Archives of Current Research International

Volume 25, Issue 1, Page 182-197, 2025; Article no.ACRI.130007
ISSN: 2454-7077

Supply Chain Management of Sago Noodle Production in Cempaka Healthy Noodle Business

Natelda R Timisela [a*], Ester D. Leatemia [a] and Hlouke A Huliselan [a]

[a] Agribusiness Study Program, Faculty of Agriculture, Universitas Pattimura, Ambon, Maluku, Indonesia.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/acri/2025/v25i11049

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/130007

Original Research Article

Received: 18/11/2024
Accepted: 20/01/2025
Published: 24/01/2025

ABSTRACT

The aim of this study is to determine the marketing efficiency of sago noodle product at the Cempaka Healthy Noodle business. This study employed a survey method, using critical observation to obtain detailed information on a specific problem. The survey method used a questionnaire as a data collection instrument with MSME Cempaka Healthy Noodle as the sample, selected using purposive sampling. The results showed that in the SCOR analysis, the performance value of sago Cempaka noodle supply chain was 35.430 and was included in the poor criteria. In addition, the highest and lowest weights were on the plan and source criteria, accounting for 0.386 and 0.034, respectively. The results show that there are 5 performance assessment criteria used. The highest (0.386) and lowest weight (0.034) were in plan criteria and source

**Corresponding author: Email: nateldatimisela@gmail.com, nateldatimisela@yahoo.com;*

Cite as: *Timisela, Natelda R, Ester D. Leatemia, and Hlouke A Huliselan. 2025. "Supply Chain Management of Sago Noodle Production in Cempaka Healthy Noodle Business". Archives of Current Research International 25 (1):182-97. https://doi.org/10.9734/acri/2025/v25i11049.*

criteria, respectively. This shows that the plan criteria were prioritized over others. The company considered the plan criteria as important and also the basis for other processes to run according to plan.

Keywords: Sago noodle; supply chain management; performance value.

1. INTRODUCTION

Sago plants are native to Indonesia and play an important role in addressing the problem of national food shortages. These plants reduce the dependence of the Indonesian community on rice. The nutritional content contained in sago certainly provides various consumption benefits. Therefore, placing sago as a component in building national food security is a strategic step with far-reaching implications (Bintoro et al., 2013).

Sago plants are a traditional food staple in Indonesia, consumed in forms like papeda, sinole, and sago lempeng (Timisela, 2006). These plants, which are a staple food of the Maluku community, specifically in rural areas, are a superior commodity. Therefore, the commodity needs to be developed into food product that have added sales value. In addition to being a food ingredient, sago can also be used as a raw material for other business, such as adhesives, cosmetics, and various chemical business. Therefore, the use of sago plants can support various business, including small, medium, and high-tech (Timisela, 2006).

The evolving use of sago as a food ingredient is gaining momentum, driven by innovative developments in the industry. The public needs to realize that sago has a very large potential to be developed into various innovative products. Not only as a staple food, sago can be processed into modern products that are in accordance with current market trends, so that they can compete in the global industrial arena (Suryani, 2022). Sago forests should be developed to maintain food security in the face of supply crisis that is predicted to occur in the future. Therefore, innovation, such as the manufacture of noodle from sago starch, is needed to maintain food security and can be a source of income for the community.

Indonesia's dependence on imported wheat flour is very high, especially for noodle production. In fact, based on research (Hariyanto, 2011), as much as 75% of wheat flour consumed in Indonesia is used to make noodles. Based on research by (Lerner et al., 2017), the high gluten content in noodles made from wheat flour can trigger various health problems. Gluten is associated with an increased risk of autoimmune diseases, as well as causing symptoms such as bloating and digestive disorders. One solution to overcome the food crisis is to develop local food products, such as noodles made from sago and sweet potatoes. Given that Indonesia is the country with the second largest noodle consumption in the world, this product has very good market prospects. Unlike wheat noodles that contain gluten and various types of nutrients, sago noodles that are rich in fiber and complex carbohydrates are more friendly to digestion. The fiber content helps maintain gut health, while the complex carbohydrates provide energy gradually (Martina et al., 2020).

The use of sago starch in noodle processing is an effort to diversify food consumption in the community. This noodle innovation from sago starch has been developed by Cempaka Healthy Noodle, a micro, small, and medium enterprise (MSME) in the culinary field located in Ambon City. The company markets noodle product made from sago, vegetable, and fruit extracts.

The need for sago raw materials to support the development of the Cempaka Healthy Noodle business is very important. This necessitates the participation of all actors from farmers as suppliers of raw materials to manufacturing to support sustainable local food supply chain management. Sustainable supply chain performance management is a holistic approach that integrates economic, social and environmental aspects in managing business operations (Amrullah & Sakbani, 2023). Cempaka Healthy Noodle actively participates in exhibition events outside Ambon City, such as Makassar and Jakarta. In addition to noodle, the company produced sago sticks and *gandaria* juice, which are also native fruits of the Ambon region. The production process was carried out when there was a request from the distributor. The marketing of Cempaka Healthy Noodle product includes local supermarkets, souvenir shops, national supermarkets, and abroad. Although product have penetrated the international market, the marketing coverage has not been very widespread. There is also a lack of

popularity in Ambon City, despite marketing product in various supermarkets. These conditions necessitate reliable advantages to survive in business competition. The background shows the importance of this study because considering the implementation of supply chain management is very essential in increasing competitiveness. The concept of supply chain management can also help new industry to coordinate from upstream to downstream and solve problems in the process, as well as increase profits.

2. METHODOLOGY

The study was conducted at Cempaka Healthy Noodle located in Ambon City, *Sirimau* District, *Honipopu* Sub-district, and was implemented in June-July 2023. This study employed a survey method, using critical observation to obtain detailed information on a specific problem (Huliselan et al., 2024). The survey method used a questionnaire as a data collection instrument (Kriyantono, 2014) with MSME Cempaka Healthy Noodle as the sample, selected using *purposive sampling*. According to (Sugiyono, 2012), purposive sampling is a method used to select samples based on specific criteria or reasons. Cempaka Healthy Noodle was selected as the sample because it is the only MSME that processes local sago-based noodle product, which are in high demand by the Ambon community.

The data was then processed and analyzed using descriptive and *Supply Chain Operations Reference* (SCOR) methods. The SCOR method helps determine the variables to be studied along with the attributes, thereby producing key performance indicator (*KPI*) that will be used to assess the performance of supply chain management at the site. Supply chain performance indicators were identified by applying the SCOR model, including the company's supply chain process, and used as evaluation material in improving performance (Wahyuniardi et al., 2017). The SCOR model divided supply chain process into 5 core processes, namely plan, source, make, deliver, and return (Paul, 2014). SCOR has three levels of processes from general to detailed (Bolstorff & Rosenbaum, 2012).

2.1 Calculation of Total Value of Supply Chain Management Performance

Performance attributes and their metrics are shown in Table 1. Performance attributes are supply chain criteria that allow for analyzing and evaluating a supply chain against other supply chains with competitive strategies.

Table 1. Performance attributes and metrics in SCOR

No.	Performance Attributes	Definition of Performance Attributes	Level 1 Metrics
1	Supply Chain Reliability	The performance of the company's supply chain in fulfilling buyer orders with the right products, quantities, time, packaging, conditions, and documentation, so as to provide confidence to buyers that their orders can be fulfilled properly.	Perfect Order Fulfillment
2	Supply Chain Responsiveness	The speed of a company's supply chain in fulfilling consumer orders.	Order Fulfillment Cycle Time
3	Supply Chain Agility	Supply chain agility in responding to market changes to gain or maintain competitive advantage	• Upside Supply Chain Flexibility • Upside Supply Chain Adaptability
4	Supply Chain Costs	Costs associated with implementing supply chain processes	• Total cost of supply chain management • Cost of Goods Sold
5	Supply Chain Asset Management	The effectiveness of a company in asset management to support the fulfillment of consumer satisfaction	Cash to Cash Cycle Time

Source: https://scpiteam.com/SCOR%20Metrics.htm

According to Sumiati (2007), the level of performance fulfillment is defined by the normalization of the performance indicators. Each indicator has different weights with different scales of measurement. Therefore, a parameter equalization process is needed, namely by means of normalization. Here, normalization plays a fairly important role in achieving the final value of performance measurement. The normalization process is carried out using the Snorm De Boer normalization formula, namely:

$$Larger\ is\ Better :: Snorm = (\frac{(Si - Smin)}{S\ max - S\ \min} x100)$$

$$Lower\ Is\ Better : Snorm = (\frac{(S\max - Si)}{S\max - S\ min} x100)$$

Description:

Si = Actual indicator value achieved
Smin = Worst performance achievement value of performance indicator
Smax = Best performance achievement value of performance indicator

In this measurement, each indicator weight is converted into a certain value interval, namely 0 to 100. Zero (0) is interpreted as the worst and one hundred (100) is interpreted as the best. Thus, the parameters of each indicator are the same, after which a result is obtained that can be analyzed.

The total value of supply chain performance was calculated using a formula from *Microsoft Excel Office Software*. Monitoring was used to remind the organization when a problem occurs and to help keep work on track (Suaidah & Sidni, 2018), as shown in Table 2.

The formula for determining the value of supply chain performance includes:

1. Normalization = Score value/total score value
2. Weight = Average of the total normalization
3. Matrix multiplication = Score value x weight
4. Eigen Value = Average of the total matrix multiplication divided by weight
5. CI (Consistency Index) = (Eigen Value–n)/(n-1)
6. CR (Consistency Ratio) = CI/RI, with the RI value, can be seen in Table 3.
7. Global Weight = Criteria weight x attribute weight x sub-criteria weight
8. Performance Assessment = Global weight x work value (Jati, 2021).

Table 2. Performance indicator monitoring system

Monitoring system	Performance indicator
< 40	*Poor*
40-50	*Marginal*
50-70	*Average*
70-90	*Good*
>90	*Excellent*

3. RESULTS AND DISCUSSION

3.1 Company Overview

Cempaka Healthy Noodle is an MSME in the culinary field owned by DP which is located in Ambon City. Product of Cempaka Healthy Noodle were produced from sago, vegetable, and fruit extracts. The location of Cempaka Healthy Noodle is on Jalan Cempaka, *Honipopu* Sub-district, *Sirimau* District, Ambon City. This company, founded in 2016 produced dry and wet sago noodle, wonton skins, sago sticks, and *gandaria* juice (Huliselan et al., 2024). As MSME, Cempaka Healthy Noodle has developed its business quite well. These results are supported by the report of (Fidiasari et al., 2022) that the success of the MSMEs Tofu Miss Maya is highly dependent on how good the business relationship is between all parties in supply chain. A solid relationship is the key to the smooth production and distribution of product. According to (Frohlich & Westbrook, 2001), MSMEs deneed to have good abilities in connecting various elements inside and outside the company, such as production, distribution, and markets, to compete and grow.

Table 3. Random Consistency Index (RI)

N	2	3	4	5	6	7	8	9	10
RI	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.51

Source: (Aramyan et al., 2007)

Sago noodle product stands out with exceptional quality, using natural sago raw materials and vegetable/fruit juices for coloring. This innovative method enhances visual appeal and nutritional value, making Cempaka Healthy Noodle a superior choice. Product is free from the use of preservatives, dyes, or drugs, showing its health benefit. Currently, Cempaka Healthy Noodle has succeeded in marketing product to local supermarkets, souvenir shops, national supermarkets, and even outside the region, such as Makassar. The company is also active in participating in exhibitions outside Ambon City, such as Jakarta, Samarinda, Makassar, Jambi, and Medan, and even abroad, namely America and Australia. The development of Cempaka Healthy Noodle is quite good through the official website of KKI Website 2023 (karyakreatifindonesia.co.id). Cempaka Healthy Noodle sales activities through the official website, IG, FB, WhatsApp, or direct visits to the production site.

3.2 Supply Chain Management

According to (Hasibuan, 2011), management is the science and art of managing the process of using human and other resources effectively and efficiently to achieve objectives. Supply Chain is a network of companies that work together to develop and deliver product to the hands of end users (Pujawan & Mahendrawathi, 2017). According to Simchi-Levi et al (Radhi & Hariningsih, 2019), supply chain management is a series of methods used to effectively integrate suppliers, manufacturers, warehouses, and stores. This allows for the production and distribution of inventory in the right amount, to the right location, and at the right time, thereby minimizing the cost incurred by the system. According to (Adinata, 2013), companies that successfully integrate various parts of supply chain and always follow the latest developments will be superior to the competition. In the 1990s, there was an awareness that all parties in production, from suppliers to consumers, must work together to produce high-quality, affordable, and quickly available product. This phenomenon led to the concept of supply chain management (Zabidi, 2001); (Wullur, 2008)).

Based on (Pujawan & Mahendrawathi, 2010), every activity of a company or community has supply chain. This supply chain covers all production activities from raw materials, and manufacturing processes to distribution. The Cempaka sago noodle supply chain is a series of productive activities that are connected between one activity and another. The main members of the Cempaka sago noodle supply chain consist of suppliers (raw material suppliers and packaging suppliers), manufacturers, distributors, and consumers. In Cempaka sago noodle, supply chain starts with suppliers (raw material suppliers and packaging suppliers), then manufacturers to production. Furthermore, product is distributed to consumers through distributors or directly to consumers, as shown in Fig. 1.

The Cempaka Healthy Noodle supply chain consists of three raw material flows, namely product flow, information, and finance. According to (Assauri, 2011), supply chain is an interconnected network between suppliers, manufacturers, distributors, retailers, and consumers. In this network, the flow of goods moves from the beginning to the end of the production process, while money moves in the opposite direction. Information also flows continuously between all parties. This result is consistent with the report of (Katili et al, 2020) that supply chain of roa fish in Kumu Village, Tombariri District, Minahasa Regency flows from upstream to downstream and downstream to upstream.

Fig. 2 shows the flow of information from upstream to downstream (supplier to consumer) and vice versa. The flow of information takes the form of suppliers-manufacturers, manufacturers-distributors, manufacturers-consumers, and distributors-consumers. All supply chain actors exchange information about prices, raw materials, product quality and quantity, labels, and product packaging. This result is supported by the study by (Devyana et al., 2023) that suppliers provide the latest data on cost prices, product quality standards, and production capacity. Meanwhile, consumers provide input in the form of re-offers, complaints about the quality of goods received, and the volume of orders that have been submitted. The information exchange process was carried out by meeting in person or by communicating via social media, such as *WhatsApp, Instagram,* and *Facebook*.

Fig. 3 shows the flow of raw materials from suppliers to manufacturers. The raw materials come from sago farmers in *Negeri Rutong*, who are regular suppliers to Cempaka Healthy Noodle. This is because the quality of sago is very good, with a soft texture and pure white color. When there is a shortage of raw material

stock from *Negeri Rutong*, then Cempaka Healthy Noodle entrepreneurs order sago flour from *Seram* and *Saparua* Islands. This happens because sago farmers from *Negeri Rutong* cannot meet the continuous demand for raw materials. In the case of an important event, such as an exhibition that should be attended by Cempaka Healthy Noodle entrepreneurs, then entrepreneurs produce noodle in large quantities. A study by (Wulandari et al., 2023) shows that raw materials have a significant impact on the success of the production process. The availability and quality of raw materials directly affect the efficiency and productivity of production.

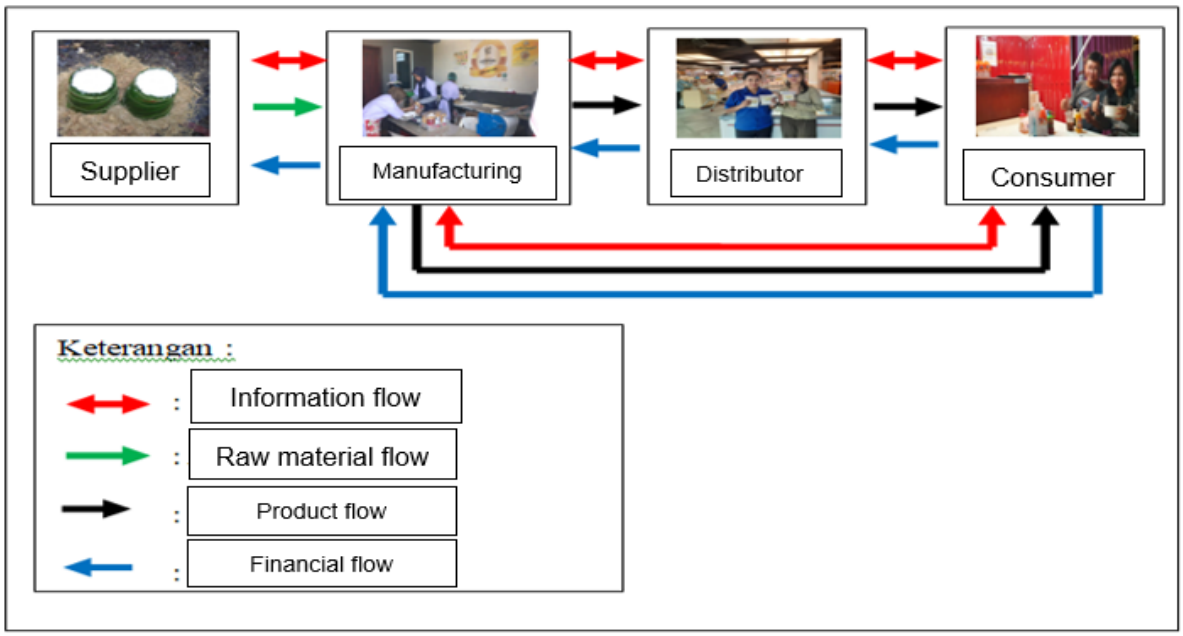

Fig. 1. Supply Chain of Cempaka Sago Noodle Product

Fig. 2. Information flow

Fig. 3. Raw material flow

Cempaka healthy noodle product was produced continuously to meet consumer demand. Consumer appeal is not only seen from the appearance but also from the packaging and labels of product. The packaging and labels should be attractive to capture the attention of consumers. The packaging and labels of Cempaka noodle product was ordered from outside the region.

Orders for product packaging and label stickers, packing boxes, dry noodle plastic, and wet noodle plastic were supplied from Surabaya through cooperation with the Surabaya Studio store in Ambon City. When there are obstacles in the delivery of packaging and labels, entrepreneurs purchase from the Rumah Kemasan Passo store.

The flow of product from manufacturers to distributors and consumers is shown in Fig. 4. The producers in the company process sago flour into noodle product, which is then distributed to distributors, such as local and national supermarkets, as well as souvenir shops. Product is also distributed to local supermarkets, such as Fris Fresh Market, *Dian Pertiwi Poka*, *Oasis* Mart, *Indojaya*, and Supermart, as well as National supermarkets, namely Hypermart ACC and MCM, Foodmart, and Farmers Market. Some of the souvenir shops that receive the distribution include *Ambon Manise* Shop, *Cahaya*, *Santho's*, *Gracia*, *Kole-Kole*, *Sinar Baru*, and *Petak 10*. In addition to sales to distributors, manufacturers also sell directly to consumers. Product flow is quite good because there are a lot of community interested in Cempaka sago noodle.

The flow of money from downstream to upstream, namely from consumers to distributors then to manufacturers, and finally to suppliers, is shown in Fig. 5. This process starts with consumers as buyers then flows through each link and finally reaches the producer to be used as production costs. The flow is unidirectional, meaning that money is generated through the process of exchanging product purchased by consumers. The payment process is in the form of *cash*, credit, and transfers via *m-banking* or banks. For credit, the payment process is carried out by exchanging notes with the distributor, and later product will be paid for on a certain date. The entire supply chain flow of cempaka sago noodle products starting from the flow of products, finance and information is well integrated. This is supported by research by (Windrawati et al., 2022) that the flow

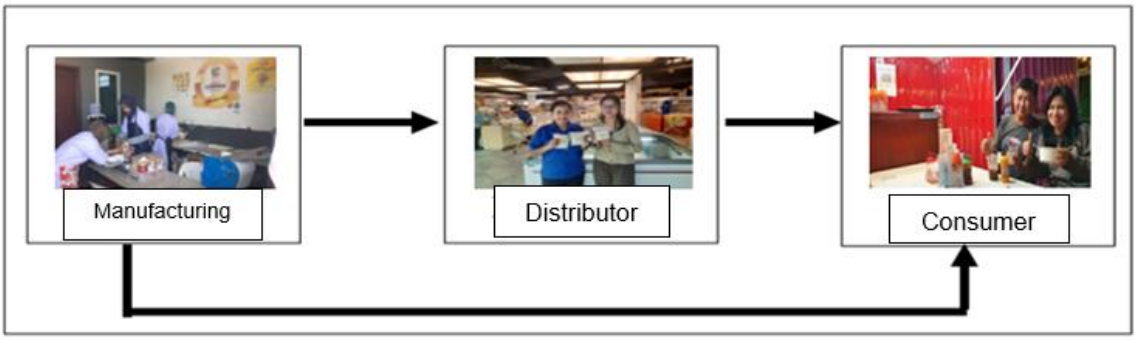

Fig. 4. Product flow

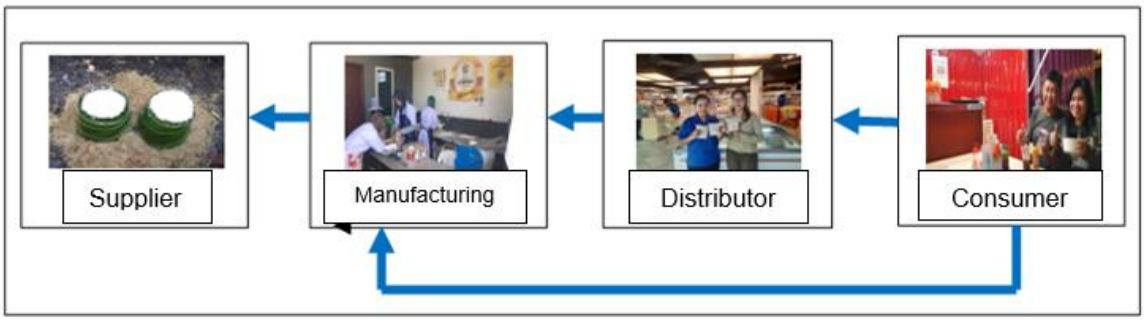

Fig. 5. Money flow

of products, finance and information in the supply chain of laying hen farms at PT Wiratama Maju Lestari has been well integrated as indicated by the fulfillment of the number of eggs ordered on time according to the contract.The mechanisms of the Cempaka Sago Noodle supply chain actors include:

1. Suppliers

Suppliers in the Cempaka Sago Noodle supply chain consist of raw material and packaging suppliers. Raw material suppliers are farmers, either communities or groups. Cempaka Healthy Noodle collaborates with sago farmers in *Negeri Rutong*, *Saparua Island*, and *Seram Island*. For packaging suppliers, Cempaka Healthy Noodle collaborates with *Surabaya Studio* and *Rumah Kemasan Passo* stores to supply product packaging in the form of plastic, label stickers, and packing boxes. The average cost of raw materials incurred by Cempaka Healthy Noodle is IDR 2,000,000-4,000,000 per month. Meanwhile, the average cost of Cempaka Healthy Noodle product packaging is IDR 4,000,000 per month. Table 4 shows the average supply of sago and the cost of Cempaka Healthy Noodle raw materials. The result showed that the average sago flour raw material needed by manufacturing each month is 250-300 kg. The demand for raw materials from suppliers is always met, showing that the continuity of the business is quite good. Product packaging from suppliers is being consistently delivered on time, meeting the needs of the manufacturing department.

2. Manufacturing

Manufacturing is a business entity that changes raw materials into semi-finished or finished goods that have a selling value. Cempaka Healthy Noodle Manufacturing is a manager of raw materials in the form of raw sago. Noodle was produced in several types, such as in dry and wet forms. Dry sago noodle include titi and kwantong with original variants, mixed fruit, and mixed vegetables. Similarly, wet sago noodle with original variants, mixed fruit, and mixed vegetables. Table 5 shows the average amount of sago noodle production in 2022.

3. Distributor

Cempaka sago noodle distributors are agents who work with Cempaka Healthy Noodle. For the Maluku region, the company distributes sago noodle product to local and national supermarkets, as well as souvenir shops. The local supermarkets included Fris, *Dian Pertiwi Poka*, *Oasis* Mart, *Indojaya*, and Supermart.

Table 4. The average supply of sago raw materials in 2022

Month of Supply	Amount of Supply (Kg)	Price (Rp/Kg)	Amount (Rp)
January	200	8,000	1,600,000
February	200	8,000	1,600,000
March	200	8,000	1,600,000
April	200	8,000	1,600,000
May	250	8,000	2,000,000
June	250	8,000	2,000,000
July	300	8,000	2,400,000
August	300	8,000	2,400,000
September	300	8,000	2,400,000
October	300	8,000	2,400,000
November	300	8,000	2,400,000
December	300	8,000	2,400,000
Total	3100		24,800,000

Source: Processed Primary Data, 2023

Table 5. Average amount of Sago Noodle Production in 2022

Product Name	Product Size (g)	Price (Rp/Unit)	Average Production (per/*pack)*
Wet Sago Noodle	1,000	40,000	3,000
Dry Sago Noodles	200	25,000	7,200
Sago Noodle Package	100	25,000	7,500
Total Average Production			17,700

Source: Processed Primary Data, 2023

Table 6. Purchases and Sales of Cempaka Healthy Noodle Product January - September 2023

Product Name	Purchase Amount	Sales Amount	Purchase Price (Rp)	Selling Price (Rp)
Cempaka Noodle Kwetiauw	258	258	10,000	12,500
Cempaka Original Kwantung Noodles	5	3	20,000	27,000
Cempaka Sago Noodle 250 g	20	17	10,000	13,500
Cempaka Original Titi Noodle	9	7	20,000	26,000
Cempaka Carrot Noodle 250 g	5	4	10,000	14,000

Source: Processed Primary Data, 2023

Cempaka Healthy Noodle provided special prices for distributors in Ambon City, namely original dry sago noodle for IDR 20,000/pack, while dry sago noodle with vegetable and fruit variants are sold for IDR 25,000/pack. The distributors in Makassar were given original dry sago noodle for IDR 25,000/pack, while dry sago noodle with vegetable and fruit variants were sold for IDR 35,000/pack. Similarly, the distributors have wet sago noodle with a size of 250 grams for IDR 15,000/pack for distributors in Ambon City. Purchases and sales of Cempaka Healthy Noodle product is shown in Table 6.

Table 6 shows that the number of purchases and sales of sago noodle product is not always the same. Unsold product will be returned to the manufacturer, who will replace with new product at no additional cost to the distributor, as per the agreement.

4. Consumers

The final consumers of Cempaka sago noodle are the Ambon City community, namely young community and parents as well as from the State Civil Apparatus, the Indonesian National Army (TNI), and the Police. The original dry sago noodle product was priced at IDR 25,000 per pack, while the vegetable and fruit variants were IDR 35,000 per pack. The wet sago noodle, available in 1 kg, are priced at IDR 50,000 per pack. Sago noodle offer a unique and delicious taste, as well as several health benefits, including being a suitable diet food and promoting smooth digestion.

Overall, these innovations provide key momentum towards the dominant food regime by rewarding producers for sustainable practices, establishing stronger producer–consumer relationships, and motivating consumers to assume shared responsibility (Hennchen & Schäfer, 2022). Food innovation generates social relationships between various actors along the supply chain management that are oriented towards quality services.

3.3 Supply Chain Management Performance

The performance of supply chain management to assess the *plan, source, make, deliver*, and *return* processes at Cempaka Healthy Noodle is shown in Table 7. In the *plan-reliability attribute*, three *KPIs* were used. Based on the results of observations and interviews in the field for the use of raw materials, the company adjusted to product demand from distributors to 150 kg of sago flour for production per week. Raw materials were procured based on orders, eliminating the need for storage. This method prevents a decline in quality, as storing raw materials can compromise the quality of noodle. As a result, raw material orders can be placed more frequently, even multiple times a week, to be consistent with market demand.

The available raw materials are processed into Cempaka sago noodle product, followed by product delivery. The company adjusts delivery to match distributor demand, using a pre-order system where product is shipped according to demand. The national store distributor places a single order for 15 units of each product, while national stores order approximately 30 units per product. For product level planning, based on field conditions, the average number of products by the company from 15 sago *tumang* raw materials is 10 - 15 kg of dry and 15 - 39 kg of wet sago noodle. The high-water content in raw sago materials causes difficulty in predicting the exact yield of finished product. As a result, the number of raw materials required cannot be precisely determined, and the same quantity of raw materials may not always produce the same total amount of product. Table 6 shows the 16 *KPIs* used in this study.

In the *plan-asset* attribute, there is one *KPI*, namely, the rate of return on production capital. Based on field conditions, the company plans to return production capital within one day. Several distributors, such as Dian Pertiwi Poka, Fris

Fresh Market, and Oasis Mart, Indogrosir, Foodmart, Farmers Market make payments when delivery is complete in *cash* or transfer. However, some supermarket distributors, such as SuperMart and Indojaya exchange notes within ± 14 days. This is because the supermarket distributor makes payments using the credit payment type.

In the *source-reliability* attribute, there is 1 *KPI*, namely, the quality of raw materials. Based on the conditions in the field, before purchasing raw materials, the company first checks the quality.

In the *source-responsiveness* attribute, there is one *KPI*, namely, the raw material procurement period. Based on the conditions in the field, the raw material procurement period by the supplier is ± 7 day. This is because the supplier still uses traditional methods to prepare raw sago. The company purchases 15 *tumang* of raw materials from *Rutong* every week to meet production demands from distributors, excluding exhibition events. However, when an exhibition requires high production, the company supplements the raw material supply by sourcing from *Saparua* and *Seram*. This contingency planning is part of the company strategy.

In the *source-agility* attribute, there is one *KPI*, namely, the flexibility of raw material procurement time. Based on the conditions in the field, the company provides a flexibility of ± 14 days for suppliers in *Rutong*. Alternative suppliers of raw materials are on the islands of *Saparua* and *Seram* when there are exhibition activities that require manufacturing to produce more. However, suppliers have been able to provide raw materials according to the days determined by the company.

In the *make-reliability* attribute, there are two *KPIs*, namely, the use of production results and product quality. Based on field conditions, the entire production output meets the company's predetermined quality standards, making it marketable. The quality control standards for production include achieving the specified noodle color, maintaining a consistent, unbroken texture, and ensuring a suitable level of dryness in the finished noodle.

In the *make-responsiveness* attribute, there is one *KPI*, namely, the production period. Given the field conditions, the company plans to complete the production process in one day, as scheduled, since the process is mechanized and relies on machines and specialized production tools.

In the *make-agility* attribute, there is one *KPI*, namely, the flexibility of production time for repairing machines or production tools. The company provides flexibility in production time due to repairs to machines or production tools of 1 day. However, there has been no delay in production because the tools are more than 2 machines.

In the *deliver-reliability* attribute, there is one *KPI*, namely, the level of fulfillment of the order numbers. The company can fulfill the number of orders requested by distributors and consumers. Furthermore, there is one *KPI* in

Table 7. Key performance indicator

No	Key Performance Indicator	Attributes	Abbreviations
1	Raw Material Usage Planning	Plan-Reliability	PR-1
2	Product Delivery Planning		PR-2
3	Product Level Planning		PR-3
4	Production Capital Return Rate	Plan-Asset	PA
5	Raw Material Quality	Source-Reliability	SR
6	Raw Material Procurement Period	Source-Responsiveness	SRe
7	Raw Material Procurement Time Allowance	Source-Agility	Sag
8	Production Result Use	Make-Reliability	MR-1
9	Product Quality		MR-2
10	Production Period	Make-Responsiveness	MRe
11	Production Time Allowance Machine Repair	Make-Agility	MAg
12	Order Fulfillment Level	Deliver-Reliability	DR
13	Delivery Period	Deliver- Responsiveness	DRe
14	Delivery Time Allowance	Deliver-Agility	Dag
15	Complaint Handling	Return-Reliability	RR
16	Complaint Handling Period	Return-Responsiveness	RRe

the *deliver-responsiveness* attribute. Based on the conditions in the field, the company needs ± 3 days for delivery outside the region, such as Makassar, and only one day in Ambon City.

In the *deliver-agility* attribute, there is one *KPI*, namely, delivery time flexibility. Based on the conditions in the field, the company, distributor, and consumer agree to provide a delivery time flexibility of 3 days to 1 week. In the event of a delay exceeding the specified timeframe, the company quickly reaches out to the distributor or consumer to inform the affected parties of the expected delay in product delivery. At present, the company is fulfilling its commitments based on the agreed terms.

In the *return-reliability* attribute, there is one *KPI* namely, complaint handling. In this context, the company receives all types of complaints about product. The company promptly addresses complaints received, such as damaged or broken dry sago noodle product, by immediately replacing the defective items with new product. Furthermore, there is one *KPI* in the *return-responsiveness* attribute, namely, the complaint handling period. The company provides flexibility to distributors and consumers to handle existing complaints. For this reason, a period of three days was provided for consumers and distributors who want to submit complaints about product. *KPI* is important for the company success. Continuous monitoring of these 16 *KPIs* will improve performance. Tracking *KPI* enables the company to set clear objectives driving development and progress.

3.4 SCOR Hierarchy

The SCOR model is a useful tool for assessing supply chain performance (Mutakin & Hubeis, 2011). SCOR model is a model developed by *Supply Chain Council* (SCC). This model is used to measure and improve the performance of the total supply chain. Some of the characteristics of the model include assessment of delivery and demand fulfillment performance, inventory and asset management, production flexibility, warranties, process costs, as well as other factors that affect the performance assessment of supply chain (SCC, 2012).

The hierarchy of core processes, performance attributes, and measurement matrices are shown in Fig. 6. This hierarchy affects the calculation of the weight of each matrix. The weight at each level is part of the previous level. The plan criteria have two levels, namely *reliability* and assets with three and one sub-criteria, respectively. The source criteria have three *attributes*, namely *reliability, responsiveness*, and *agility*, with each having one sub-criteria. In the *make* criteria, there are three *attributes*, namely *reliability* with two sub-criteria, *responsiveness*, and *agility* with one sub-criteria. Similarly, the *delivery* criteria have three attributes, namely *reliability, responsiveness,* and *agility* with one sub-criteria each. The *return* criteria also have two attributes, namely *reliability*, and *responsiveness*, with one sub-criteria each.

3.5 Supply Chain Performance Value

Performance measurement is comparing actual results with planned outcomes. In other words, it is essential to assess the targeted objectives and evaluate the extent to which achievements have been implemented to attain the desired goals (Ruky, 2001). The results of measuring the total value of supply chain performance are shown in Table 8. Each weight on the criteria, attributes, and sub-criteria affected the global weight and performance assessment. Total performance was obtained by multiplying each global weight and score.

Based on Table 8, there were 4 attributes used in performance assessment and the highest weight of 0.457 was found in *reliability*. This shows that the company is more focused on carrying out work according to expectations to meet market demand to increase the trust of consumers and distributors. The lowest weight of 0.109 was found in the *responsiveness* attribute. This result shows that the company needs to focus more on the speed of supply chain in fulfilling consumer orders. According to (Timisela et al., 2023), companies are more focused on executing tasks as expected to meet market demand, thereby enhancing consumer and distributor confidence in product.

Table 8 shows the value of the Cempaka sago noodle supply chain performance of 35.430. This performance value was included in the *poor* category, as shown in Table 1. The lowest performance assessment value was in the SRe (Raw material procurement period) and MRe (Production period) sub-criteria and both were in the *responsiveness* attribute. Although considered acceptable within the company, the result showed that the speed of work execution, measured by the order fulfillment cycle, does not meet the desired standards.

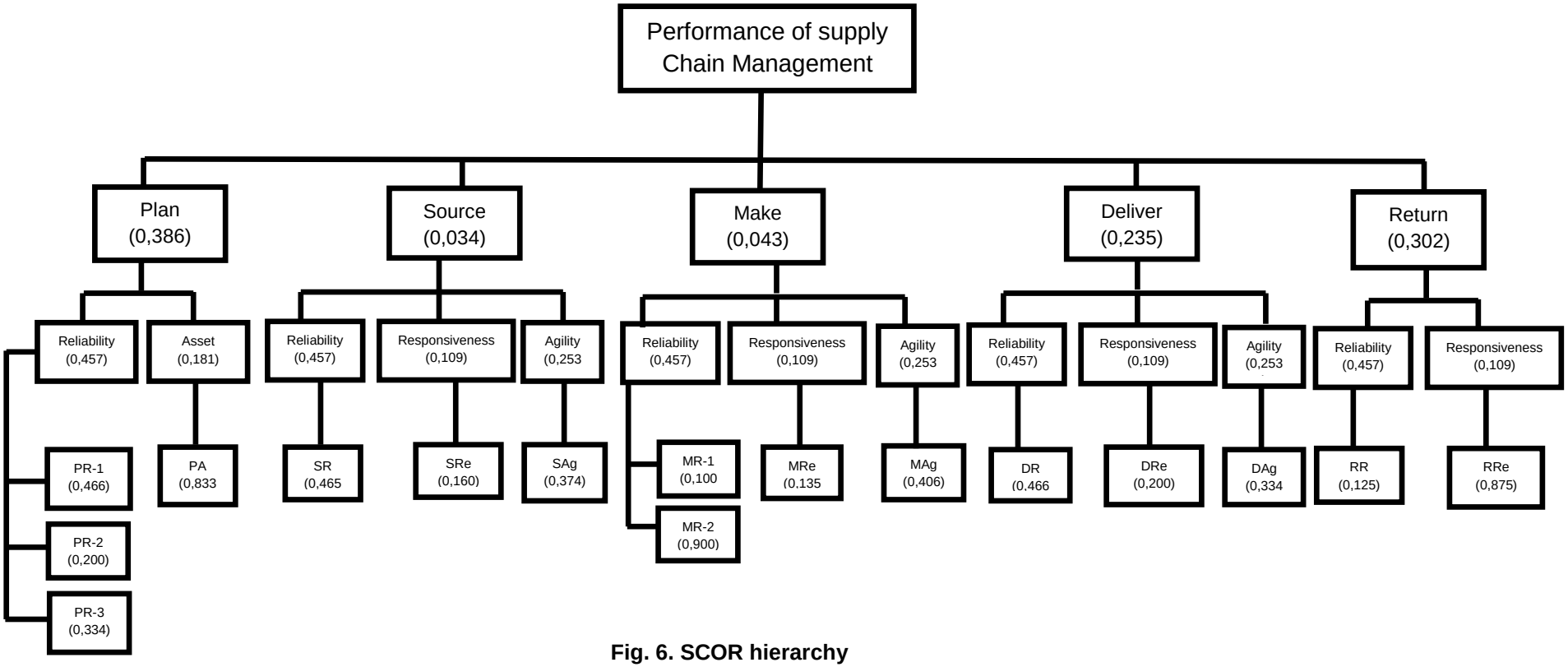

Fig. 6. SCOR hierarchy

Table 8. Performance assessment results

Criteria	Weight	Attribute	Weight	Sub Criteria	Weight	Global Weight	Performance Value	Performance Assessment
Plan	0,386	*Reliability*	0.457	PR-1	0.466	0.082	100	8.220
				PR-2	0.2	0.035	100	3.528
				PR-3	0.334	0.059	37	2.180
		Asset	0.181	Pas	0.833	0.058	100	5.820
Source	0,034	*Reliability*	0.457	SR	0.465	0.007	100	0.723
		Responsiveness	0.109	SRe	0.16	0.001	100	0.059
		Agility	0.253	SAg	0.374	0.003	100	0.322
Make	0,043	*Reliability*	0.457	MR-1	0.1	0.002	100	0.197
				MR-2	0.9	0.018	100	1.769
		Responsiveness	0.109	MRe	0.135	0.001	100	0.063
		Agility	0.253	MAg	0.406	0.004	100	0.442
Deliver	0,235	*Reliability*	0.457	DR	0.466	0.050	100	5.005
		Responsiveness	0.109	DRe	0.2	0.005	100	0.512
		Agility	0.253	DAg	0.334	0.020	100	1.986
Return	0,302	*Reliability*	0.457	RR	0.125	0.017	100	1.725
		Responsiveness	0.109	RRe	0.875	0.029	100	2.880
Total Performance Assessment								35.430

Source: Data Processing Results Using Microsoft Excel 2007

Therefore, supply chain performance was impacted, leading to a poor performance rating. Given the small size of the company, with limited marketing reach, there is a need for significant improvements to enhance supply chain performance and prevent further decline in the upcoming year (Adi Nurmansyah et al., 2022). This result is consistent with the study of (Leppe & Karuntu, 2019) that the actors in the home industry supply chain of tofu in the Bahu Sub-district need to develop and improve the quality as well as the pattern of cooperation between supply chain. Furthermore, the actors need to carry out innovative developments in terms of procedures and production facilities. This will develop supply chain structure by expanding the potential market area.

The order of the criteria weight values from highest to lowest is shown in Table 9. The results show that there are 5 performance assessment criteria used. The highest (0.386) and lowest weight (0.034) were in *plan* criteria and *source* criteria, respectively. This shows that the *plan* criteria were prioritized over others. The company considered the *plan* criteria as important and also the basis for other processes to run according to plan.

Table 9. Criteria priority

Criteria	Weight
Plan	0.386
Return	0.302
Delivery	0.235
Make	0.043
Source	0.034

Source: Primary Data, processed 2023

Based on field conditions, the company prioritizes planning criteria due to a commitment to providing safe and healthy product. To achieve this, the company continually enhances product quality, leading to increased consumer satisfaction. Meanwhile, the lowest weight on the source criteria showed the constraints on raw materials. Sago farmers in Negeri Rutong are unable to produce raw sago in large quantities. This condition causes the company to supply raw materials from Saparua and Seram Islands, thereby increasing transportation costs. Table 10 shows the priority of sub-criteria for performance assessment.

This study used eight sub-criteria in the performance assessment, and the highest weight of 0.9 was found in MR-2 (Production quality). Similarly, the lowest weight of 0.1 was found in MR-1 (Use of production results). This showed that the company focused more on production quality as evidenced by the significant difference between the RRe weight and the other 15 sub-criteria.

Table 10. Priority of Sub-criteria

Sub-criteria	Weight
MR-2	0.9
RRe	0.875
PAs	0.833
PR-1	0.466
PR-2	0.466
SR	0.465
MAg	0.406
SAg	0.374
PR-3	0.334
DAg	0.334
PR-2	0.2
DRe	0.2
SRe	0.16
MRe	0.135
RR	0.125
MR-1	0.1

Source: Primary Data, processed 2023

4. CONCLUSION

In conclusion, supply chain management was carried out by Cempaka Healthy Noodle through several stages, namely (a) Suppliers of sago raw materials from Negeri Rutong, Seram Island, and Saparua, as well as packaging suppliers from Surabaya Studio and Rumah Kemasan Passo. (b) Processing of sago raw materials by Cempaka Healthy Noodle into Cempaka sago noodle products. (c) Product channels to distributors included local and National supermarkets, as well as souvenir shops. (d) The final stage for consumers of cempaka sago noodle was the community. Based on the results of the SCOR analysis, the value of the Cempaka sago noodle supply chain performance was 35.430 and included in the poor criteria.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Adi Nurmansyah, F., Awaluddin, R., & Ahmad Yusuf, A. (2022). Analysis of Rice Supply Chain Management with a Score Model Approach. Agrimanex Journal: Agribusiness, Rural Management, and Development Extension, 2(2). https://doi.org/10.35706/agrimanex.v2i2.6355

Adinata, R. C. (2013). Analysis of Supply Chain Management Performance Based on Balanced Scorecard (Study at PT. Misaja Mitra - Pati, Central Java). Analysis of Supply Chain Management Performance Based on Balanced Scorecard (Study at PT. Misaja Mitra - Pati, Central Java), Supply Chain Management Performance, 1–51.

Amrullah, E., & Sakbani. (2023). Analysis of Sustainable Supply Chain Performance Management in the Palm Fiber Craft Industry Using Causal-Loop Analysis. Journal of Industrial Engineering Optimization (JOTI), 5(2), 62. https://doi.org/10.30998/joti.v5i2.19609

Aramyan, L. H., Lansink, O. A. G. J. M., van der Vorst, J. G. A. J., & van Kooten, O. (2007). Performance measurement in agri-food supply chains: a case study. Supply Chain Management: An International Journal, 12(4), 304–315. https://doi.org/https://doi.org/10.1108/13598540710759826

Assauri, S. (2011). Production and Operations Management. Universitas Indonesia Publishing Institute.

Bintoro, M. H., Amarillis, S., Kemala, R., & Ahyuni, D. (2013). The Forgotten Green Pearl Sago of the Equator. Digreat Publishing.

Bolstorff, P., & Rosenbaum, R. (2012). Supply chain excellence: a handbook for dramatic improvement using the SCOR model. American Management Association.

Devyana, M., Rahmani, N. A. B., & Dharma, B. (2023). Analysis of Supply Chain Management of Tofu Home Industry in Dusun I Sidorukun, Labuhan Batu Regency. Scientific Journal of Management, Economics, & Accounting (MEA), 7(2), 1553–1567. https://doi.org/10.31955/mea.v7i2.3224

Fidiasari, I., Handayani, A., & Sunarso. (2022). Implementation of Supply Chain Management in Mbak Maya Tofu UMKM in Jebres Surakarta. Journal of Economics and Entrepreneurship, 22(3), 292–300.

Frohlich, M. T., & Westbrook, R. (2001). Arcs of Integration: An International Study of Supply Chain Strategies. Journal of Operations Management, 19, 185–200. https://doi.org/http://dx.doi.org/10.1016/S0272-6963(00)00055-3

Hariyanto, B. (2011). Benefits of Sago Plants (Metroxylon sp) in providing food and in controlling environmental quality. Journal of Tek. Ling, 12(2), 143–152.

Hasibuan, M. S. P. (2011). Management: basics, understanding and problems. PT. Bumi Aksara.

Hennchen, B and Schäfer, M. (2022). Do sustainable food system innovations foster inclusiveness and social cohesion? A comparative study. Front. Sustain. 3:921169. doi: 10.3389/frsus.2022.921169.

Huliselan, H. A., Timisela, N. R., & Leatemia, E. D. (2024). Agrosilvopasture-Tech Journal Marketing Efficiency of Sago Noodle Products in the Cempaka Healthy Noodle Business Marketing Efficiency of Sago Noodle Products in the Cempaka Healthy Noodle Business. 2(2), 80–88.

Jati, A. W. S. (2021). Supply Chain Management Performance Measurement [Thesis, Sanata Dharma University]. https://repository.usd.ac.id/39179/2/142214204_full.pdf

Katili et al. (2020). Analysis of Roa Fish Supply Chain Management in Kumu Village, Tombariri District. EMBA Journal, 8(3), 261–270.

Kriyantono, R. (2014). Practical Techniques for Communication Research. Prenada Media.

Leppe, E. P., & Karuntu, M. (2019). Analysis of Home-Based Industrial Tofu Supply Chain Management in Bahu Manado. Jurnal EMBA, 7(1), 201–210.

Lerner, A., Shoenfeld, Y., & Matthias, T. (2017). Adverse effects of gluten ingestion and advantages of gluten withdrawal in nonceliac autoimmune disease. Nutr Rev., 75(12), 1046–1058. https://doi.org/doi: 20.1093/nutrit/nux054. PMID: 29202198.

Martina, A., Lestari, W., Linda, T. M., Hasibuan, S., & Wardani, I. (2020). Processing Sago into prebiotic noodles as functional food and efforts to improve food security in Alai Selatan Village, Tebing Tinggi Barat District, Meranti Islands. Unri Conference Series: Community Engagement, 2, 112–116.

https://doi.org/10.31258/unricsce.2.112-116

Mutakin, A., & Hubeis, M. (2011). Measuring Supply Chain Management Performance with SCOR Model 9.0 (Case Study at PT Indocement Tunggal Prakarsa Tbk). Journal of Management and Organization, 2(3), 89–103.

Paul, J. (2014). Guide to Implementing Supply Chain Transformation with SCOR Model. PPM Publisher.

Pujawan, I. N., & Mahendrawathi, E. R. (2010). Supply Chain Management (2nd ed.). Guna Widya.

Pujawan, I. N., & Mahendrawathi, E. R. (2017). Supply chain management: complete discussion of strategy, design, operation, and improvement of supply chain to achieve competitiveness. Andi.

Radhi, F., & Hariningsih, E. (2019). Analysis of Supply Chain Management Implementation Case Study in Retailer Company. JBTI: Business Journal: Theory and Implementation, 6(1), 33–44.

Ruky, A. S. (2001). Work Management System. Gramedia Pustaka Utama.

SCC. (2012). Supply Chain Operation Reference Model Version 11. In Supply Chain Council Inc. Pittsburgh.

Suaidah, S., & Sidni, I. (2018). Design of Monitoring Academic Achievement and Student Activities Using Key Performance Ind Approach icator (Case Study of SMA N 1 Kalirejo). Jurnal Tekno Kompak, 12(2), 62–67.

Sugiyono. (2012). Qualitative quantitative research methods and R&D. Alfabeta.

Sumiati. (2007). Measuring Company Supply Chain Performance Using the Supply Chain Operation Reference (SCOR) Approach at PT. Madura Guano Industri (KAMALMADURA). Surabaya: UPN Veteran East Java. TEKMAPRO: Journal of Industrial Engineering and Management, 2(2): 1-14.

Suryani, S. (2022). Boba Sago Innovation with Local Wisdom of Sungai Tohor Village as an Attractive Millennial Product Boba Sago Innovation with Local Wisdom of Sungai Tohor Village as an Attractive Millennial Product. JCSPA: Journal of Community Services Public Affairs, 2(4), 164–174.

Timisela, N. R. (2006). Analysis of sago household businesses and their marketing. Jurnal Agroforestri, 1(3), 57–64.

Timisela, N. R., Tuhumury, M. T. F., & Maharani, D. S. (2023). Analysis of Performance and Efficiency of Supply Chain of Harum Maluku 52 Oil. Journal Europeen Des Systemes Automatises, 56(1), 35–42. https://doi.org/10.18280/jesa.560105

Wahyuniardi, R., Syarwani, M., & Anggani, R. (2017). Measuring supply chain performance using the supply chain operation references (SCOR) approach. Scientific Journal of Industrial Engineering, 16(2), 123–132.

Windrawati, R., Susrusa, K. B., & Ambarawati, I. G. A. A. (2022). Supply chain management performance on laying chicken farm. International Journal of Business, Economics & Management, 5(4), 496–503. https://doi.org/10.21744/ijbem.v5n4.2056

Wulandari, A., Maha, N., & Aisyah, S. (2023). Analysis of Supply Chain Management Work Capability at KFC (Case study on Aceh Fried Chicken in Deli Serdang). Journal of Economics and Business, 3(3), 161–166.

Wullur, M. (2008). The Influence of Supply Chain Management Practices and E-Business Technologies on Operational Performance (Study on ISO 9000 Certified Manufacturing Companies in Indonesia. Formas Journal, 2(1), 1–10.

Zabidi, Y. (2001). Supply Chain Management: The Latest Technique in Managing Material/Product Flow and Information in Winning Competition. Entrepreneur, 2 Years Xxx.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/130007