, T.D. Brewer, P. Farrell, H. Kottage, E. Reeve, A.M. Thow, and N.L. Andrew, "Conceptualizing value chain research to integrate multiple food system elements," *Global Food Security*, Vol 28, 2021.
- [3] S. Li, Y.Wang, G.M.L Tacken, Y.Liu, S.J and Sijtsema, "Consumer trust in the dairy value chain in China: The role of trustworthiness, melamine scandal, and media," *Journal of Dairy Science*, Vol 104, No7, 2021.
- [4] D. Kumar, P.V. Rajeev, "Value Chain: A Conceptual Framework," *International Journal of Engineering and Management Sciences*, Vol 7, No 1, pp 74-77, 2016.
- [5] J. Strakova, I. Rajjani, P. Partlova, J. Vachal, and J. Dobrovic, "Use of The Value Chain In The Process of Generating A Suitable Business Strategie on The Example of the manufacturing And Industrial Enterprises in the Czech Republic," *Sustainability*, Vol 12 Iss 12, pp 1-15, 2020.
- [6] K. Vattikoti, Razak, "Critical Evaluation of Value Chain Analysis for Assessing for Competitive Advantage A Study on Select Companies of E-Tailing Industry ," *Academic of Strategic Management Journal*, Vol 17, Iss 6. 2018.
- [7] J. Nagy, E.Olah, D. Erdei, J.Mate, and J. Popp, "The Role and impact of industry 4.0 and the internet of things on the business strategy of the value chain-the case of Hungary," *Sustainability*, 10, 2018.
- [8] L. Jones, M, Demikarya, and A.N.N, Bethman, "Global Value Chain Analysis: Concepts and Approach," *Journal of International Commerce and Economics*, April, pp 1- 29, 2019.
- [9] A. Lefevre, B, Perrin, C.L. Dumoilin, C. Salembier, M. Navrette, "Challenges of complying with both food value chain specifications and agroecology principles in vegetable crop protection," *Agricultural Systems*, Vol 185.2020.
- [10] L. Delgado, M. Schuster, M. Terrero, "Quantity, and Quality Food Losses Across The Value Chain: A Comparative Analysis," *Food Policy*, available online 9 September. 2020.
- [11] N.D. Widodo, "Forms of Eco-Efficiency in Value Chains in the Laweyan Batik Cluster, Surakarta City," *Journal of the Region and the Environment*, Vol 1 No 3, pp. 387-302.2013.
- [12] M. Wijaya, "Value Chain Analysis in Improving Company Performance and Competitive Advantage," *Media Informatics*, Vol 18, No. 3, pp. 122- 128. 2019.
- [13] S.W. Ndiritu, "Beef value chain analysis and climate change adaptation and investment options in the semi-arid lands of northern Kenya", *Journal of Arid Environments*, vol 181, October 2020.
- [14] R. Kuijpers, "Integrated Value Chain Development: Evidence from Bangladesh," *Food Policy*, Vol 97, December. 2020.
- [15] R. Askari, M. Shafii, M.A. Abolhassani and E. Salarikhah, "Failure Mode and Effect Analysis improving Intensive Care Unit Risk Management Processes," *International Journal of Health Care Quality Assurance*, Vol 27, No 5, pp 414- 426, 2014.
- [16] K, Jain, "Use of failure mode effect analysis (FMEA) to improve medication management process. *International Journal of Health Care Quality Assurance*, Vol 30, No 2, pp 175-186, 2017
- [17] Ghadge, Abhijeet, D. Samir, O. Ritesh, C. Nige, "Using risk-sharing contracts for supply chain risk mitigation: A buyer-supplier power and dependence perspective," *Computers and Industrial Engineering*, 103, 262–70. 2017.
- [18] J. Trafialek, and W. Kolanowski, "Application of Failure Mode and Effect Analysis (FMEA) for auditing of HACCP system," *Food Control*, 44, 35- 44.2014.
- [19] A. Hassan, "Conceptual process planning an improvement approach using QFD, FMEA, and ABC methods," *Robotics and Computer-Integrated Manufacturing*, Vol 26, No 4, pp 392–401, 2010.
- [20] A.P. Subriadi, and N.F. Najwa, "The consistency analysis of failure mode and effect analysis (FMEA) in information technology risk assessment," *Heliyon*, 6. 2020



ORIGINALITY REPORT

7%

SIMILARITY INDEX

6%

INTERNET SOURCES

6%

PUBLICATIONS

5%

STUDENT PAPERS

PRIMARY SOURCES

|   |   |    |
|---|---|----|
| 1 | Engrid Latifa Noferita Kaswati, Adhi Harmoko Saputro, Cuk Imawan. "Examination system of chicken meat quality based on hyperspectral imaging", Journal of Physics: Conference Series, 2020<br>Publication | 2% |
| 2 | <a href="https://repository.futminna.edu.ng/8080">repository.futminna.edu.ng:8080</a><br>Internet Source  | 2% |
| 3 | Submitted to Kaplan College<br>Student Paper  | 2% |
| 4 | <a href="https://pertambangan.fst.uinjkt.ac.id">pertambangan.fst.uinjkt.ac.id</a><br>Internet Source  | 1% |
| 5 | <a href="https://repositorio.autonoma.edu.co">repositorio.autonoma.edu.co</a><br>Internet Source  | 1% |

Exclude quotes On

Exclude matches < 1%

Exclude bibliography On