

# Supply Chain Resources of Red Chili Based on Food Supply Chain Network in Kulonprogo Indonesia

Susanawati<sup>1,\*</sup>, Muhammad Fauzan<sup>1</sup>, Ivo Mega Candela Fanestia<sup>1</sup>

<sup>1</sup> Department of Agribusiness Universitas Muhammadiyah Yogyakarta, Yogyakarta, 55183, Indonesia

\*Corresponding author. Email: [susanawati@umy.ac.id](mailto:susanawati@umy.ac.id)

## ABSTRACT

This study is to describe the structure of the red chili supply chain relationship and describe the resources of the red chili supply chain in Panjatan District, Kulonprogo Regency. The research location was determined intentionally with the help of Cluster Sampling in determining farmers' samples. The technique used was the Snowball Sampling to determine samples other than farmers. Respondents used consisted of 80 farmers, treasurer of the auction market, 2 middlemen in Garongan Village, 2 Collecting Traders in Panjatan District, 3 Bandar PIKJ, 10 Centeng PIKJ, 20 PIKJ Retailers and 30 Consumers. Primary data collection was done by interviews and documentation with questionnaire aids. Secondary data were obtained from the Department of Agriculture and Food, Kulonprogo Regency. The analysis used was descriptive analysis presented with the help of tables and figures. The results showed: (1) The structure of the red chili supply chain relationship in Panjatan District was divided into 3 chains consisting of 8 actors; (2) a. Physical resources owned by farmers were different from other actors because they had production activities; b. Technology resources are dominated by Information Technology; c. Human resources in the form of labor are mostly owned by auction market players; d. The most capital resources were spent by the middlemen because they made purchases every day. Physical resources owned by farmers were different from other actors because they had production activities; b. Technology resources are dominated by Information Technology; c. Human resources in the form of labor are mostly owned by auction market players; d. The most capital resources were spent by the middlemen because they made purchases every day. Physical resources owned by farmers were different from other actors because they had production activities; b. Technology resources are dominated by Information Technology; c. Human resources in the form of labor are mostly owned by auction market players; d. The most capital resources were spent by the middlemen because they made purchases every day.

**Keywords:** Food supply chain network, Red chili, resources, Supply chain

## 1. INTRODUCTION

Horticulture is one of the agricultural sub-sectors consisting of commodities of fruits, vegetables, ornamental plants (floriculture) and medicinal plants (biopharmaceuticals) [1]. Horticultural plants are among the plants that are in great demand by farmers to be cultivated because the area in Indonesia has a diversity of agro-climates that allow for the development of various types of horticulture, both in tropical and subtropical climates. Regarding vegetable crops, Indonesian consumers are very fond of chilies (*Capsicum annum* L.), and they use them as a complementary ingredient in many of their dishes [2]. In general, chilies contain many nutrients and vitamins, including calories, protein, fat, carbohydrates, calcium, vitamin A, vitamin B1, and vitamin C [3]. Red chili is one of the chilies that is widely

consumed by the people of Indonesia. According to the production statistics of the Directorate General of Horticulture in 2014, the Red Chili Production Center in Indonesia is the island of Java with a total production of 556,669 tons or about 51.81 percent of the total national chili production.

Kulonprogo Regency is one of the regions in DIY which has the largest amount of red chili production in the period 2012 - 2016 with an average production of 13,278 tons, as shown in Table 1. This value can provide the highest contribution of 71% to production. red chili in DIY. The demand for red chili in Kulonprogo does not only come from the region but also from outside the district and other big cities. Therefore, Kulonprogo is often referred to as a supplier of red chili in Java.

Based on Table 1, Panjatan District is one of the largest red chilies producing areas in Kulonprogo with an average production of 4,526.4 tons. This value causes Panjatan District to provide the largest contribution to the production of red chili in Kulonprogo Regency, which is 34.09%. This condition causes Panjatan District to be chosen as the research location.

Red chili is one of the agricultural products that are seasonal, where this seasonal product has quite a few weaknesses, one of which is the production of red chili produced each year is different, sometimes experiencing an increase in the amount of production or even a decrease in the amount of production. This will encourage price and production fluctuations in red chili. Gaging the relationship between consumer demand and availability, the price of chilies is likely to fluctuate and thereby impact the national economy [4]. This demand will likely continue to increase as the population itself increases [5]

Fluctuations in the price of red chili in Panjatan District always occur every season. These fluctuations were caused by the amount of supply and demand in the market, including the Kramatjati Jakarta Main Market (PIKJ). This is because red chilies from Kulonprogo Regency are also distributed to PIKJ which is the central fruit and vegetable market in Jakarta. The process of red chili distribution to consumers is inseparable from the supply chain concept. More specifically, the supply chain covers all interactions between suppliers, manufacturers, distributors, and customers [6].

The supply chain evolves in three parts [7], namely, the upstream supply chain, the internal supply chain, and the downstream supply chain. [8] claim that the supply chain is dynamic and covers the flow of information, products, and money at the supply chain level. Moreover, a supply chain consists of parties involved either directly or indirectly in response to customers, and these parties include manufacturing, suppliers, transportation, warehouses, retailers, and customers. Meanwhile, [9] explains that the supply chain constitutes several physical activities and decision-making processes related to the flow of substances, information, and money. Physical flow concerns the movement of products from supplier to customer, while information flow concerns the number of requests.

Based on the Food Supply Chain Network (FSCN) framework, there are 4 types of resources in the supply chain, namely physical, human, capital, and technological resources [10]. These four resources are very important in a supply chain, because they can support supply chain performance, including for red chili commodities in Kulonprogo Regency. Therefore, it is important to do This study aims to (1) describe the structure of the red chili supply chain relationship in Kulon Progo Regency in terms of the actors and their activities and (2) analyze the red chili supply chain resources in Kulon Progo Regency in terms of physical resources, technological resources, human resources, and capital resources.

**Table 1.** Red Chili Production in Kulonprogo Regency in 2012-2016

Districts	Year (Tons)					Average (Tons)	Contribution (%)
	2012	2013	2014	2015	2016		
Temon	5.369	2,677	6.225	4.224	1,665	4.032	30.37
Wates	1,210	1.809	1.328	7.028	5.006	3058.4	23.0
<b>Panjatan</b>	<b>3.568</b>	<b>2,491</b>	<b>3.576</b>	<b>3.184</b>	<b>9,813</b>	<b>4,526.4</b>	34.09
Galur	868	793	425	1,210	882	617.8	4.65
Lendah	12	34	35	100	110	58.2	0.44
Sentolo	101	579	179	157	213	245.8	1.85
Pengasih	258	209	463	655	466	410.2	3.09
Kokap	34	29	27	66	95	50.2	0.38
Girimulyo	17	14	26	9	18	16.8	0.13
Nanggulan	70	145	185	83	327	162	1.22
Kalibawang	34	34	6	64	129	53.4	0.40
Samigaluh	40	32	30	49	83	46.8	0.35
Total	11.582	10,846	12,504	16,828	18,805	13,278	100.00

## 2. RESEARCH METHODS

This research employed a descriptive method that systematically describes, actually and accurately, the factors, properties, and relationships between the phenomena in the study [11]. The analytical description method is a research method that describes systematically accurately and in relation to the factors, properties, and relationships between the phenomena studied [12]. The study was conducted in Panjatan District because most of the population work as chili farmers and Panjatan District is the largest chili producer in Kulonprogo Regency.

The location of this research was chosen deliberately in Kulon Progo Regency because it has the highest red chili production in DIY as shown in Table 1. Sampling of red chili farmers was carried out in stages. First, Panjatan District was chosen deliberately because the production of red chilies in Panjatan District is the most in Kulonprogo District, as shown in Table 1. The second stage is the determination of villages, Garongan Village was chosen because of the red chili auction market in the area and the most, namely 4 units. The third stage, the selection of hamlets was chosen Dusun Garongan because it has the reddest chili farmers.

Sampling of other supply chain actors after red chili farmers uses the snowball sampling technique, namely sampling by following the red chili supply chain flow carried out by each actor from farmers to final consumers in Jakarta. Based on field conditions, the number of chain actors after farmers are 1 auction market administrator, 2 middlemen in Garongan Village, 2 collector traders in

Panjatan District, 3 PIKJ Bandars, 10 PIKJ Centeng, 20 PIKJ retailers and 30 end consumers.

The data used in this study is primary data, which was collected by interview technique using a questionnaire. The structure of the red chili supply chain relationship was analyzed descriptively in terms of the actors and their activities. The results of the analysis of the supply chain relationship structure are displayed in the form of images. Red chili supply chain resources were analyzed based on the FSCN which consisted of aspects of partner selection, contractual agreements, transaction systems, government support and supply chain collaboration. The results of supply chain resource analysis are presented in tabular form for physical, human, capital and technological resources.

## 3. RESULTS AND DISCUSSION

### 3.1. Red Chili Supply Chain Relationship Structure

In a supply chain there are actors who are directly or indirectly involved. The red chili supply chain relationship structure describes the actors involved and their activities in the flow of information, products and money in the chain. The structure of the red chili supply chain relationship in Kulonprogo Regency is formed by three chains. Here is the structure of the relationship that occurs:

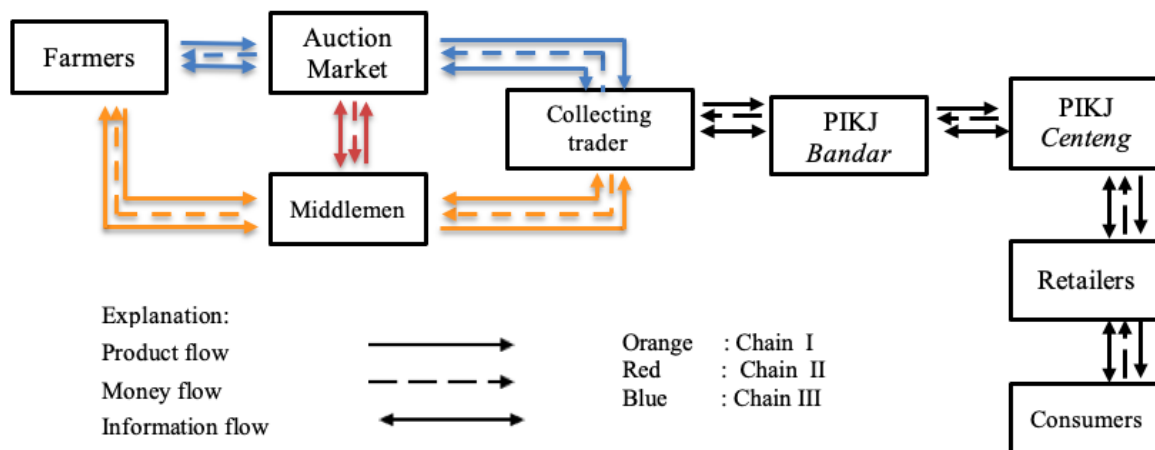


Figure 1. Structure of Red Chili Supply Chain Relationship in Panjatan District, Kulonprogo Regency

**Table 2.** Activities of Red Chili Supply Chain Actors

No	Activity	Perpetrator							
		Farmer	Middleman	Market Auction	Trade Collector	Bandar PIKJ	Centeng PIKJ	Retailer	Consumer
1	Chili Cultivation	√							
2	Sorting	√	√	√	√				
3	Packaging		√	√	√		√	√	
4	Determination Price		√		√	√	√	√	
5	Offer Price					√	√	√	√
6	Updates Information		√	√	√	√	√		
7	Purchase of Red Chili		√		√	√	√	√	√
8	Freight				√				
9	Delivery Red Chilli Pepper				√				
10	Accept Payment		√	√	√	√	√	√	
11	sales					√	√	√	
12	Clean and Separate Red Chili					√	√	√	√

Red chili supply chain actors are institutions, or all actors involved in the product flow, information flow and money flow that apply from red chili farmers in Kulonprogo Regency to final consumers in Jakarta. Based on Figure 1, the structure of the red chili supply chain relationship in Kulonprogo Regency is formed by 3 chains and consists of 8 actors, namely:

1. Farmers – Middlemen – Collecting Traders – PIKJ *Bandar* – PIKJ *Centeng* – Retailers – Consumers.
2. Farmers – Middlemen – Collecting Traders – PIKJ *Bandar* – PIKJ *Centeng* – Retailers – Consumers.
3. Farmers – Middlemen – Auction Markets – Collecting Traders – PIKJ *Bandar* – PIKJ *Centeng* – Retailers – Consumers.

**3.1.1. Farmer**

Activities carried out by farmers are all activities related to red chili cultivation from seeding to harvesting. The last planting season for red chili is from March 20 – August 31, 2019. The planting of red chilies between farmers is usually done simultaneously. Starting from seeding to harvesting, usually farmers will make their own seeds to be planted on their own land. The following are the activities of red chili farmers in the red chili cultivation process:

**a. Procurement of seeds**

Procurement of seeds is done by making your own or buying seeds that are ready to be planted. Red chili farmers in Panjatan District use seeds that are ready to be planted because they are more practical than making their own which requires a lot of time and effort. Apart from

being more practical, seeds that are ready to be planted usually have good quality seeds. The red chili varieties in Panjatan District are helix, kio, profit, red lava, yosi, trophy, lolay and NV. The helix and kio varieties are not resistant to excessive rain but are resistant to pests while NV is resistant to rainwater but prone to pests.

**b. Cultivation of land**

Before planting red chili, the planting media must go through processing first. The necessary land management is plowing the land which aims to remove weeds that grow on the land to be planted. After plowing, the land will be mixed with manure which serves to increase the fertility of the land. The manure used by farmers is cow and goat manure.

**c. Planting**

Seedlings are planted aged 25 - 20 days or have 4-5 leaves. Seedlings are planted with a spacing of 50-60 cm from one hole to another. In one planting hole, one red chili seed is planted. Seeds that will be planted before must be sprayed with fungicides and insecticides to prevent pests and diseases. Planting is done in the morning or evening to reduce evaporation of water on the land. At the time of planting takes place watering should be done before and after planting.

**d. Maintenance and Harvesting of red chili plants**

After planting, fertilization is carried out at least 3 times during the cultivation process. The type of fertilizer used depends on the area of land and the area planted with red chili. . This is done because the level of soil fertility and soil types are different from place to place. Fertilization is done periodically with a period of 10 -12 days when the plants have not changed. After fertilizing

the plants, the embroidery process is carried out in the morning and evening. This activity is carried out 2 or 3 times during the cultivation process. Embroidery is done in the first week and second week after planting. Irrigation activities are carried out by sucking water using diesel and using a ring with the help of a ring so that the water can spread.

Harvesting of red chili is carried out on chili plants aged 70-75 days depending on the variety planted. Chili plants that are ready for harvest are characterized by their dense fruit and bright red color. Harvesting is done by picking the fruit along with the stalk which aims to keep the chili longer. The average harvesting of red chilies in Panjatan District during one planting season is 10-25 times of picking. Chili fruit that is attacked by pests or diseases must also be picked so as not to spread the disease to other plants.

### *3.1.2. Auction Market*

The The auction market is a means used to bring together red chili farmers with traders directly by establishing prices that are carried out transparently without any pressure from any party. Likewise with the red chili auction market in Panjatan District, the auction market is the second actor after farmers in the red chili supply chain in Panjatan District, Kulonprogo Regency.

- a. The auction market starts at noon, when the farmers have finished harvesting the farmers will immediately bring the chilies to the auction market.
- b. At 17.00 WIB, the auction market administrator begins to weigh the red chilies that have been deposited by the farmers in the harvest ward.
- c. At 19.00 WIB, the auction process begins by writing down the price that has been set by each trader participating in the auction. The auction system implemented uses a closed auction through the auction market administrator.
- d. After the price is formed, the auction market manager will carry out the packaging. The packaging used in the auction market is cardboard with holes. In one box contains a net weight of 30 kg of red chili which is covered with tape. The average red chili auction in one auction is 2.5 tons.
- e. After the packaging is complete, the chili will be transported to the truck belonging to the collecting trader who won the auction to be distributed to the Kramat Jati Main Market.

### *3.1.3. Middlemen*

Red chili middlemen are the second actors who have the same position as the auction market. The difference between the two lies in their position. If the auction market is a supply chain actor but is still included in the supporting facilities, the middleman is a farmer who

stands alone as well as a trader who receives red chili production from other farmers.

- a. The middleman's activity starts at 07.00 until the goods are sold out. Middlemen carry out their activities in lapak owned or commonly referred to as a kiosk.
- b. The middlemen daily update the price information from the collecting traders. Information updates in addition to prices, middlemen also update information regarding the quantity of chili and chili quality.
- c. After updating the information, the middleman will determine the price for each red chili that will be traded. If there is a price difference, there will be negotiations between middlemen and collectors.
- d. When the price is established, the chili will be packaged in a cardboard box. The packaging used by middlemen is in the form of cardboard with a cardboard capacity of 30 kg of chili net weight. After being packaged, it will be transported and sent directly by the collector.

### *3.1.4. Gathering Merchants*

The Collector traders are the third supply chain actor who buys red chilies in large quantities from the auction market by winning the auction. Collecting traders who win the auction will get red chilies with an amount that can reach one ton or even more.

- a. Collectors play a role in determining prices in the auction market and in middlemen.
- b. The price that has been set by the collecting trader will be agreed with the highest price auction. After the price is established, the collecting traders will take the goods with the help of the labor they have in the auction market.
- c. Before the process of sending chilies to the next actor, the collecting trader must contact the next actor to find out information about the quality and quantity of red chili owned. After that, the collecting traders will make deliveries to the next perpetrator.
- d. After the red chili arrives at the next perpetrator, the collecting trader will get payment from the next perpetrator by transferring the money.

### *3.1.5. PIKJ Bandar*

PIKJ dealers will usually buy red chilies from collecting traders who bring in large quantities of red chilies which will then be resold to PIKJ centeng

- a. The activities required by the city start at 09.00 – 17.00.
- b. The dealer buys red chilies from collecting traders by placing orders via sms or telephone to collecting traders.

- c. Selling red chilies to PIKJ centengs on a large scale by making an offer in advance to checkings who have long subscribed to the city before the general sale opens.
- d. Receive payment from checkbox by transfer after the chili is sold out.

### 3.1.6. PIKJ Centeng

*Centeng* is the fifth actor in the red chili supply chain in Panjatan District, Kulonprogo Regency. Centeng usually buys red chilies from dealers in large enough quantities to then resell to retailers.

- a. Checking activities start at 05.00 WIB but start selling their goods at 07.00 - 16.00 WIB.
- b. Purchasing red chilies from the PIKJ airport on a large scale.
- c. Sorting chilies that have poor quality.
- d. Carry out packaging using clear plastic in accordance with the needs of consumers. Centeng has a minimum purchase requirement of 5 kg of red chili, if you make a purchase of less than 5 kg you will be charged a higher price.
- e. Carry out packaging using clear plastic in accordance with the needs of consumers. Centeng has a minimum purchase requirement of 5 kg of red chili, if you make a purchase of less than 5 kg you will be charged a higher price.

### 3.1.7. Retailer

Retailers are the sixth actor in the red chili supply chain from centeng in relatively small quantities to direct resale to final consumers. Retailers usually have facilities in the form of their own stalls which are used as a place to sell their red chilies

- a. Retailer activity starts at 05.00-12.00 WIB.
- b. Retailers make purchases of red chilies at the checkmark at PIKJ which are carried out every day.
- c. Retailers play a role in determining prices for consumers.
- d. Doing sorting for chili that is worth selling.
- e. Doing direct sales to consumers
- f. Receive payments from consumers.

### 3.1.8. Consumer

Consumers do not have much activity in the red chili supply chain. Consumers usually make purchases when the market has started to open. Almost the majority of consumers start purchasing activities in the morning because the red chilies are still fresh. The time for consumers is also not determined, consumers can make purchases at any time as long as the market is still open.

## 3.2. Red Chili Supply Chain Resources

Red chili supply chain resources are factors that can support the process of occurrence of activities related to the process of flow of goods, information flow and the flow of money in red chili commodities. In addition, the resources owned by each actor play a role in the development of all chain actor activities. In the supply chain there are 4 kinds of resources, namely, physical resources, technological resources, human resources and capital resources.

### 3.2.1. Physical resources

The physical resources of all red chili supply chain actors are a grouping of resources based on the facilities owned by each actor. Physical resources have a function as a facility that must be managed to ensure that the flow that occurs in the supply chain runs in a timely and efficient manner.

Table 3 shows the classification of physical resources in the chili supply chain in Panjatan District. Each actor has varying physical resources. In terms of physical resources, PIKJ centeng does not have a means of transportation because the location of the PIKJ centeng stall is adjacent to the PIKJ airport. While the majority of red chili supply chain actors have transportation tools in the form of motorbikes. On physical resources in the form of supporting facilities and infrastructure such as the place where all activities carried out by each actor take place. The facilities are in the form of land that is only owned by farmers as a place for red chili cultivation activities to take place.

In table 4 it can be seen the technological resources of each red chili supply chain actor in Panjatan District, Kulonprogo Regency. The technology used also varies for each actor. In farmers, the type of technology used is called cultivation technology. Red chili handling technology only consists of the use of a blower which serves to reduce the risk of red chili rotting due to humidity, this technology is only available in PIKJ Bandar and PIKJ Centeng. The use of this technology is indeed widely used by bookies and checkers because they carry out red chili sales activities with longer working hours compared to other actors. Information technology used in the form of the use of social media in the form of Whatsapp, SMS and telephone. Payments in the process of buying and selling red chilies are made using a transfer system to facilitate the process of transferring money between actors. The transfer system is usually done using an ATM or Automated Teller Machine.

**Table 3.** Physical Resources of All Red Chili Supply Chain Actors in Panjatan District, Kulonprogo Regency

No	Information	Actors							
		Farmer	Auction Market	Middleman	Collecting traders	Bandar	Centong	Retailers	Consumers
1	<b>transportation</b>								
	a. Bike	√	-	-	-	-	-	-	-
	b. Motorcycle	√	-	√	-	-	-	√	√
	c. Truck	-	-	-	√	-	-	-	-
	d. Pick Up	-	-	-	√	√	-	√	-
	e. Tossa	√	-	-	-	-	-	-	-
2	<b>stalls</b>	-	-	√	-	√	√	√	-
3	<b>Land</b>	√	-	-	-	-	-	-	-
4	<b>Farming Equipment</b>								
	Hoe	√	-	-	-	-	-	-	-
	Sickle	√	-	-	-	-	-	-	-
	Diesel	√	-	-	-	-	-	-	-
	Hose	√	-	-	-	-	-	-	-
	ring	√	-	-	-	-	-	-	-
	Rickshaw	√	-	-	-	-	-	-	-
	Engrong	√	-	-	-	-	-	-	-
	Shovel	√	-	-	-	-	-	-	-
	Jet Pump	√	-	-	-	-	-	-	-
	Sprayer	√	-	-	-	-	-	-	-
	Bucket	√	-	-	-	-	-	-	-
	Fork	√	-	-	-	-	-	-	-
	Paralon	√	-	-	-	-	-	-	-
3	<b>Trading Equipment</b>								
	a. Cutter	-	-	-	-	√	√	-	-
	b. Calculator	-	√	√	-	√	√	√	-
	c. blower	-	√	-	-	√	√	-	-
	d. Mechanical Scales	-	-	√	-	√	√	√	-
	e. Manual Scale	-	√	√	√	√	√	√	-

**Table 1.** Technological Resources of All Red Chili Supply Chain Actors in Panjatan District, Kulonprogo Regency

No	Information	Actors							
		Farmer	Auction Market	Middleman	Collec. trader	Bandar	Centeng	Retailers	Consumers
1	<b>Cultivation Technology</b>								
	a. Mulch	√	-	-	-	-	-	-	-
	b. Hose Usage	√	-	-	-	-	-	-	-
	c. Jet Pump	√	-	-	-	-	-	-	-
	d. Tractor	√	-	-	-	-	-	-	-
	e. Battery Sprayer	√	-	-	-	-	-	-	-
2	<b>Handling Technology</b>								
	a. blower	-	-	-	-	√	√	-	-
3	<b>Information Technology</b>								
	a. Whatsapp	-	√	√	√	-	-	-	-
	b. SMS	√	√	√	-	-	-	-	-
	c. Telephone	√	√	√	√	√	√	-	-
4	<b>Payment by Transfer</b>	-	√	√	√	√	√	-	-

**Table 2.** Human Resources of All Red Chili Supply Chain Actors in Panjatan District, Kulonprogo Regency

NO	Information	Perpetrator													
		Farmer		Auction Market		middleman		Ped. collector		PIKJ city				Check PIKJ	
		Number of Kindergarte	Working	Number of Kindergarte	Working (Hour)	Number of Kindergarte	Working	Number of Kindergarte (person)	Working (Hour)	Number of Kindergarte	Working (Hour)	Number of Kindergarte	Working Hours		
1	<b>On Farm Labor</b>														
	a. Seed Preparation	10	4	-	-	-	-	-	-	-	-	-	-	-	-
	b. Tractor	2	2	-	-	-	-	-	-	-	-	-	-	-	-
	c. Spreading Compost and mulch	7	9	-	-	-	-	-	-	-	-	-	-	-	-
	d. Planting	17	4	-	-	-	-	-	-	-	-	-	-	-	-
	e. Stitching	5	7	-	-	-	-	-	-	-	-	-	-	-	-
	f. HPT Control	4	4	-	-	-	-	-	-	-	-	-	-	-	-
	g. Weeding	6	7	-	-	-	-	-	-	-	-	-	-	-	-
	h. Fertilization	6	4	-	-	-	-	-	-	-	-	-	-	-	-
	i. Irrigation	3	4	-	-	-	-	-	-	-	-	-	-	-	-
	j. Harvest	9	8	-	-	-	-	-	-	-	-	-	-	-	-
2	<b>Off Farm Labor</b>														
	a. Weighing	-	-	4	2	-	-	-	-	-	-	-	-	-	-
	b. Unloading and loading	-	-	-	-	-	-	3	6	3	6	3	6	3	6
	c. Selling chili	-	-	-	-	-	-	3	8	2	1	2	9	2	9
	d. Packaging	-	-	15	4	-	-	4	4	3	7	-	-	-	-
	e. Grading	-	-	-	-	-	-	-	-	4	8	-	-	-	-
	f. Delivery	-	-	-	-	-	-	-	-	4	7	-	-	-	-



**Table 6.** Capital Resources of All Red Chili Supply Chain Actors in Panjatan District, Kulonprogo Regency for 1 planting season (4 months)

No	Information	Perpetrator							
		Farmer	Auction Market	Middleman	Collec. traders	Bandar	Centeng	Retailers	Consumers
	Capital Source	-	-	-	-	-	-	-	-
a.	Alone (Rp)	7,758,824	450,000	534,393,900	2,577,764,000	12,332.160,000	1,541,520,000	6,581,200	600,000
b.	Loans (Rp)	6,090.476	200,000	-	1,104,756,000	-	-	-	-
	Origin of Loan	-	-	-	-	-	-	-	-
a.	Bank	6,090.476	-	-	1,104,756,000	-	-	-	-
b.	Fellow	-	-	-	-	-	-	-	-
c.	Farmers	-	200,000	-	-	-	-	-	-
d.	Others (LKMD)	-	-	-	-	-	-	-	-
	Flower (%)	7	-	-	7	-	-	-	-

**3.2.2. Human resources**

Red Chili Supply Chain Human Resources are all actors involved in product distribution which include product flow, money flow and information flow. Each red chili supply chain actor has human resources in the form of workers who can assist in the activities carried out by each actor. In the workforce, each activity and working hours are distinguished by gender. This difference occurs because when viewed from a physical point of view, men are physically stronger than women, so that different activities are carried out. Male workers usually carry out activities in the form of loading and unloading that require more physical strength.

Table 5 shows the human resources of all actors in the red chili supply chain in Panjatan District, Kulonprogo Regency. Human resources owned in the form of labor, each workforce owned by each actor has varied activities. The workforce in human resources is separated into on-farm workers and off-farm workers. On farm workers carry out activities related to red chili cultivation and are only owned by farmers. While off-farm activities outside of cultivation such as weighing chilies and selling chilies.

**3.2.3. Capital resources**

Capital resources in the supply chain are related to the capital owned by supply chain actors to be able to carry

out all the activities carried out. Red chili supply chain capital resources are all financial-related factors used in supply chain activities.

Table 6 shows the capital resources of the entire red chili supply chain in Panjatan District, Kulonprogo Regency. The capital resources used by each actor vary. Most of the capital is issued by the dealer because the dealer makes purchases from collecting traders every day. The amount of capital issued by the city is Rp. 12,332.160,000 for the purchase of red chili. The interest rate on the loan is 7%. The origin of capital loans is mostly obtained from loans at banks because banks are the fastest providers of capital. The bank used is Bank Rakyat Indonesia with the type of KUR (Kredit Usaha Rakyat) loan with a loan interest of 7%.

**4. CONCLUSION**

The structure of the red chili supply chain relationship in Kulonprogo Regency is formed by three chains consisting of 8 actors, namely (1): Farmers – Middlemen – Collecting Traders – PIKJ Bandar – PIKJ Centeng – Retailers – Consumers; (2) Farmers – Middlemen – Auction Markets – Collecting Traders – PIKJ Dealers – PIKJ Centeng – Retailers – Consumers. And (3) Farmers – Auction Market – Collector Traders – PIKJ Bandar – PIKJ Centeng – Retailers – Consumers. The physical resources owned by the red chili supply chain actors

consist of transportation equipment, land, stalls, warehouses, farming equipment, and trading business equipment. The technological resources owned by the red chili supply chain actors are cultivation technology, post-harvest handling technology, information technology for communication and payment systems by transfer. Human resources in the red chili supply chain include on-farm staff and weighing, loading, and unloading, packaging, grading, and shipping. The capital resources used by each actor vary, where the most capital is issued by the PIKJ city.

[12] Nazir, Moh. (2013). *Metode Penelitian*. Bogor : Ghalia Indonesia.

## REFERENCES

- 1] Simanullang, M. Analysis of Leading Commodities of Horticulture Sub-Sector in North Sumatra Province (Master's thesis).
- [2] Zamrodah Y, Pintakami LB. Pendapatan Dan Kelayakan Usahatani Cabai Rawit. *J Agric Soc Econ*. 2020;1(1):48–53.
- [3] Karyani T, Susanto A, Djuwendah E, Hapsari H. Red chili agribusiness and the risks faced by the farmers. *IOP Conf Ser Earth Environ Sci*. 2020;466(1):1–8.
- [4] Van JC, Huang WC, Anindita R, Chang WI, Yang SH. Price volatility of cayenne pepper and red chili pepper in Papua and Maluku Provinces, Indonesia. *Scholar J Econ Bus Manag*. 2017;4(9):590–9.
- [5] Suwarsinah HK, Harwanti NF, Hastuti, Firdaus M. The pricing system of red onion and red chili commodities. *Jurnal Management and Agribusiness*. 2018;15(2):150–61.
- [6]. Yildiz K, Ahi MT. Innovative decision support model for construction supply chain performance management. *Prod Plan Control*. 2020:1–13. doi: 10.1080/09537287.2020.1837936.
- [7] Anatan L. Pengaruh Implementasi Praktik-Praktik Manajemen Rantai Pasokan Terhadap Kinerja Rantai Pasok Dan Keunggulan Kompetitif. *Jurnal Karisma*. 2010;4(2):106–17.
- [8] Chopra S, Meidl P. *Strategy, planning, and operation. Supply chain management*. London, England: Pearson Education International; 2004.
- [9] Van der Vorst, J. G. A. J. (2004). *Supply chain management: theory and practices*. In *Bridging Theory and Practice* (pp. 105-128). Reed Business.
- [10] Lambert DM, Cooper MC. 2000. Issues in Supply Chain Management. *Industrial Marketing Management*; 29(2000) : 65-83.
- [11] Sugiyono. *Metode Penelitian Bisnis. Pendekatan Kuantitatif, Kualitatif, Kombinasi, Dan R&D*. Bandung: CV Alfabeta; 2017.