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Abstract— Robusta coffee is one of the most widely cultivated plantation crops in Indonesia. West Nusa Tenggara Province which has the potential for the development of robusta coffee (*Robusta canephora*) is North Lombok Regency. The purpose of this study is to analyze the supply chain system of Robusta coffee of Gangga District, North Lombok regency. The method used in this study is descriptive. Data collection was carried out with field observation and literature study. The study revealed supply chain of Robusta coffee of Gangga District, North Lombok Regency. Groups or actors in the coffee supply chain consisted of farmers, distributors and consumers. The product flows from farmers to consumers. Financial flows were from consumers up to coffee growers. Information flows up and down the coffee stream. Supply chain management can be used to coordinate and evaluate all activities in the chain involved, with the potential for Robusta Gangga coffee in North Lombok Regency

Keywords— *robusta coffee, supply chain, coffee business.*

I. INTRODUCTION

Plantation as an integral part of the agricultural sector is a sub-sector that has an important and strategic role in national development. The contribution of the plantation sub-sector to the Agriculture, Livestock, Hunting and Agricultural Services sectors is around 25.75% [1]. Coffee is one of the mainstay commodities in the Indonesian plantation sector which has market opportunities both domestically and abroad. The coffee commodity can contribute in the form of foreign exchange and state income, a source of income for farmers, job creation, growth drivers for the agribusiness and agro-industry sectors, regional development and environmental preservation [2]. The share of Indonesian coffee exports in the international coffee market is the fourth highest after Brazil, Vietnam and Colombia with most of Indonesia's coffee exports being Robusta coffee (94%) and the rest is arabica coffee [3]. Total coffee exports in the last eight years have tended to fluctuate, ranging from 40.15 - 30.46% with most of Indonesia's coffee exports being Robusta coffee (94%) and the rest is arabica coffee. Indonesia's consumption rate grew 44% in this ten-year period, Indonesia's coffee consumption reaches 1.13 kg/year and the share of Indonesia's consumption level in 2019 among producing countries in the Asia and Oceania region is the highest, namely 13.5%. Meanwhile, the share of Indonesia's consumption level in the world in the same year was the 5th highest, at 2.9% [5]. If many Indonesians

consume Indonesian coffee themselves, farmers and producers will be able to sell coffee at a higher price.

West Nusa Tenggara Province has superior plantation commodities, one of which is coffee. Because it has not maximised the potential of its plantation, recorded that 28.58% has been utilised and 71.41% is still available, coffee that grows and develops includes types of robusta and arabica coffee. One of the districts in NTB that has the potential for the development of robusta coffee is North Lombok Regency. Where the coffee processing system on the island of Lombok uses dry processing and wet processing [2]. The production and area of robusta coffee still dominates with an area of 1,119 ha and reaches 710 tonnes. So that the initial export of robusta coffee was carried out in 2019 as many as 10 tons with an export value of IDR 508,000,000 as a USD 363,086,32 to South Korea using SKA (Certificate of Origin) issued from NTB. This robusta coffee export activity is carried out by the NTB Provincial Government in collaboration with the Ministry of Agriculture and UD.Berkah Alam as a distributor of robusta coffee. Currently, commercial agriculture is dominated by agribusiness principles, which strive for larger positive impact by developing linkages forward and backward [7], and this development has led to an increased focus on agricultural supply chain [8-9]. As the focus shifts, supply chains receive more attention due to their efficiency and high return on investment. Also, agricultural supply chains integrate many participants (e.g., producers, growers, manufacturers, trades, and consumers) who each receive benefits, resulting in higher total gains for multiple parts of the community [8-10].

Problems related to the supply chain often occur in the coffee industry, for example uneven income in supply chain elements [11]. Supply chain management refers to the implementation of systems to plan, organize, actuate, and control all stages of the supply chain, all in an effort to maximize operation efficiency and effectiveness [12-14]. The simplest supply chain management plays a role in coordinating and evaluating all activities in the chain involved from upstream to downstream due to the large potential for local coffee from the production side in the Gangga region of North Lombok. The issue of coffee quality when upstream farmers are still harvesting with a one-harvest system, while the harvest should be chery (red) colored coffee beans selected and after harvest the farmers still dry haphazardly, fermentation should be carried out so

that the coffee taste and aroma produced does not decrease in quality. Applying the concept of supply chain well in commodity crops/plantations then a mutually beneficial partnership program with distributor coffee can guarantee the market and prices which is conducive to farmers.

The implementation of good supply chain management will result in all entities involved in the coffee supply chain feeling benefited, and will have an impact on advantages in various aspects thereby increasing competitive advantage. Activities that start from converting natural resources and raw materials into products that are distributed to end consumers. Information about price, quality and availability is also needed to support supply chain activities [15]. The most important thing in a supply chain is the maintenance of product, information and financial flows so that it requires extensive and detailed supply chain information.

The purpose of this study was to analyze the supply chain system for Robusta Gangga coffee in North Lombok Regency. Following the introductory and study methods, this paper begins by describing, in the results and discussion section, product flow, financial flow, information flow and supply chain mechanisms to determine the steps of the coffee supply chain strategy in increasing competitiveness so as to provide market assurance and Coffee prices are conducive to North Lombok coffee farmers. The final section of the results and discussion presents the impact of the coffee chain that can be further enhanced so that the competitiveness and efficiency of each supply chain actor (agents / actors) increases profits and welfare.

II. METHODS

This research was conducted in Gangga District, North Lombok Regency. The data source in this study was divided into two data sources, primary data and secondary data. Primary data is data in the form of qualitative and quantitative data obtained from interviews [16-18], field observations on coffee farmers, distributor and related other. Secondary data collection is obtained through literature and written reports [16-18]. The literature is specifically concerned with available theory and published research findings. Written reports are those available from individuals or data providers. This research method is a descriptive method [18-20] applied to describe the indicators of the robusta coffee supply chain as a system capable of integrating the North Lombok Robusta Gangga coffee supply chain actors.

III. RESULT AND DISCUSSION

Conducting supply chain analysis aims to determine the condition of the coffee supply chain that occurs. After knowing the condition of the coffee supply chain, the information obtained is used as input that can be used for improvement to develop the supply chain [21]. The Robusta coffee supply chain system in Gangga District, North Lombok Regency by describing in the results and discussion section, product flow, financial flow, information flow and supply chain mechanisms [22] to determine the steps of the coffee supply chain strategy in increasing competitiveness so as to provide assurance conducive market and coffee prices for North Lombok coffee farmers

Overview of the Robusta Gangga Coffee Plantation in North Lombok Regency

One of the superior plantation products in North Lombok Regency is coffee. The type of coffee grown is robusta (Robusta caneporapierre). Coffee has great potential to be developed as one of the mainstay products to sustain the community's economy and support tourist destinations. The location of this robusta coffee plantation is under the northern foothills of Mount Rinjani, North Lombok Regency at an altitude of 450-850 masl with a plantation area of 1,452 ha23. This is quite good in the criteria for coffee plantations so that West Nusa Tenggara is one of the d areas that produces quite high coffee production.

North Lombok Regency has five districts: Bayan, Gangga, Kayangan, Pemenang and Tanjung [23]. The coffee production of the five districts in 2016 is shown in Table I.

TABEL I. COFFEE PRODUCTION IN NORTH LOMBOK REGENCY BY DISTRICT, 2016

District	Production (ton)
Pemenang	73.05
Tanjung	90.74
Gangga	383.66
Kayangan	52.20
Bayan	79.23

The largest coffee production is Gangga District [24], so that the research area is focused on Gangga District, North Lombok Regency. Apart from growing coffee, members of the Gangga coffee farmer group also cultivate bananas, cocoa, cloves and durian using an intercropping system. Intercropping is a planting system that aims to make maximum use of the land. Intercropping planting is carried out by utilizing the remaining land or between the main crops [25]. Gangga District, North Lombok Regency, located on the island of Lombok, with an area of 157.35 km². Consists of 5 villages namely Bentek Village, Gondang Village, Genggelang Village, Rempek Village, and Sambik Bangkol Village [26]. Gangga District is directly adjacent to the Java Sea to the north [26]. Geographically, Gangga District has the following boundaries:

North Boundary	Java Sea
Eastern Boundary	Kayangan District
Southern Boundary	West Lombok Regency
Western Boundary	Tanjung District

Robusta Gangga Coffee Supply Chain Member

The supply chain is an organizational system in distributing production goods and services to customers [27]. This chain is a network of interconnected organizations that have the same goal. Members of the Robusta Gangga coffee supply chain in North Lombok Regency involve various parties with different roles according to the perspective of each member.

a. Coffee Farmers (Supplier)

Coffee farmers are the parties who have the responsibility to provide coffee commodities. In the Robusta coffee supply chain, farmers act as producers of coffee commodities ranging from cultivation, traditional processing to post-harvest processing for consumption by exporters and

consumers in general [28]. The results of Robusta coffee production are usually sold by farmers to collectors and exporters who do partners. The center of Robusta coffee supply chain activities is located in two agro-industry activity units, namely traditional cultivation and processing

b. Distributor

Robusta coffee is distributed through collectors, wholesalers and exporters. Collectors act as distributors for wholesalers. Wholesalers buy coffee directly from collectors and UD. Berkah Alam, which acts as an exporter, also purchases coffee directly from farmers. The trust of some coffee farmers who make partnerships with exporters to market their crops is because the prices offered by exporters are higher than selling their crops to collectors and to the nearest traditional market. The obligations of partner farmers in supplying their crops to exporters are in accordance with the specifications agreed upon by both parties. Destination countries for which export activities have been carried out are South Korea, Ireland, China and Canada.

c. Consumer

Robusta coffee is sold through collectors, traditional market and exporters. Collectors, pasar tradisional and exporters have a pull system from farmers while farmers have a push system to meet all the needs or demands of collectors and exporters. So that collectors and exporters are consumers of Robusta Gangga coffee farmers in North Lombok Regency. The supply chain will stop when the coffee product reaches the end user, namely the final consumer who consumes the coffee product by purchasing at a store that provides the product [29].

The flow of the Robusta Gangga Coffee Supply Chain

In a supply chain there are three flows that must be managed [30], including the flow of goods flowing from upstream to downstream, financial flows that flow from downstream to upstream and information flow that can occur from upstream to downstream or vice versa. In general, product flow occurs from upstream to downstream while information flow occurs in two directions and financial flows mostly occur from downstream to upstream. The flow of information that is well established between members of the supply chain will affect the flow of products and financial flows that occur [31]. If there is an error of information between members, it will have an impact on errors in product delivery and errors in making payments [32]. The Robusta coffee supply chain is a journey of coffee agricultural commodities from farmers to consumers. However, in this study, the supply chain pattern is limited to the exporter only. The flow of the Robusta Gangga coffee supply chain, North Lombok can be seen in Figure 1.

Information:

- a. : product flow
- b. : information flow
- c. : financial flow

Fig. 1. Supply Chain Flow of Robusta Gangga Coffee, North Lombok

a. The Product Flows

The products flows starts from coffee farmers as suppliers that produce coffee cultivation. The flow of coffee products from farmers in the form of dry beans to village-level traders and exporters. Coffee from wholesalers is then sold to wholesalers. Meanwhile, exporters here, UD.Berkah Alam, buy coffee from farmers, checking the raw materials which include the suitability of the quantity ordered, on time delivery and checking the quality of the raw materials received. Raw materials that do not comply with predetermined specifications will be returned to the farmer, while raw materials in accordance with specifications will be brought. Coffee products that pass the quality test will continue with the packaging process. Products that have been packaged will be exported by shipping from the sea route and other products marketed to retail and coffee shops. Robusta Gangga coffee products are also marketed directly to consumers through outlets established by the company, namely through shops

b. Financial Flow

The financial flow of Robusta Gangga coffee occurs from downstream to upstream [31]. Farmers who sell coffee to collectors, the process of disbursing money from selling coffee takes about 2-3 days. This depends on the circulation of money from the capital owned by the collector traders. There are also farmers who sell bonded bonds, usually getting money immediately or waiting for the disbursement process for several days. This is done because farmers want to get income immediately, although sometimes farmers are also disadvantaged by the bonded bond system. The ijon system is an activity of coffee farmers in making sales when the coffee fruit is not fully formed [33]. Farmers pick the coffee cherries without differentiating between red and green fruit. This method is done because it is faster to work with and the bonded bond system is applied. Because it does not separate between red coffee beans and green coffee beans, there are many defective, damaged and moldy beans on the dry coffee beans. The bonded bond system causes losses because coffee prices are not in accordance with market prices, so this activity poses risks, especially to coffee prices [34]. As for payments from exporters themselves, they provide an initial down payment to coffee farmers. The payment is made according to the agreement of both parties where there are farmers who ask for an advance payment before the coffee is sent to the company and there are farmers who make payments when the product has been received by the company. The company buys wet coffee beans from farmers for IDR 5,000/kg as a USD 0,35/kg, while for dry coffee beans, IDR 23,000/kg as a USD 0,163/kg . After experiencing the drying process, the coffee beans experienced a shrinkage of ¼ from 120 tons to 40 tons. Then the company sells when it has been processed by the roasting process so that there is added value with a selling price of IDR 85,000-100,000 kg as a USD 6-7 kg

c. Information Flow

The flow of information in the Robusta Gangga coffee supply chain occurs from upstream to downstream and vice versa [31]. The flow of information from upstream to downstream occurs starting from the farmer to the collector traders regarding the amount of coffee that has been harvested and the exporter. Before buying robusta coffee

products has provided some information related to the requested coffee standard, the quantity required and the price of robusta coffee per kilogram through the head of the Gangga farmer group, North Lombok. then the head of the farmer group prepares the needs the exporter wants by collecting it from his coffee farmer members. On the other hand, the flow of information from downstream to upstream occurs from information about coffee sales provided to the company as the basis for determining the next sales volume. The supply chain involves a continuous relationship regarding products, money and information. Products generally flow from upstream to downstream, money flows from downstream to upstream, while information flows from both upstream to downstream and downstream to upstream [35].

Business Process

The business processes that occur in the coffee supply chain consist of business activities which include various activities from planning, procurement, processing, shipping and return. Activities that occur in planning are land preparation and plant care to be carried out. Business activities that are included in the procurement are coffee harvesting activities carried out from June to November. One of the business activities that occurs is post-harvest processing according to the request of the exporter. Coffee processing is carried out using natural and full wash methods and the company also carries out processing, namely coffee roasting.

The next activity that is included in the business process is distribution, distribution that occurs includes the distribution of raw materials in the form of fertilizers and agricultural equipment, products and goods needed such as gold. The risk aspect is also one that is included in the business process. Chain risk is the possibility of loss experienced by elements of the supply chain and can be analyzed based on its likelihood of occurrence, cause and effect [36]. The risk that can be experienced by Robusta Gangga coffee farmers and garden owners is the occurrence of crop failure which can be caused by weather, pests, plant diseases or due to natural disasters [37]. At the shipping stage, there are distribution activities carried out by courier services, namely distributing products for export activities. The choice of this expedition service is based on the quantity of the product to be sent, the quantity of exports carried out requires 2 trucks as transportation and shipments are made by sea from Lombok-Surabaya-Busan.

IV. CONCLUSIONS

Supply chain management can be used to coordinate and evaluate all activities in the chain involved³⁷, with the potential for Robusta Gangga coffee in North Lombok Regency which is quite large in terms of production. The coffee supply chain members involved are coffee farmers, distributors and consumers who own them. each role in its own right. The flow of supply is the flow of goods from coffee farmers to consumers. The financial flow comes from consumers to coffee farmers suppliers and information flows from both farmers to consumers and from consumers to farmers. These conditions can be said to be good in running the supply chain. Meanwhile, farmers' post-harvest handling can still be resolved but they are constrained by market price

guarantees that must be considered. The establishment of a coffee agribusiness development model requires ensuring access to supply chain actors to the availability of production facilities, production methods and efficient marketing. The ability to cooperate and integrate among the actors involved, the unity of direction and accuracy of policies of the power holders are also needed

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