NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY
[IJIERT] ISSN: 2394-3696 Website: ijiert.org
VOLUME 10, ISSUE 1, Jan. -2023

PERFORMANCE AND SUSTAINABILITY STRATEGY OF CHILLI JAMU SUPPLY CHAIN MANAGEMENT IN SUMENEP REGENCY

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ABSTRACT

Introduction: Madura is famous for its traditional herbal medicine and Madurese ingredients. One of the components of traditional raw materials that are widely cultivated by farmers in Sumenep Regency is camu chilies. The performance of chili herbs and the traditional herbal medicine industry has not been effective, so supply chain management engineering is needed to sustainably develop chili herbs. This study aims to analyze supply chain mechanisms, analyze supply chain performance, and design strategies to improve the performance and sustainability of the chili herbal supply chain in Sumenep Regency, Madura.

Methods: This research was conducted in September-December 2022 in Bluto District, Sumenep Regency, Madura which is a center for herbal chili farming. Respondents in this study consisted of farmers, farmer groups, traders and processing industries. In this study experts were also used consisting of researchers, extension workers, academics, and chili herbal processing industry players. To find out the mechanism of the supply chain for chili herbs, a qualitative descriptive analysis was used. SCOR analysis was used to analyze the performance of the supply chain of the chili herbs processing industry, and to formulate strategies for improving the performance and sustainability of the supply chain for the chili herbs using the AHP method.

Results: The supply chain for herbal chilies in Sumenep Regency consists of three streams, namely product flow, money flow and information flow. There are seven marketing channels for chili herbs in Madura. The flow of money flows from downstream to upstream. The price of herbal chilies at the farm level ranges from Rp. 70,000-80,000 per kilogram. Collector traders on average earn a margin of IDR 2,000/kg, while the processing industry earns a margin of IDR 30,000/kg. The flow of information flows from upstream to downstream and from downstream to upstream. The results of the gap analysis of the performance attributes of supply chain reliability with the perfect order fulfillment (POF) matrix produce actual data above the company's target value. The supply chain responsiveness performance attribute with the order fulfillment cycle time (OFCT) matrix is in accordance with the target. The supply chain cost attribute with the COGS matrix produces actual data that is less than the target. Supply chain asset performance attributes produce actual data values below the company's target value. This research recommends a strategy to build a partnership between herbal chili farmers and agro-industry to improve the performance and sustainability of the chili herbal supply chain.

Keyword: Chili Jamu, Sustainable Supply Chain Management, SCOR, AHP.

PRELIMINARY

Lots of Javanese chiliescultivated on dry land in Madura. Javanese chili in Indonesia is also known as herbal chili (Piper retrofactum Vahl), because it is widely used as an ingredient in traditional medicine. The herbal chili production center in East Java is in Madura. The plantation area is spread over four districts on Madura Island, namely Sumenep (1,709 ha), Sampang (1,017 ha), Pamekasan (715 ha), and Bangkalan (356 ha). Sumenep Regency is the largest herbal chili plant center in Madura (Anisah & Hayati, M., 2017).
CultivationJamu chili is a business opportunity that is quite promising because the demand for dried herbal

chili is increasing, both for the domestic market and for the export market. The world's current demand for herbal medicine is 6 tons and Indonesia can only meet 2 tons (Bahrudin, A et al., 2021). Herbal chili importing countries include China, the Middle East, Europe, Singapore, Malaysia and America.

The main problem in developing herbal chilies is that most farmers have not carried out intensive cultivation (Anisah and Hayati, M., 2017), marketing is still limited to sub-district level collectors and herbal medicine producers, fluctuations in selling prices at harvest, no partnerships with companies have been established. herbal medicine on a national scale, and there is not much differentiation of processed products, and product competitiveness is relatively low (Kristina, L., & Abdurrahma, L., 2021), so it is necessary to design good supply chain management. From the agro-industry perspective, the herbal medicine agro-industry in Sumenep is actually one of the superior products, but from the aspect of distribution it is inefficient due to the long marketing distribution channels for traditional herbs and spices. as well as the high profit margins determined by each marketing agency (Fatmawati and Destryana., 2017). These problems can be overcome by collaboration between supply chain actors in developing the system information in order to form an optimal supply chain flow (Salimah et al., 2022). There are three flows that can be managed in supply chain management, namely information flows, goods flows, and financial flows (Rum et al., 2019).

Sustainable supply chain management (sustainable supply chain management/SSCM) can be defined as management of the flow of materials, information and capital which is cooperation between companies along the supply chain by integrating goals that cover the three dimensions of sustainable development namely economic, social and environmental, which translated from the demands of customers and stakeholders (Seuring, 2013).

Some of these economic performance measures include production costs (Lindner et al., 2010), profits (Rondon et al., 2010), increased sales, product quality, customer satisfaction, level of responsiveness (Cetinkaya et.al., 2011). Several indicators of social aspects include: occupational safety and health (Ahi and Searcy, 2015), the presence of CRS and consumer satisfaction (Gopal and Thakkar, 2015). Environmental aspects are related to the company's impact on the natural environment (Cetinkaya et al., 2011). forest restoration and conservation, minimizing the use of raw materials (Pujawan, Nyoman and Mahendrawati. 2017), and reducing emissions and improving efficiency (Gopal and Thakkar, 2015). Measuring supply chain performance can be done by assessing the attributes of reliability, responsiveness, agility, costs and assets (Septarianes et al., 2020).

SSCM studies can be used to increase the linkages of an industrial system so as to produce added value from the three aspects of sustainability. The application of SSCM in industry has provided benefits related to the three aspects of sustainability, namely economic, social and environmental. In modern business development, several researchers consider the importance of implementing SSCM (Hall et al., 2011) and Pagell & Shevchenko., 2014). By strengthening SSCM each objective from the economic, social and environmental aspects can be achieved without harming other aspects (Cetinkaya et al., 2011). This study aims to analyze supply chain mechanisms, analyze supply chain performance, and design strategies to improve the performance and sustainability of the chili herbal supply chain in Sumenep Regency, Madura.

METHOD

This research was carried out in September-December 2022. Data collection activities were carried out in Bluto District, Sumenep Regency. Primary data collection in this study was carried out using survey methods and in-depth interviews with experts. The selected experts are experts who know in depth about cultivation, marketing, processing, and have in-depth knowledge of the subject matter. The selected farmer is the head of a farmer group in Bluto District, Sumenep Regency, on the basis that they understand the cultivation and marketing of herbal chilies. The number of farmer group heads who were used as respondents in this study were twenty people. Respondents from the elements of the processing industry were two people, namely the owner of CV. Nurul Jannah and CV. Madurese heritage. Respondents from elements of marketing institutions as many as five people, consists of four collectors and one exporter of herbal chilies. The formulation of the strategy for improving the performance and sustainability of the herbal chili supply chain was carried out by interviews with five experts, namely the head of the Sumenep Regency

Agricultural Extension Center, agricultural extension workers in Bluto District, herbal chili researcher, head of the Center for Research and Innovation of Spices LPPM UTM, and the owner of CV. Nurul Jannah.

The procedure for data analysis consists of two parts, consisting of identification and analysis of supply chain mechanisms, measurement of supply chain performance, and preparation of strategies to improve the performance and sustainability of supply chain management for chili herbs. Procedure and data processing analysis is described in table 1.

Table 1. Stages, stakeholders, methods, and research data

Purpose	holders Involved	Method	Data Retrieval Method	output
Identify and analyze the supply chain mechanism for chili herbs	Farmers, farmer groups, collectors, exporters, and CV	Qualitative descriptive	Field survey, descriptive analysis	Pattern Genrechain supply,resources, management and processbusiness
Analysis andperformance measurement chain supply chili herbs	Researchers, extension workers, petrator agro industry	SCORE andper	Interview with agro-industry actors	The performance value of the supply chain of herbal chilies
Designing a performance improvement strategy andsupply chain management sustainability of herbal chilies	Extension officers, researchers, chairmanCentre Studyand InnovationSpice LPPMUTM, perpetratoragro industry	AHP	Expert interviews, filling out questionnaires, andstrategy formulation discussion withexpert	Performance improvement strategy andchain management sustainability supplyherbal chili

RESULTS AND DISCUSSION

Chilli Herbal Supply Chain

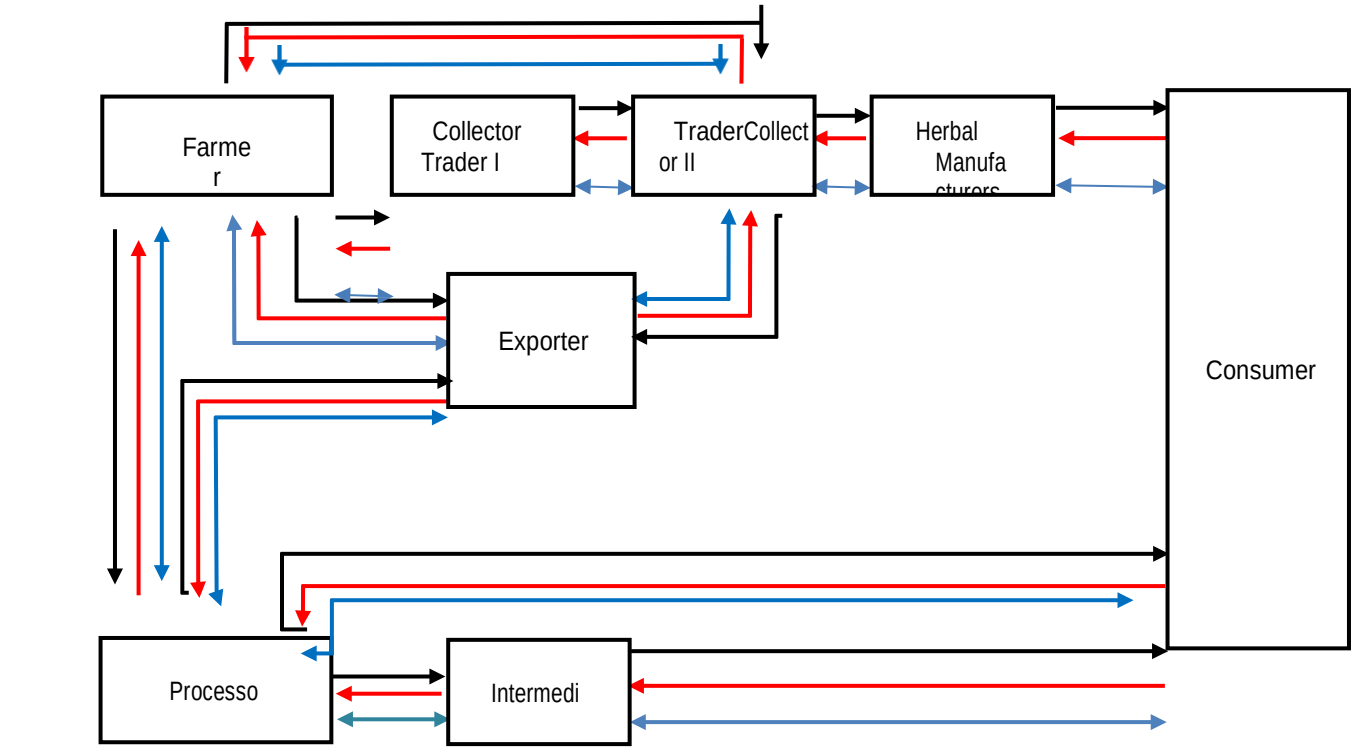
The supply chain pattern for chili herbs is in the form of a regulatory system in the form of three streams, namely product flow, financial flow, and information flow in the processing and distribution of products made from herbal chili peppers. The supply chain pattern for chili herbs is shown in Figure 1.

The product stream flows from upstream to downstream. Herbal chilies are cultivated by farmers in Bluto sub-district, which are spread over twenty villages.Herbal chili plants grow vines and bear fruit throughout the year. During the rainy season, the harvest can be done twice a month. However, during the dry season, harvesting intervals are shorter, approximately up to three harvests. Most of the herbal chili plants are border plants.

The product flow for chili herbs consists of seven streams, namely: 1). flow of products from farmers directly to exporters; 2). flow of products from farmers through collectors II (wholesalers), then to exporters; 3). product flow from farmers through processors, then to exporters. Acting as a processing industry namely CV. Nurul Jannah and CV. Madurese heritage. The activities carried out by the processing industry are carrying out the production process of herbal chili powder and herbal chili powder coffee; 4). the flow of products from farmers to exporters by passing through two marketing agencies, namely collector traders I (small traders) and sword collectors II (larger traders); 5). flow of products from farmers, collectors I, traders II, herbal medicine producers, and consumers. Herbal medicine producers buy dried herbal chilies as a component of the raw materials for the traditional Madurese herbal medicine industry; 6). flow of products

from farmers to consumers through the processing industry and intermediary traders. The activities carried out by intermediary traders are conducting sales promotions through e-commerce and marketplaces; and 7). flow of products from farmers to consumers through the processing industry.

The flow of money flows from downstream to upstream. The price of herbal chili at the farm level fluctuates, ranging from 70,000-80,000 per kilogram. In September 2022 the average price at the farm level was IDR 70,000 per kilogram, in October 2022 there was an increase of IDR 10,000 per kilogram so that the price of dried herbal chilies was IDR 80,000 per kilogram. Collector traders I earn a sales margin of Rp.2,000/kg, Collector traders II earn a sales margin of Rp.2,000/kg, and processing industries earn a margin of Rp.30,000/kg. The portion of the margin earned by the processing industry is due to the fact that more activities are carried out, namely purchasing, drying, sorting, processing, packaging, labeling and storage. Meanwhile, collecting traders I and II only perform the functions of purchasing, sorting, and storing.



Information:
= product flow
= Financial flow
= Information flow

Image 1. Patterns of Jamu Supply Chain Supply Chain in Sumenep Regency, Madura

The area of herbal chili in Bluto District, Sumenep Regency is presented in table 2 following

Table 2. Land Area and Number of Herbal Chilli Plantation Trees in Bluto District, Sumenep Regency, Madura

No	Village	Land area (Ha)	Chilli Jamu		
			ıd Area (Ha)	Number Trees	Percentage ofof Land Area (%)
1	Guluk Manjung	74	1,8	2017	2,42
2	Kapedi	523	25,3	27,836	4.83
3	Western view	298	58	63,749	19.47
4	Middle View	179	28,6	31,413	16.02
5	Sangra's view	282	44.9	49,378	15.92
6	Aengdeke	250	8,6	9,475	3,44
7	Aengbaja Kenek	235	6,6	7,248	2.81
8	Bluto	217	45.5	50,053	20.99
9	Lobuk	414	19,7	21,646	4.76
10	Connection	134	2	2.216	1.49
11	Masaran	117	2,2	2,367	1.88
12	Palongan	135	7,1	7,800	5,28
13	King Aengbaja	65	1,2	1,326	1.84
14	Campa Coral	104	1,3	1,454	1.25
15	East Sara	77	1,7	1,841	2,20
16	Middle Sera	89	4,3	4,731	4.83
17	West Sara	46	0.8	893	1.75
18	Gillang	77	1,7	1875	2,21
19	Errabu	88	3,4	3,750	3.87
20	Gigging	123	3	3.315	2.44
	Total	**3,527**	**267.7**	**294,383**	**7.59**

Source: BPP Bluto District, Sumenep (2022)

The costs and income of the herbal chili coffee processing business carried out by CV. Nurul Janah is presented in table 3.Based on table 3, it can be seen that the fixed cost of herbal chili coffee production at CV Nurul Janah is IDR 1,030,000/month. Fixed costs incurred by employers include the cost of depreciation of equipment and the cost of renting a production site and warehouse. Variable costs incurred by employers include the cost of raw materials, auxiliary materials, and labor wages. While the variable costs used are input costs and labor costs. The variable costs incurred by the entrepreneur are Rp.9,113,000/month. The total costs incurred by CV. Nurul Janah to produce herbal chili coffee for IDR 11,393,000/month.

Table 3. Herbal Cabe Coffee Business Costs at CV. Nurul Janah

No	Component	Amount	Unit	Unit Price (Rp)	Amount Price (IDR)
1	Fixed Costs				
	Cost of depreciation of means of production				230,000
	Rent production space and warehouse				800,000
	Rent a pick-up car				1,250,000
	Total Fixed Costs (Total Fixed Cost)				**2,280,000**
2	Variable Cost				
	A. Raw materials				
	Herbal chili	30	kg	80,000	2,400,000
	Ginger	5	kg	80,000	400,000
	Cinnamon	5	kg	120,000	600,000
	Turmeric	5	kg	70,000	350,000
	Coffee	105	kg	35,000	3,675,000
	Sub total (Rp)				7,425,000
	B. Auxiliary materials				
	LPG				88,000
	Electricity				50,000
	Packaging				50,000
	D Labor				1,500,000
	Total variable costs (Total Variable cost)				**9,113,000**
3.	**Total Cost**				**11,393,000**

Source: Processed Primary Data, 2022

As for the acceptance of the herbal chili coffee business received by CV. Nurul Janah in each month is presented in the following table:

Table 4. Herbal Cabe Coffee Business Income at CV. Nurul Janah

Description		Unit	Score
a.	Fixed cost	Rp	2,280,000
b.	Variable Cost	Rp	9,113,000
c.	Total cost	Rp	11,393,000
d.	Production Amount	kg	140
e.	Product price	IDR/Kg	150,000
f.	Total Admissions	Rp	21,000,000
g.	Income	Rp	9,607,000
h.	R/C Ratio		1,8

Source: Processed Primary Data, 2022

The table above also explains the herbal chili coffee produced by CV Nurul Janah of 140 Kg/month. In one month CV Nurul Janah produces herbal chili coffee 14 times with an average production capacity of

10 kg per production process. The raw materials used to produce herbal coffee consist of herbal chilies, ginger, cinnamon, turmeric, and coffee. The selling price of herbal coffee products is IDR 150,000/Kg. Herbal chili coffee products are packed with aluminum foil with a net weight of 100 gr. Product price for packaging 1000 of IDR 15,000. The total income received by CV Nurul Janah in one month is IDR 21,000,000, with an income of IDR 9,607,000/month. The R/C ratio of this chili coffee business is quite high, namely 1.8. Thus the herbal chili coffee business CV. Nurul Janah is considered feasible to be developed.

The flow of information forms the basis for implementing supply chain management and is used by managers in making decisions (Pujawan and Maya, 2017). By knowing the flow of information, entrepreneurs can find out the number of requests and product attributes that consumers like (Sunendar, Darwanto, & Irham, 2019). Herbal chili production technology affects product quality. Currently, the processing industry uses appropriate technology for the processing of herbal chili powder, including flouring machines, drying machines, and continuous sealers. Information on the quality standards of commodities and herbal chili products, as well as price information is urgently needed by farmers, farmer groups, traders and processing industries.

Performance Evaluation of Herbal Chilli Powder Coffee Supply Chain

Based on the situational analysis, the supply chain actor being evaluated is the processing industry, namely CV. Nurul Janah. Analysis of supply chain performance using SCOR analysis.Measurement of supply chain performance uses SCOR metrics using work attributes, namely supply chain reliability, supply chain responsiveness, supply chain agility, supply chain cost, supply chain assets.The results of supply chain performance evaluation are presented in table 5 below.

Table 5. Measuring the Supply Chain Performance of Herbal Chilli Ground Coffee at CV. Nurul Janah

Performance Attributes	matrix	Actual Data	Parity	Advantage	Superior
Supply Chain Reliability	POF (%)	93.80%	80.75%	96.36%	139.57%
Supply Chain Responsiveness	OFCT (day)	5	9	7	5
Supply Chain Agility	USCF (day)	0	10	6	4
Supply Chain Costs	COGS (%)	11%	10%	14%	17%
Supply Chain Assets	CTCCT (day)	38	42	39	35

Source: Processed Primary Data, 2022

Table 5 shows the results of supply chain performance measurement data processing that occurred at CV Nurul Jannah by conducting a benchmark analysis to obtain the actual data position for supply chain reliability work attributes using the perfect order fulfillment (POF) matrix with a value of 93.80% producing actual data in the position above parity level with a value of 80.75% and below the advantage level with a value of 96.36%. The actual data from the supply chain responsiveness performance attribute with the order fulfillment cycle time (OFCT) matrix obtained a value of 5 days resulting in the position of the actual data being above the advantage level with a value of 6 days and below the superior level with a value of 4 days. The actual data from the supply chain agility performance attribute with the Upside Supply Chain Flexibility (USCF) matrix produces an actual data value of 0 so that benchmark analysis cannot be carried out. Actual data with supply chain cost performance attributes with the cost of goods sold (COGS) matrix produces a calculation value of 11%, causing the actual COGS data to be in a position below the adventage level which has a value of 14% and below the superior level which has a value of 17%. Meanwhile, the actual data with

supply chain asset performance attributes with a cash to cash cycle time matrix produces a value of 38 days which causes the actual data to be in a position above the advantage level with a value of 39 days and below the superior level which has a value of 35 days. Actual data with supply chain cost performance attributes with the cost of goods sold (COGS) matrix produces a calculation value of 11%, causing the actual COGS data to be in a position below the adventage level which has a value of 14% and below the superior level which has a value of 17%. Meanwhile, the actual data with supply chain asset performance attributes with a cash to cash cycle time matrix produces a value of 38 days which causes the actual data to be in a position above the advantage level with a value of 39 days and below the superior level which has a value of 35 days. Actual data with supply chain cost performance attributes with the cost of goods sold (COGS) matrix produces a calculation value of 11%, causing the actual COGS data to be in a position below the adventage level which has a value of 14% and below the superior level which has a value of 17%. Meanwhile, the actual data with supply chain asset performance attributes with a cash to cash cycle time matrix produces a value of 38 days which causes the actual data to be in a position above the advantage level with a value of 39 days and below the superior level which has a value of 35 days.

Gap Analysis

Gap analysis is a tool that can be used to analyze and compare company performance from actual or current data with historical data with the aim of improving company performance in the future (Endra & Prasetya, 2017).

Table 6. The Gap in the Supply Chain Needs of Herbal Chilli Powder Coffee in CV. Nurul Janah

Performance Attributes	matrix	Actual Data	Parity	Advantage	Superior	irements Gap
Supply Chain Reliability	POF (%)	93.80%	80.75%	96.36%	139.57%	2.56%
Supply Chain Responsiveness	OFCT (day)	5	9	7	5	0
Supply Chain Agility	USCF (day)	0	10	6	4	6
Supply Chain Costs	COGS (%)	11%	10%	14%	17%	6%
Supply Chain Assets	CTCCT (day)	38	42	39	35	1

Source: Processed Primary Data, 2022

The results of the gap analysis of the performance attributes of supply chain reliability with the perfect order fulfillment (POF) matrix produce actual data above the target value of companies that are at the advantage level, namely with a value of 96.36%, this shows that supply chain reliability performance has exceeded the target of CV Nurul Jannah . Meanwhile, in the Halsil gap analysis, the supply chain responsiveness performance attribute with the order fulfillment cycle time (OFCT) matrix produces 5 days of actual data with a company target of 5 days, so that the company's performance is on target. USCF gap analysis results could not be carried out because no actual data was obtained for that period. The results of the gap analysis of supply chain cost attributes with the COGS matrix produce actual data of 11% with a company target of 17%. so that the company's performance is lower than the target set by CV Nurul Janah. Then for the gap analysis results of supply chain asset performance attributes it produces an actual data value of 38 days which shows actual data below the target value of CV Nurul Jannah which targets 39 days.

CONCLUSION

The herbal chili supply chain in Sumenep Regency consists of three streams, namely product flow, money flow, and information flow. There are seven marketing channels for chili herbs in Madura. Product flow flows from upstream to downstream, cash flowflow from downstream to upstream, and information flow from upstream to downstream and from downstream to upstream. Supply chain sustainability performance based on the SCOR analysis is in a good category, and most of it is in line with the company's targets. The recombined strategy is partnership development.

THANK-YOU NOTE

This research was funded by the Independent Research Fund of LPPM, University of Trunojoyo Madura (UTM). Thanks were conveyed to the Chairperson of LPPM UTM and the Chancellor of Trunojoyo Madura University. The researcher also thanks CV Nurul Janah for providing the information and data needed for this research.

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