

## Supply Chain of Moringa Leaf Products at Banua Zahra Moringa in Palu City

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### Abstract

The purpose of this study was to identify the supply chain model in the moringa product business in Banua Zahra Kelor, Palu City. This research was conducted over one month. The research employed a descriptive qualitative method using a survey approach. The study took place in Palu City, Central Sulawesi Province. Data collection involved interviewing informants who served as sources for this study. Data were analyzed using descriptive methods in NVivo 12, with a focus on supply chain analysis. The results revealed that the Banua Zahra Moringa business has two supply chain models. The first model begins with moringa farmers, followed by Banua Zahra Kelor, and then consumers. The second model starts with moringa farmers, proceeds through Banua Zahra Kelor, then resellers, and finally to consumers.

**Kata Kunci:** Supply Chain, Moringa Leaf Products

### INTRODUCTION

Indonesia is a country rich in biodiversity, and many plant species have the potential to benefit human life, including Moringa. This plant offers multiple health benefits, but not many people are aware of its potential. Moringa is known as the "miracle tree" or "miracle plant" because it is a natural source of nutrition with medicinal properties that far surpass those of conventional plants.

Moringa oleifera, a tree native to the Indian subcontinent, is a high-value-added product derived from agricultural biological resources that has been used for thousands of years for its health benefits. Moringa is a plant that grows quickly, has a prolonged flowering period throughout the year, and is resistant to extreme heat. Moringa trees have great potential as staple food seedlings due to their adaptability and ability to grow in tropical and subtropical climates. Growing moringa trees in these climates, which are also areas where malnutrition is most common, makes moringa a primary source of essential nutrients for pregnant women, and it has also been recognized as one of the most nutritious tree crops in the world.

Historically, the moringa tree was used by the ancient Greeks, Romans, and Egyptians as a medicinal plant and was referred to as the "tree of the gods" and the "miracle tree". Moringa plants are widely used as medicinal herbs in India and Africa, where they are also used in traditional Ayurvedic medicine and are said to treat more than 300 diseases. In fact, moringa contains many beneficial nutrients, including vitamins A, B1, B2, and B3; folic acid and ascorbic acid (vitamin C); calcium; potassium; magnesium; phosphorus; and iron. Because of its rich nutrient profile, Moringa can provide numerous health benefits, including nourishing the skin and hair, protecting the liver, and preventing and treating cancer.

The use of moringa trees in Indonesia remains limited. People often use moringa leaves as a complement to daily cooking. Most people use moringa trees only as ornamental plants grown on house terraces; in some parts of Indonesia, moringa leaves are used more for bathing corpses, removing amulets, and feeding other animals. Among residents of several regions in Indonesia, moringa is associated with a mystical aura, which has led to the assumption that it should not be eaten. In fact, for the people of Palu City and its surroundings, moringa is not a foreign tree; for generations, they have consumed moringa almost every day. Moringa plants are easy to grow, so nearly every household has a moringa tree, which is often used as a natural fence. Moringa leaves can be harvested at any time and processed with coconut milk, as in the Uta Kelo cuisine. In fact, this plant is so popular in Palu City that there is a legend that anyone outside Palu City who eats Moringa will immediately return to Palu and even settle there. This phenomenon is evident in the limited use of moringa, which is often cultivated as an ornamental plant or in mystical contexts in some regions. Only a small number of communities, such as those in Palu City, have optimally utilized this plant as a daily food source and a source of essential nutrients.

On the other hand, the Banua Zahra Kelor business, founded by Sabdin and his wife in 2015 with two employees, has been processing moringa leaves into various health and beauty products, including moringa soap, moringa masks, and moringa tea. This business grows with increasing public awareness of the benefits of moringa but faces various supply-chain constraints related to raw-material quality, production processes, and product distribution. These supply chain challenges prompted the research to analyze and develop solutions to moringa supply chain problems at the Banua Zahra Moringa business in Palu City.

The supply chain is a network of companies that work together to create and deliver a product to the end user. A supply chain is a network of organizations that are interconnected and share the same goal: organizing the procurement or distribution of these goods. (Chopra & Mendl, 2004) State that the supply chain is a dynamic system encompassing the flow of information, products, and money. The main problems in the supply chain of agricultural products in general have characteristics including: (1) products are perishable, (2) cultivation and harvesting are highly dependent on climate and season, (3) quality varies, (4) some products are perishable, and some products are tough to transport and manage because of the size and complexity of the product. These four factors should be considered when designing and analyzing the supply chain management of agricultural products.

For suppliers, the first problem or constraint is the availability of raw materials that are abundant but constrained in sales, particularly during harvest periods when buyers are unwilling to purchase them. The second constraint is the quality of raw materials; the quality of moringa leaves varies with the supplier's drying process and timing. At Banua Zahra Kelor, as a business owner, the first problem is the long production process: some products require up to one month of storage before they can be marketed, resulting in delays in fulfilling customer requests. The second obstacle is the buildup of demand: when stock runs out, a waiting period ensues, leading to a surge in consumer requests. According to Mrs. Aminah, the business owner's wife, there is a high demand for the products. However, the products remain empty. She will list or manually record all pending orders so that, when the products are available again, they can be sent immediately to consumers who have placed previous orders.

Distributors face challenges in reaching distant areas; marketing products to regions beyond the region, such as East Nusa Tenggara, may be constrained by delivery times, costs, and the need to maintain product condition. Finally, retailers face product availability issues: products needed by consumers are not always available, especially when production is disrupted. The second constraint is the demand for superior products; products such as Moringa soap are often prioritized in the market, and retailers may struggle to meet demand when stocks are limited. These issues can disrupt the supply chain for moringa products and require integrated solutions from all parties involved to maintain the stability and continuity of supply and demand.

## **LITERATURE REVIEW**

### **Operations Management Production**

Operations management encompasses a broad field, ranging from analyzing and making long-term decisions before production and operations begin to decisions about preparing and executing production and operations.

Operational management is a series of activities that produce value in the form of goods and services by converting inputs into outputs. (Heizer & Render, 2009). Operational management is a process of transforming inputs such as materials, machinery, labor, management, and capital, which are then converted into outputs in the form of goods and services. In the opinion of (Assauri, 2008) Operational management is an activity that organizes and coordinates the use of resources in the form of human resources, tool resources, and fund resources and materials, effectively and efficiently, to create and increase the utility of a good or service. Operations Management is one of the three main functions of every organization that is closely related to other business functions. That is because all organizations sell, calculate, and produce to determine how to segment operational management across organizational functions.

### **Supply Chain Management**

The supply chain is the network of activities that deliver finished products to customers. It includes raw material and parts sourcing, product manufacturing and assembly, warehousing, order entry and tracking, distribution channels, and customer delivery. A supply chain is different from a supply network. A supply network comprises the operations that are linked to provide products to the end customer. (Sinaga et al., 2011).

Supply chain management is an 'umbrella process' in which products are created and delivered to consumers from a structural point of view. An integrated supply chain will increase the overall value it generates. Supply chain management is a system that encompasses a company's relationships with suppliers, production processes, inventory, and consumers. (Budi Prasetyo & Nurul Ngaini, 2022)

The supply chain is the process of material flow from the source to the consumer, with attention to cost, timeliness, and production quantity, all conducted efficiently to minimize potential costs. According to (Wakhid et al., 2023), Supply chain efficiency is based on the concept of marketing efficiency and is used to assess performance in the supply chain, assuming outputs are physical.

## Food Supply Chain Network

Supply chain management can be evaluated within a complex food supply chain network (FSCN). The supply chain is the integration of business processes from the primary method through the original supplier to the end user, providing products, services, and information that add value for customers and other stakeholders. Supply Chain Management requires that goods flow smoothly to the end consumer. (Erna Marliyana et al., 2023).

## METHODS

This study employs a qualitative, descriptive approach that emphasizes analysis, processes, and meanings, with a focus on the subject's perspective. This research examines the distribution process of moringa products in the supply chain of the Banua Zahra Moringa business in Palu City. This approach is aimed at the context and the individual holistically (as a whole), so it is not permissible to isolate individuals or organizations as variables or hypotheses; instead, they must be viewed as part of a whole.

The subjects in this study were the Banua Zahra Kelor business owner, Mr. Sabdin Pandu, and nine informants. This research was conducted from September to October 2024 and employed non-participant observation, interviews, and documentation. Data analysis of the moringa supply chain at the Banua Zahra Moringa business was conducted using NVivo 12 Plus. The data analysis stage included data processing, data reduction, data presentation, and conclusion. The results were presented as inbound and outbound flows.

## RESULTS and DISCUSSION

### INBOUND

Inbound supply chain refers to the flow of materials from raw materials through intermediate stages to producers. In general, the supply chain for moringa products is a network that encompasses various parties, from production (inbound) to utilization at the consumer level. On the inbound side, moringa leaves are supplied from sources such as moringa farmers in the form of dried moringa leaves. The dried moringa leaves are then ground into moringa powder and processed into moringa products for consumer markets. Inbound research from the Banua Zahra Moringa business only has 4 (four), namely raw materials, suppliers, product manufacturing processes, and product types.

On the inbound path, researchers found 1 (one) inbound path in the Banua Zahra Kelor business, as follows:

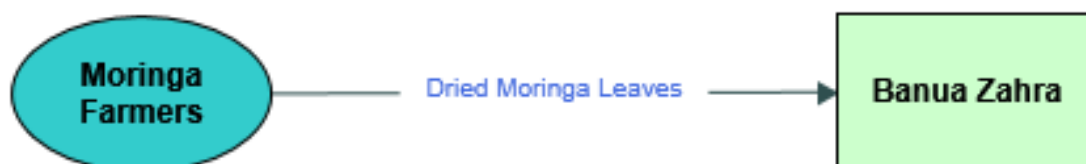


Figure 1. Inbound path 1

The figure above illustrates how the inbound flow of moringa products at Banua Zahra Business obtains raw materials directly from moringa farmers. Moringa farmers are responsible for supplying the primary raw material, dried moringa leaves. They manage the planting and harvesting of moringa leaves, which are then dried. These farmers are the primary source in the supply chain, providing the basic inputs required for further production. Dried moringa leaves are a product supplied by farmers and serve as raw materials ready for further processing. In this supply chain, dried moringa leaves are the primary commodity processed by the receiving party.

Banua Zahra Kelor is a party that receives dried moringa leaves from farmers and processes them into ready-to-sell products, including moringa tea, moringa soap, moringa masks, and ringworm medicine. In this context, Banua Zahra Kelor functions as a processor or producer, transforming raw materials into marketable products.

### OUTBOUND

Outbound refers to the supply chain from producers to consumers. Outbound is also closely related to the processes involved in distributing Banua Zahra Moringa leaf products to consumers. The series of activities in an outbound company constitutes a supply chain cycle that begins with moving an item from one location to another, continues through intermediate stages, and culminates in its delivery to consumers.

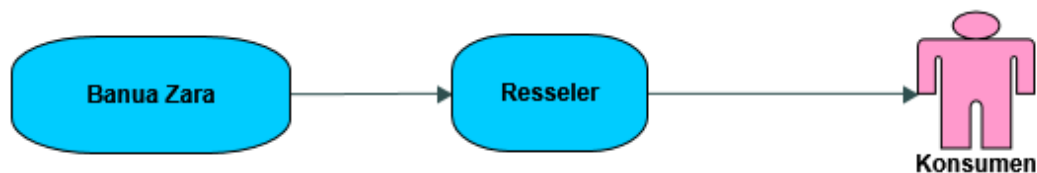


**Figure 2. Supply Chain 1**

The results of the outbound mapping of the research indicate a schema for the production quantities of moringa products, product prices, distribution channels, and constraints. Based on the outbound results, the researcher found 2 (two) supply chain channels for Banua Zahra Moringa leaf products to reach consumers.

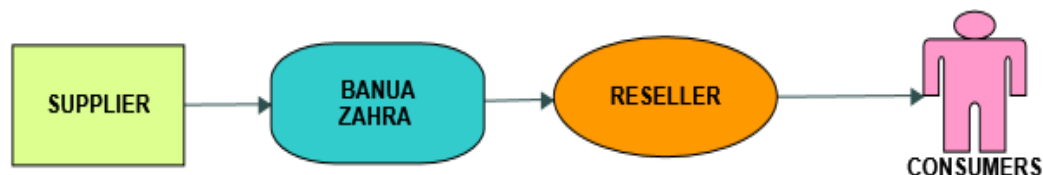
The supply chain diagram above illustrates how moringa product supply lines originating from Banua Zahra's business as a moringa product maker are sold directly to consumers without intermediaries. Hence, consumers are the final link in the supply chain, purchasing moringa products directly from Banua Zahra.

From outbound research, the second supply chain flow was also found by researchers. The supply chain flow from Banua Zahra to consumers passes through Banua Zahra product resellers, who resell to consumers; the price offered when buying from producers differs from the reseller price and the selling price to consumers. The reseller sells to consumers at the same price as the producer. Flow of supply chain 2 (two) at Banua Zahra Kelor Business:



**Figure 3. Supply Chain 2**

Based on several identified inbound and outbound paths, the researchers summarized the entire supply chain of Banua Zahra's business, from the earliest to the final stages, namely, the consumer stage. The following is an overall picture of the supply chain in the Banua Zahra Kelor business:



**Figure 4. Supply Chain Path of Banua Zahra Moringa Business**

From the picture above, it is known that the earliest supply chain in the Banua Zahra Moringa business starts from moringa farmers, moringa farmers are the initial raw material suppliers for the manufacture of moringa leaf products, moringa farmers supply moringa leaves in the form of dried moringa leaves which Banua Zahra then processes into moringa leaf products, moringa leaves that have been produced into moringa products by Banua Zahra are then marketed to consumers through resellers and direct purchases to Banua Zahra stores.

The selling price for consumers and resellers purchasing at Banua Zahra differs substantially. The selling price of moringa products from producers and resellers of moringa soap, moringa masks, and moringa and ringworm medicine to consumers is the same, ranging from IDR 10,000 to IDR 50,000 per unit. The similarity of unit selling prices from producers and resellers can avoid adverse price competition in the market. Without a significant price difference, resellers will not be drawn into a price war that could erode their profits. The manufacturer's reseller price ranges from IDR 10,000 to IDR 40,000 per unit.

### Constraints

A constraint is an obstacle, hindrance, or limitation that hinders or limits the ability of someone or something to achieve a goal or perform an action. Constraints can include physical, Financial, Technical, Legal, and other factors that complicate or hinder a process or business. The obstacles faced by suppliers are

the abundance of moringa raw materials and the constraints imposed by buyers; in Palu City, the number of buyers remains very small or nonexistent.

The primary obstacle in Banua Zahra's business is the production process for moringa soap, which is relatively time-consuming. However, SP is proactive in addressing this problem through anticipatory measures to maintain customer trust. This demonstrates a commitment to product quality and to providing exemplary service to consumers and resellers.

One of the resellers has difficulty controlling product availability, resulting in frequent stockouts when consumers need the products immediately. The product restocking process requires additional time because RW may be further from the supplier or face longer restocking lead times, and marketing efforts have not been optimized, which can affect the attractiveness and success of reaching new consumers. Meanwhile, other resellers report that they do not face significant problems in operating as resellers.

On the consumer side, Banua Zahra Kelor continues to receive the product well, so the problem is more related to internal processes within the distribution chain. For the system to run optimally, there is a need for:

1. Better absorption of raw materials.
2. More efficient stock management and production processes at Banua Zahra.
3. Improved stock management and promotion at Reseller 2.

### Price Margin

Based on the results of interviews conducted by researchers, the price margin on the Moringa product supply chain at Banua Zahra can be seen in the table below:

<b>No.</b>	<b>Highest Profit</b>	<b>Total Profit</b>
1	Banua Zahra	IDR 5.000-IDR 20.000/pcs
2	Reseller	IDR 4.000-IDR 15.000/Pcs

From the table above, it can be seen that the highest margin process circuit or the highest profit is in the producer, namely Banua Zahra Kelor, with a profit of IDR 5,000 - IDR 20,000/Pcs, then the amount of profit obtained by Banua Zahra product resellers is IDR 4,000 - IDR 15,000.

### CONCLUSION

Based on research results and discussions on the supply chain for Banua Zahra Kelor's moringa products, the conclusion is that the raw materials used to produce these products are dried moringa leaves supplied by external vendors. There are differences in the selling prices of Banua Zahra products, specifically the reseller price and the consumer price, and the most popular product is moringa soap. Suppliers, Banua Zahra, and one of the resellers face particular challenges. The supplier's challenges include a small market share for moringa leaves; at Banua Zahra, the drying process sometimes takes a long time, leading to stock shortages of moringa soap; and resellers face less efficient stock management and less effective promotion. The salted fish supply chain at Banua Zahra's business has two paths: the first runs from moringa farmers to Banua Zahra and then to consumers, while the second starts at Banua Zahra, passes through resellers, and then reaches consumers.

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