



Received: September 17, 2024

Revised: November 02, 2024

Accepted: November 30, 2024

*Corresponding author: Israyani Putri,
Department of Management, Faculty of
Economics and Business, Universitas
Muhammadiyah Mamuju. Mamuju,
Indonesia.

E-mail: Israyaniputri17081997@gmail.com

SOCIAL SCIENCE AND EDUCATION | RESEARCH ARTICLE

Model of Soybean Raw Material Inventory Planning for the Tofu and Tempeh Production Process at Mekar Sari in Kalukku-Mamuju, Indonesia

Israyani Putri¹, Muhammad Aqil², J. Junaeda³

^{1,2,3}Department of Management, Faculty of Economics and Business, Universitas Muhammadiyah Mamuju. Mamuju, Indonesia. Email: Israyaniputri17081997@gmail.com, muh_aqil@unimaju.ac.id, edha.doraemong2@gmail.com

Abstract: The Soybean Home Industry is a factory that processes soybeans into tofu and tempeh, located in Dipanamba, a village in the Kalukku sub-district of Mamuju Regency. This study aims to analyze the preparation of soybean raw material supply for the tofu and tempeh production process at Mekar Sari in Kalukku District, Mamuju Regency. Using a case study approach, Mekar Sari serves as the primary source of information to meet the research objectives. The data processing method combines both quantitative and qualitative descriptive approaches through observation, interviews, and analysis using the Economic Production Quantity (EPQ) model.

Keywords: Inventory Preparation, Soybean Raw Materials, Tofu Tempe Production Process.

1. INTRODUCTION

Human life is inherently tied to needs and desires, where needs refer to essential goods and services required to sustain life, while desires focus on satisfaction and pleasure rather than necessity. To fulfill these, individuals purchase goods and services to survive. Rapid economic development brings positive socio-economic changes that significantly impact marketing. Firstly, increasing income and purchasing power boost consumption and investment, directly contributing to economic growth. Secondly, technological advancements enhance production quality. Thirdly, increased investment strengthens the economy's ability to produce goods and services, making Indonesia more competitive in the global market. As an agrarian country, Indonesia has a majority rural population engaged in farming. According to Deddy Wahyudin et al. (2020), "Agriculture is an activity of utilizing biological resources carried out to produce materials that can be used to manage the human environment." The agricultural sector is strategic and plays a crucial role in the national economy by contributing to GDP, providing employment, and ensuring domestic food supply. Farmers continue to be a fundamental part of the national economy, highlighting the need for serious attention to agriculture for sustainable economic development.

One of the rapidly growing small industries today is the tofu and tempeh-making industry, driven by its broad consumer base across all social strata. Tofu and tempeh are not only consumed by the lower class but also by the upper class. As traditional Indonesian foods made from soybeans, they are rich in protein and considered healthy. Their popularity stems from their delicious taste and high nutritional value, as soybeans contain vegetable protein that benefits overall health. Due to the high demand for tofu and tempeh, the agroindustry for their production is widespread across Indonesia, including in Kalukku Sub-district, Mamuju Regency, which is also capable of producing these foods.



However, tofu and tempeh producers tend to use imported soybeans rather than locally grown ones due to the guaranteed supply of imported ingredients.

Soybeans are the primary raw material essential for the continuous production of tofu and tempeh, which are increasingly in demand. These products are made by allowing soybeans to settle or clump using coagulants. According to Geograf.id (accessed September 14, 2023), soybeans, also known as *Glycine max*, are a type of legume with numerous health benefits. The presence of Mekar Sari in Kalukku Sub-district aims to raise awareness about the importance of nutrition, encouraging the community to consume healthy foods such as tofu and tempeh. This growing public awareness has led to a sustained demand for these products, driving continuous purchases and supporting the growth of the soy-based industrial sector. As a result, ensuring a stable supply of soybeans is crucial for tofu and tempeh production. According to Eddy Herjanto (2020), "Inventory refers to raw materials or stored goods that will be used to fulfill specific purposes, such as production, assembly, resale, or as spare parts for equipment or machinery."

In addition to raising awareness about the importance of nutrition, the home industry also plays a significant role in absorbing labor and reducing unemployment, particularly in Kalukku District. Consumer preference for tofu is not solely based on taste but also on its affordability, making it accessible to all social groups, especially the lower-middle class. Moreover, tofu is highly nutritious, containing approximately 86% water, 8-12% protein, 4-6% fat, and 1-6% carbohydrates. It is also rich in essential minerals such as calcium, iron, phosphate, potassium, and sodium, as well as vitamins like choline, vitamin B, and vitamin E. Additionally, tofu has a low saturated fat content and is free of cholesterol, making it a healthy dietary choice.

2. LITERATURE REVIEW

2.1. Marketing

Before understanding marketing management, it is essential to first understand marketing itself. Marketing is a managerial process through which individuals or groups achieve their desires by creating, offering, and exchanging valuable products or services. It encompasses all activities related to delivering products or services from producers to consumers. Marketing management, on the other hand, involves planning, organizing, directing, and coordinating marketing operations within a company to achieve organizational goals efficiently and effectively. A key function of marketing management is market analysis, which helps identify opportunities and assess potential threats in the marketing environment. According to Sudarsono (2020), this analysis is crucial for understanding market conditions and determining the best strategies to seize opportunities while mitigating risks.

According to Tjiptono and Diana (2020), marketing is the process of creating, distributing, promoting, and pricing goods, services, and ideas to facilitate satisfying exchanges with customers while building and maintaining positive relationships with stakeholders in a dynamic environment. Similarly, Zainurrossalamia (2020) defines marketing management as the process of planning and implementing pricing, promotion, and distribution strategies for goods, services, and ideas to create exchanges with target groups that align with organizational objectives.

2.2. Raw Material Inventory

According to Herjanto (2020), inventory refers to raw materials or stored goods used to fulfill specific purposes, such as production, assembly, resale, or as spare parts for equipment or machinery. Finisa and Octavia (2020) define an inventory system as a system designed to organize and monitor the inventory of trade goods within a company. This system includes procedures for calculating, tracking, and managing inventory to effectively and efficiently meet consumer needs. Rudianto (2020) describes inventory as the total amount of finished goods, raw materials, and work-in-process items that a company holds for resale or further processing. Indrajit (2020) explains that raw materials are unprocessed materials that will be transformed into finished goods as the company's primary output. Similarly, Ramadhani et al. (2020) state that raw materials are essential components used in

production, which remain visible in the final product or constitute the largest part of its structure. According to Handoko (2020), inventory can be categorized into several types:

- Raw material inventories consist of tangible goods, such as steel, wood, and other components, that are used in the production process.
- Inventory of assembly components (purchased parts/components) refers to the stock of goods consisting of components obtained from other companies, which can be directly assembled into a product.
- Inventory of auxiliary or supporting materials (supplies) refers to the stock of goods needed in the production process, but which are not part or components of the finished goods.
- Inventory of goods in process (work in process) refers to the stock of goods that are the output of each stage of the production process or have been partially processed, but still require further processing to become finished goods.
- Finished goods inventory refers to the stock of goods that have been fully processed in the factory and are ready to be sold or shipped to customers.

The purpose of inventory preparation, according to Assauri (2020), can be detailed as follows:

- To prevent the company from running out of inventory, which could lead to the cessation of production activities.
- To ensure that the company's inventory is not too large or excessive, preventing inventory-related costs from becoming too high.
- Minimizing small purchases to avoid increasing ordering costs.

2.3. Soybeans

According to Supriatna and Hasiani (2019), soybeans are the third most important food crop commodity after rice and corn. As a legume, soybeans serve as the primary ingredient for various foods in the Asian region, particularly in East Asia, including soy sauce, tofu, and tempeh. As one of the leading commodities in the agricultural sector, soybeans play a strategic role in fulfilling the vegetable protein needs of the Indonesian population while also providing essential nutrients such as fat, fiber, carbohydrates, vitamins, and minerals. Archaeological evidence suggests that soybean cultivation began approximately 3,500 years ago in East Asia (Rohman et al., 2020). In terms of staple or raw materials, the types of soybeans commonly found in markets across various regions in Indonesia can be categorized into four main types.

- White soybeans are a type of legume that serves as a source of protein. They have an ivory white color and are larger in size compared to yellow soybeans.
- Black soybeans are a variety of soybean with a black outer skin, while the seeds inside remain white. These soybeans are commonly used as the primary raw material in the production of soy sauce.
- Green soybeans (edamame) are the largest type of soybean compared to other varieties. Edamame is rich in isoflavones, which are substances known for their cancer-preventing properties, as well as vitamin K. It can be processed into healthy snacks and is also suitable for diets.
- This type of soybean has a pale yellow color, with smaller seeds and a clear outer skin. Yellow soybeans are similar to white soybeans, differing only in color.

2.4. Production

Companies generally aim to generate profits by providing quality goods and services, but they often face limited resources. Therefore, managers must carefully plan and calculate production to maximize profitability. Production is an economic activity that focuses on creating goods or services by adding value through changes in form, function, and timing. According to Nurliah (2023), "Production is the transformation or conversion of production factors into product goods or a process where inputs are converted into outputs." This means that production involves processing raw materials into either finished or semi-finished goods for resale. Similarly, Purwadinata (2020) states that "production is an activity of converting inputs (production factors) into outputs (goods and

services)." The production process not only transforms raw materials into final products but also aims to meet human needs, enhance societal welfare, expand business opportunities, and increase profitability for business actors.

Production management is a vital aspect of management that coordinates various activities to achieve business goals. Effective production organization requires strategic decision-making to ensure that the goods and services produced align with the planned targets. Therefore, production management focuses on making decisions regarding production methods to optimize efficiency and achieve organizational objectives. According to Handoko (2020), "Production and operations management is the optimal management of resources commonly referred to as production factors including labor, machinery, equipment, and raw materials in the process of transforming inputs into various products or services."

3. Research Method and Materials

This research was conducted at Mekar Sari in Kalukku District, Mamuju Regency, from July to August 2024. The study utilizes both quantitative and qualitative data. According to Sugiyono (2020), "quantitative research methods are based on the philosophy of positivism, used to examine specific populations or samples, with data collected using research instruments." Meanwhile, Sugiyono (2020) explains that "qualitative research methods are based on the philosophy of positivism or interpretivism and are used to study natural object conditions." The data sources in this study include primary and secondary data. Sugiyono (2020) defines primary data as "data obtained directly from sources that provide information to researchers." In this study, primary data was collected through direct interviews with several sources at the Mekar Sari factory in Kalukku District, Mamuju Regency. On the other hand, secondary data serves as supporting information for primary data. According to Sugiyono (2020), "secondary data sources do not provide data directly to researchers but must be accessed through other people or documents." In this study, secondary data includes written materials or literature such as books, articles, scientific journals, and publications that discuss issues relevant to the research. The data analysis in this study employs the Economic Production Quantity (EPQ) model, which is used to minimize costs by ensuring a continuous flow of inventory while assuming that demand rate, production rate, holding costs, and ordering costs remain constant. EPQ determines the optimal quantity of products required to achieve maximum efficiency in management and expenditure. Inventory arrives and depletes gradually to meet production needs, with the production speed needing to exceed usage speed to prevent stockouts. Additionally, the Just-In-Time (JIT) production system is applied, where companies produce and procure only the necessary raw materials and components. The primary goal of JIT is to reduce inventory levels, lower storage costs, and shorten production time. This system also minimizes the time and costs associated with quality inspections by selecting suppliers that can ensure timely delivery, accurate quantities, and consistent quality of purchased materials.

4. Results and Discussion

4.1. Economic Production Quantity (EPQ) Analysis

Economic Production Quantity (EPQ) analysis is used to identify and manage the supply of soybean raw materials in the tofu tempeh industry (Mekar Sari) to ensure that monthly production needs are met without experiencing shortages or excess inventory. Before conducting an EPQ analysis at Mekar Sari, it is essential to determine the quantity of soybean raw materials purchased each month, the ordering costs, the storage costs per kilogram, and the monthly production level. Detailed information regarding the quantity of soybean raw materials can be found in Table 1 below.

Table 1. Economic Production Quantity (EPQ) Analysis

No	Description	Source	Amount
1.	Raw Material Purchase (D)	Tons	24
2.	Monthly Production Rate (P)	Tons	24,85

No	Description	Source	Amount
3.	Ordering Cost(S)	Rp	24.000
4.	Storage Cost per Unit (H)	Rp	3.0395
5.	Cost When Short of Inventory (b)	Rp	3.150

- EPQ analysis to determine the economical order:

$$E = \sqrt{\frac{2 \cdot D \cdot Sc \cdot P}{Hc (P - d)}}$$

$$E = \sqrt{\frac{3 \times 24 \times 1,233 \times 24,85}{3,0395(24,85 - 24)}}$$

$$E = \sqrt{\frac{2,206}{2,583}}$$

$$E = 924$$

$$E = \sqrt{854077}$$

$$\text{Monthly } Q/m = 924 : 12 = 77$$

- EOQ analysis to determine economical orders:

$$E = \sqrt{\frac{3 \cdot D \cdot Oc}{Hc (P - d)}}$$

$$E = \sqrt{\frac{3 \times 24 \times 1,233}{3,0395(24,85 - 24)}}$$

$$E = \sqrt{\frac{88,776}{2,583}}$$

$$E = \sqrt{34,369}$$

$$E = 189$$

$$\text{Monthly } Q/m = 189 : 12 = 15.75 \text{ or } 16$$

- Storage Cost Per Unit

$$Tc = O + Hc \left(\frac{D}{Q} \right) \left(\frac{Q}{3} \right)$$

$$Tc = \left(\frac{24}{189} \right) 1.233 + \left(\frac{189}{3} \right) 3.0395$$

$$Tc = 156.79 + 191.49$$

$$Tc = R. 348.28$$

- Determination of Order Frequency Per Unit

$$= \frac{D}{E}$$

$$F = 348.28 \times 24$$

$$F = 8,358$$

$$189$$

Based on the calculations above, the Economic Production Quantity (EPQ) for the tofu tempeh industry (Mekar Sari) is as follows:

- The results of the orders, calculated using the Economic Production Quantity (EPQ) analysis, show a total of 77 units per month.
- The results of the orders, calculated using the Economic Order Quantity (EOQ) analysis, show a total of 15.75, or approximately 16 units, per month.
- The storage cost per unit of soybean raw material in the tofu tempeh industry (Mekar Sari) is 348.28.
Then, for the frequency of orders per year for soybean raw materials (Mekar Sari) is 44 k.

5. Conclusion

The results of this study suggest that the monthly soybean raw material inventory at Mekar Sari is 24 tons. The optimal quantity of soybean raw material inventory, determined through Economic Production Quantity (EPQ) analysis, is 77 units. This indicates that Mekar Sari can increase its tempeh tofu production to ensure that raw materials do not accumulate in the warehouse and can meet consumer demand. Additionally, when using the Economic Order Quantity (EOQ) analysis, the optimal order quantity each month is 15.75, rounded up to 16 units. The storage cost per unit of soybean raw material inventory at Mekar Sari is Rp. 348.28, with a total of 44 orders per year. Therefore, it can be concluded that the soybean raw material supply in the tofu tempeh industry at Mekar Sari is economically efficient.

References

- Adiguna. (2022). *Personality Traits dan Academic Burnout pada Mahasiswa Profesi Psikologi*. Jurnal Psikologi.
- Ali, N. N. (2022). *Teori Biaya Produksi*. Dialog.
- Assauri, S (2020). *Manajemen Pemasaran* (14th ed). Pt Raja Grafindo Pesada.
- Azwar, & Saifuddin. (2022). *Sikap Manusia. Teori dan Pengukurannya*. Pustaka Pelajar.
- Deddy Wahyudin, et al. (2020). *Pengantar Ilmu Pertanian*. Yayasan Kita Menulis.
- Dkk, Eko Sudarmanto. (2022). *Metode Riset Kuantitatif dan Kualitatif*. Yayasan Kita Menulis.
- Dkk, Ramadhani. (2020). *Media Pembelajaran*. Yayasan Kita Menulis.
- Handoko, H. (2020). *Manajemen Personalialia dan Sumberdaya Manusia*.
- Heizer, J. & Barry, R (2020). *Operation Management Sustainability & Supply Chain Management*. Inc. United Kingdom.
- Herjanto, E. (2020). *Manajemen Operasi*. Grasindo.
- Hilary, D, & Wibowo, I (2021). *Pengaruh Kualitas Bahan Baku dan Proses Produksi Terhadap Kualitas Produk PT. Menjangan Sakti*. Jurnal Manajemen Bisnis Krisnadwipayana, 9(1)
- Indrajit. (2020). *Konsep Manajemen Supply Chain Cara Baru Memandang Mata Rantai Penyediaan Barang*. PT Gramedia Widiasarana Indonesia.
- Karlina. & Ernawati. (2020). *Pengertian Pendidikan, ilmu pendidikan & unsur-unsur pendidikan*. Kajian Pendidikan Islam.
- Kotler, Phillip dan Kevin Lane Keller, (2016). *Manajemen Pemasaran Edisi 12 Jilid 1 dan 2*. PT Indeks
- Murhaban dan Adnan, (2020). *Sistem Pengendalian Manajemen*.
- Nurliah. (2023). *Kewirausahaan Dalam Kebidanan*. CV. Adanu Abimata.
- Ocatvia. & Finisa. (2020). *Model-Model Pembelajaran*. Deepublish.
- Paramita. (2021). *Metode Penelitian Kuantitatif, Widya Gama*.
- Pertanian.ngawikab.go.id/2023/01/02/klasifikasi-kedelai-tanaman segudang-manfaat/ tanaman kacang kedelai (Glycine max (L.) Merrill).
- Purwadinata (2020). *Pengantar Ilmu Ekonomi Kajian Teoritis dan Praktis Mengatasi Masalah Pokok Perekonomian*.
- Rohman. (2020). *Ensiklopedia Kedelai: Deskripsi, Filosofi, Manfaat, Budidaya dan Peluang Bisnisnya*. Karya Bakti Makmur (KBM) Indonesia.
- Rudianto. (2020). *Pengantar Akutansi*. Erlangga.s.
- Saida Zainurrosalamia, (2020). *Manajemen Pemasaran Teori dan Strategi*. Forum Pemuda Aswaja.
- Sudarmanto, E. (2022). *Metode Riset Kuantitatif dan Kualitatif*. Yayasan Kita Menulis.
- Sudarsono, H. (2020). *Buku Ajar: Manajemen Pemasaran*. Pustaka Abadi.
- Sugiyono. (2020). *Metode Penelitian Kualitatif*.
- Supriatna, D., & Hasiani, R. F. (2019). *Teknologi Pengolahan Tahu dan Olahan Pangan Kedelai Lainnya*. IPB Press Printing.
- Supriyono R.A, (2018). *Akutansi Kprilakuan: Gajah Mada University Press*.

- Surbakti. (2020). Sistem Aplikasi Logika Fuzzy Untuk Penentuan Optimasi Ragi Tempe Pada Proses Fermentasi Tempe Kedelai Menggunakan Metode Fuzzy Mamdani (studi kasus: Pengrajin Tempe Kedelai Desa Bulu Cina). *Jurnal Ilmiah*.
- Tjiptono Fandy, Anastasia Diana (2020). Pemasaran Penerbit Andi Yogyakarta.
- Tumanggor, N. B. (2020). Pengaruh Kualitas Bahan Baku dan Proses Produksi Terhadap Kualitas Produk Balok Jembatan Pada PT, Wijaya Karya Beton TBK. Universitas Medan Area.
- Vikaliana. (2020). Manajemen Persediaan. Media Sains Indonesia Kharismawan, A. & Budimah (2022) Hak Hidup Atas Janin. Unhas Preass.
- Wijaya Andy, dkk, (2020). Manajemen Operasi Produksi. Yayasan Kita Menulis.
- Wijaya, A. (2020). Manajemen Operasi Produksi. Yayasan Kita.