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INTERDISCIPLINARY DIAGNOSTIC STUDY (IDS) ON LOCAL ECONOMIC DEVELOPMENT (LED) THROUGH SUSTAINABLE COCOA DEVELOPMENT PROGRAMME (SCDP) IN EAST JAVA

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Bulgarian Journal of Agricultural Science, 27 (No 3) 2021, 000–000

Agriculture supply chain performance and added value of cocoa: a study in Kare Village, Indonesia

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Abstract

Indah, P. N., Setiawan, R. F., Hendrarini, H., Yektingsih, E. & Sunarsono, R. J. (2021). Agriculture supply chain performance and added value of cocoa: a study in Kare village, Indonesia. *Bulg. J. Agric. Sci., 27 (3)*, 000–000

This study aims to determine the condition of the cocoa supply chain, the value added members of the supply chain and supply chain performance measurement, and to enhance the potential performance and added value in researched area. This study was conducted in Kare Village, Indonesia. The method of determining the location was done purposively. The method of determining the sample for cocoa supply chain actors was carried out by using the Simple Random Sampling method while for collectors, wholesalers and SMEs use Purposive Sampling method include 20 cocoa farmers, 1 trade-collector, 1 wholesaler, and 1 cocoa MSMEs. Data collection techniques were through interviews and expert opinion. The analytical method used is descriptive analysis, additional value analysis uses the Hayami method and the design of metric measurements for cocoa supply chain performance uses the SCOR (Supply Chain Operations Reference) - AHP (Analytic Hierarchy Process) method. The results presented that the supply chain conditions for Cocoa in Kare Village had not been in an optimal performance. The additional value analysis showed the proportion of the added value earned by farmers was diverse. The results of the supply chain performance measurement metric design, known that the determinants of supply chain performance in sustainable supply chain management according to experts in the actor cluster (SMEs), the performance Indicator cluster (companies) and the alternative strategy cluster are Increasing Income was diverse too. Increasing the additional value is able to be done by utilizing by-products cocoa processing such as cocoa pulp and cocoa pod husks. The cocoa pulp can be processed into nata products and cocoa juice, while the cocoa pods can be used as fertilizer.

Keywords: Agriculture Supply Chain; cocoa; Analytic Hierarchy Process; Supply Chain Operations Reference; Additional Value

Introduction

Cocoa is one of top five commodities in the plantation sector and it is the third largest contributor of all export national plantation products after palm oil and coffee in Indonesia. Even this commodity is one of the big five, but the

condition in the exporting side in the past five years from 2015 to 2019 was identified fluctuating up and down with percentage value from 7.31 until 7.53 per cent per year. Theup and down condition of Indonesia cocoa export indicated that there are one or several wrong things that need to be founded and fixed. The problem appointed in this research

is the production of the cacao which has been up and down due to many factors that need to be identified deeply. This problem should be concerned more carefully remembering that from the previous research the development of every element related to the agriculture supply chain will affect the better performance of productivity. Some researches that have a concern about agriculture supply chain were Weidenmann (2012) who studied about the stochastic programming, a way to solve the agriculture supply chain problem, Wiedenmann & Geldermann (2015) who studied about the ability of stochastic program to solve the uncertain condition in agriculture supply chain, Asian & Nie (2014), Kamble et al. (2020), Yan et al. (2017), Chai & Zhou (2014), Jaffe et al. (2010), Banasik et al. (2016), Gardas et al. (2018) and many others who concerned in this area. The possible thingswhich caused the shifted of Indonesia's cocoa condition are including low productivity, low quality of cocoa, instability in prices and supplies, environmental and market risks, and many other factors (Aini et al., 2018). Some risks of these factors must be borne by members of the cocoa supply chain (Utami et al., 2017).

Some crucial values and purposes of this study are to identify and analyze the supply chain of cocoa in Kare, one of the village samples in Indonesia, to encourage the development and productivity of cocoa plants in Indonesia especially in villages in Kare District, Indonesia and become cocoa-based Business Centers, to improve the performance of the community, especially farmers in cultivating cocoa according to the technical standards and good cocoa farming practices (Good Agricultural Practices (GAPs), to build and strengthen farmer institutions towards advanced SMEs, to increase the added value of processed cocoa products as potential superior areas based on cocoa, and to enhance the welfare of cocoa farmers, to overcome supply chain risks in cocoa distribution.

Conceptual Framework and Research

Agriculture Supply Chain

The concept of supply chain has been used around 1000 years and it became more popular after the development of supply chain management (SCM) by Keith Oliver, a consultant at Booz Allen Hamilton (Sees, 2013). SCM was defined as an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model (CSCMP, 2005). Routroy & Behera (2017) informed that agriculture and farming dates back thousands of years. In 10 000 BC, the first agricultural revolution happened, which is also known as Neolithic Revolution, and humans transitioned from hunting and gathering to settled agriculture. The latest agricultural revolution also known as Green Revolution (i.e. industrialized agriculture production which had happened all over the world, technology development, a series of research, management of agriculture) has been happening from 1943 to late 1970s. Supply chain thinking encourages a system-wide view of the chain-focusing as much on the linkages between technologically separable segments as on the management of processes within those segments (King & Venturini, 2005).

Specifically, some researchers provided the definition of agriculture supply chain. Agricultural supply chain management (ASCM) includes a number of processes such as supply management, production management and demand management to ultimately satisfy the customers through a competitive distribution channel. Tsolakis et al. (2014) defined ASC into a set of activities in a "farm-to-fork" sequence including farming (i.e. land cultivation and production of crops), processing or production, testing, packaging, warehousing, transportation, distribution, and marketing. Chandrasekaran & Raghuram (2014) interpreted ASCs as the activities of production and process management, supply management, and demand management through a competitive distribution channel for satisfying the end consumers. Sgarbossa & Russo (2017) reviewed ASCs and stated that ASCs comprise of stakeholders such as food processing, procurement, and manufacturing organizations, distribution and commercial organizations, agents, food-service firms and hotels and restaurants, and grocers, and retail organizations. Sharma et al. (2020) stated that agriculture supply chain consisted of three primary aspects which are farming and agriculture inputs, processing and storage, and transportation and distribution. Vorst (2006) has developed supply chain management in agricultural food products which refers to the *Asian Productivity Organization* (APO) development, there are six aspects, those are supply chain targets, supply chain structure, resources, chain management, business chain processes, and supply chain performance. The discussing of these aspects can be seen from the supply chain that occurred in Kare Village. The process of measuring supply chain performance can be carried out efficiently which requires the design of cocoa supply chain performance indicators (Rakhman et al., 2018).

ASC (Agriculture Supply Chain) Problem

Some problems in agriculture supply chain area have been studied time by time and every case had its study focus. Wiedenmann & Geldermann (2015) studied about supply planning model for linseed oil processor in a polymers production supply chain that optimized the expected profit

under raw material quality or quantity, raw material seasonal availability and market demand uncertainty. One of the profit mentioned in this research are the optimization of acreage for contract farming and the volume of optional supply for various situations. The researchers proposed the program namely stochastic programming which has been studiedand mentioned in the previous research provided by Weidenmann (2012) who stated that this program can easily be adjusted to other decision situation as to model utilization of by-products, the existence of different quality grades on diversification on the demand side or the commodity market, penalty costs proportional to the shortage volume, a price escalation clause and the possibilities to split optional supply. In one of the latest studies, Wiedenmann & Geldermann (2015) stated that the stochastic program provided suitable model for the uncertain condition faced by the user such as the farmers. This program turned quite flexible to be used in various conditions as well as to mitigate any risk might be applied in such cases as well.

The different subject of study nonetheless still in the supply chain context and quite interesting to be explored provided by Asian & Nie (2014) who concerned about the volatility of material owned by vendors who should supply to the buyer. Many companies which had global supply network suffered by the demand uncertainty and supply disruption. The backup supplier which should be used as the alternative resource provider sometimes would not simply agree on taking the two-sided risks and may not provide sufficient capacity. This research developed the contract based sourcing strategy that assists mitigate the negative effects of supply chain uncertainty and companies share. The problem identified in this research was the ignorance information or obscurity role of the backup vendor who supplies company's material. By providing the clear information about the backup role of backup vendors, the will turn to understand what role and way they should take and finally ramp their production level up more conservatively and finally it was found the win-win situation for the buyer and vendor in supplying material. This finding can be applied in agriculture sector which the stakeholders should consider about the backup plan and the backup resource to run their business in the volatile and uncertain condition that should be managed well.

Another different focus on agriculture research provided by Yan et al. (2017) who studied about the use of the internet of thing (IoT) in the fresh agricultural product (FAP) supply chain. This research analyzed the coordination FAP supply chain coordination which comprised manufacturer, distributor and retailer based on an improved revenue-sharing contract. Some important findings about the IoT use in FAP supply chain were IoT was able to the quality of FAP, reduced the damage and accident rate, ensured the real-time control in transit and safety management. Moreover, several other findings gave significant view. The use of revenue-sharing contract parameters combination was identified to maximize the expected profit of the supply chain which arbitrarily assigned among the manufacturers, distributors, and retailer. The price elasticity gave huge impact on the FAP supply chain profit. The increase of price elasticity identified could gradually reduce the market demand optimal order quantity and freshness. The controlling of the transit time and environment believed should be enhanced to construct the effective logistic chain through the use of IoT in FAP supply chain.

Then Chai & Zhou (2014) studied that transportation, production and marketing model that reduced the expected production total cost by determining the delivery waiting time for the final product and the processing time of production in a perishable fresh-crop supply chain. The problems raised in this research were the potential decay of the fresh product that will be exported to other countries in the delivery process and the supply of the fresh product in the local market but it was identified less profitable compared to export market. The information believed played crucial role to enhance the fresh product supply chain especially through the monitor and the update of priority variables such as processing times, the fresh-times, the departure time of the transporter, as well as the random demands. The lifetimeof the product will take a role in the consideration to deter- mine if the product should be sold in export or local market.The fresh product should be divided into "make-to-order" and "make-to-stock" which this classification will help the seller to determine which one should be treated to supply thelocal market or export market as well.

The efficient agricultural supply chain management (ASCM) also has been taking as consideration by some researchers such as Kamble et al. (2020). Some problems concerned in this research are the lack of industrialization, inadequacy of the management, information inaccuracy, and inefficient supply chains. This study tried to offer more comprehensive solutions to overcome from the inefficient supply chain such as the application of the block chain, the internet of thing and big data technology. The main purpose of the study was to understand the supply chain processes from where the data is collected, sustainable agriculture supply chain objectives attained (social, environmental and economic), the analytics used level (descriptive, predictive and prescriptive), and the supply chain resources deployed for the same. Some important findings in this research were the optimization use of SCV in agri-food supply chain (AFSC). SCV is not only the availability of the information, but is

determined by the accuracy of the shared data, usefulness timeliness, and the data structure also (Barratt & Oke, 2007; Bailey & Pearson, 1983; Gustin et al., 1995; Mohr & Sohi, 1995). Barratt & Oke (2007) define SCV as the extent to which actors within a supply chain have access to or share information which they consider will be of mutual benefit and which they consider as key or useful to their operations. SCV here was consisting of the process in supply chain such as plan, source, make, and deliver. The integration of the firm's resources consisted of organizational resource, technological resource, human resource, physical resource, intangible resource, and financial resource. It was confirmed that the high level of SCV and integration of the firm's resources will affect the sustainable performance of AFSC. SCV and integration of the firm's resources believed could be maximized its potential through the implementation of data analytic capability (DAC) which conceptualized as conceptualize DAC as the ability to utilize resources to perform analytics task, based on the interaction between IT assets and other firm resources (Cosic et al., 2015).

The discussion about supply chain in agricultural sector attracted many researchers to study and unravel the case happened. A previous comprehensive study provided by Jaffe et al. (2010) who studied about the risk and uncertainty occurred in agriculture and supply chain agriculture such as geographical separation of end uses and production, weather vagaries, unpredictable nature of biological processes, pronounced seasonality of market cycles and production, uncertain and unique political economy of food and agriculture sectors, both domestic and international. Their research used Rapid Agricultural Supply Chain Risk Assessment (RapAgRisk) method to unravel and catch the problems and then formulate the risk management strategies to answer the risk and uncertainty occurred. Another study provided by Banasik et al. (2016) who took a concern in the large amount of losses in the food manufacturing industry by analyzing the agri-food supply chain through proposing a multi-objective mixed integer linear programming model to quantify trade-offs between environmental and economic indicators and explore quantitatively alternative recycling technologies.

A study form India which concern in agricultural supply chain provided by Gardas et al. (2018). This study focused on giving the description of agriculture supply chain condition in India and finding the solutions to overcome from the identified challenges and improve the performance. Some problems faced in agricultural supply chain management in India were high cost of marketing, limited integration among the national agricultural market and limited agricultural market infrastructure. These problems can be at least minimized by implementing the effective marketing strategies which were believed will assist farmers in acquiring their fair share of the production price, improving competitiveness among the various members, decreasing the production cost, reducing ecological disasters, increasing employability in the region, and reducing waste. Another deep study of agricultural supply chain is provided by Kaijun et al. (2018) who identified the agricultural industry in China which is scattered, small, disorderly and weak. By conducting this research, it was explained that the agricultural business resource block chain based on double-chain structure can provide matching mechanism for public service platform and adaptive rent seeking.

Problem Identification at ASC (Agriculture Supply Chain) in Indonesia

In 2015, the total export volume in Indonesia reached 355 320 tons with a total value of 1.31 billion USD, decreas-ing to 330 030 tons in 2016 with a total value of 1.24 billionUSD. In 2017, total exports increased by 7.53 percent to 354880 tons compared to 2016. In 2018 the total export volume reached 380 830 tons with a total value of 1.25 billion USD, down to 358 480 thousand tons in 2019 with a total value of 1.20 billion USD (Indonesia Central Bureau of Statistic, 2020) (Figure 1, Table 1).

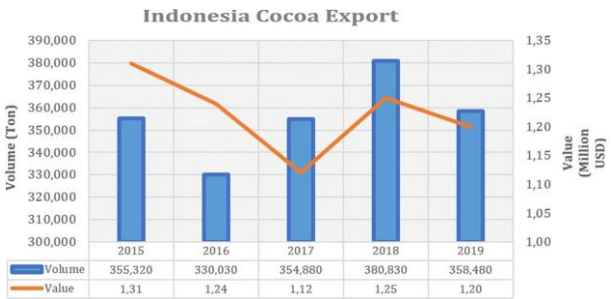

Fig. 1. Indonesia Cocoa Export 2015 - 2019

Source: Indonesia Central Bureau of Statistic, 2020

East Java is one of the provinces in Indonesia that has been developing cocoa plantations since 2011 and the cocoa productivity in East Java identified has ascended annually. The condition of cocoa productivity in Indonesia was in line with the productivity condition in East Java Province, however this condition was not in line with the condition in Madiun, one of the regencies in East Java Province. Decreased productivity can be seen in Table 2 and Table 3.

The inverted condition between Madiun regency andEast Java province or Madiun regency and Indonesia needs to be taken consideration and studied deeply. Some research-ers stated that this condition was causes by the challenges of

Table 1. Land Area, Production and Productivity of Cocoa in Indonesia 2014-2017

Year	Production (Ton)	Land Area (Ha)	Productivity (Ton/Ha)
2015	593 331	1 709 284	0.35
2016	658 399	1 720 773	0.38
2017	585 246	1 653 116	0.35
2018	767 280	1 611 014	0.48
2019	774 195	1 592 562	0.49

Source: Indonesia Central Bureau of Statistic, 2020

Table 2. Land Area, Production and Productivity of Cocoa in East Java 2016-2020

Year	Production (Ton)	Land Area (Ha)	Productivity (Ton/Ha)
2016	27 384	57 877	0.47
2017	28 214	58 019	0.49
2018	30 138	54 638	0.55
2019	30 950	54 408	0.57
2020	31 395	54 468	0.58

Source: Ministry of Agriculture, 2020

Table 3. Land Area, Production and Productivity of Cocoa in Madiun Regency 2015-2017

Year	Production (Ton)	Land Area (Ha)	Productivity (Ton/Ha)
2015	2 791	5 673	0.491
2016	2 810	5 761	0.486
2017	2 900	5 843	0.484

Source: Indonesia Central Bureau of Statistic, 2020

the global market and the added value of cocoa which brings a consequence of the need to increase competitiveness in the supply chain of cocoa industry (Budiwan & Syahrial, 2018).

Research Method

The research was conducted in Kare Village, Kare District, Madiun Regency, Indonesia. Kare Village is an area with an optimized land area to become the largest agricultural land. Kare Village has the largest area of non-paddy agricultural land and non-agricultural land compared to other villages in Kare District. The determination of the research location was carried out purposively with the consideration that Kare Village is one of the production centers for Cocoa in Madiun Regency (Tanjung et al., 2017). A quantitative approach will be used in this study where the researcher will involve the administration of a structured set of questions or statements with predefined response options aimed at a large number of respondents (Burns & Bush, 2014). The data collection methods used questionnaires and interviews with experts and related agencies. The sampling for cocoa supply chain actors was carried out by using the random sampling method, while for collectors, wholesalers and SMEs used purposive sampling method including 20 cocoa farmers, 1 collector, and 1 cocoa SMEs (Table 4).

The data analysis method used to calculate the added value produced in cocoa agro-insutry in the Kare District, Madiun Regency, is a Hayami value added analysis tool (Septiaji et al., 2018). Hayami value added analysis can be seen in Table 5.

Table 4. Data Collection Detail

No	Data Collection Approach	Explanation
1	Literature study	Used to study the concept of cocoa supply chain management, the concept of identification of the cocoa supply chain, the concept of risk analysis of the cocoa supply chain, the current state of the cocoa market and the cocoa supply chain, the concept of performance measurement using SCOR-AHP, the FMEA concept, and the concept ANP
2	Field observations	By seeing directly the activities related to supply chain management, performance measurement, and risks that often occur in the cocoa supply chain.
3	Interviews	Used to obtain accurate and in-depth information and to clarify the results of field observations on supply chain configuration and supply chain problems

Table 5. Added Value Calculation of Hayami Method

No	Variable	Value
1	Output, kg/month	A
2	Raw material, kg/month	B
3	Labor, HOK/month	C
4	Conversion factor	D = A/B
5	Labor coefficient	E = C/B
6	Output price, Rp/kg	F
7	Overage wages of labor, IDR/HOK	G
Income and profit, IDR/kg		
8	Raw material price, IDR/kg	H
9	Other input contribution, IDR/kg	I
10	Output value, IDR/kg	J = D x F
11	a. Added value, IDR/kg b. Value added ratio, %	K = J – I – F L% = (K/J) x 100%
12	a. Labor benefits, IDR/HOK b. Share of labor, %	M = E x G N% = (M/K) x 100%
13	a. Profit, IDR b. Profitability rate, %)	O = K – M P% = (O/K) x 100%
Remuneration for Production Factors		
14	a. Margin, IDR/ kg b. Profit, % c. Labor, % d. Other input, %	Q = J – H R = O/Q x 100% S = M/Q x 100% T = I/Q x 100%

NB : 1 USD = 14,500 IDR (*Estimation*)

Source: Hayami (1987)

Annotation:

A = Output / total production of cocoa products produced by the agro-in-dustry.

B = Input / raw material in the form of cocoa fruit used in the productionprocess.

C = Labor used in producing cocoa products is calculated in the form of *HOK (Hari Orang Kerja* or Working Days of Labor*)* in one analysis period.

F = Product price prevailing in one analysis period.

G = Average wages amount received by labors in each production periodwhich is calculated per HOK (Working Days of Labors).

H =Price of main raw material input per fruit (kg) during the analysis period

I = Contribution / other input costs consisting of supporting raw materialcosts, depreciation costs, and packing costs.

1 Rp = 0.0000689 USD / 0.0000571 EURO

1 IDR = 0.0000689 USD

Meanwhile, the tool to calculate supply chain performance is SCOR (Supply Chain Operations Reference) version 11.0 (Liputra et al., 2018). SCOR is based on five different business processes; those are Planning, Sourcing, Production, Distribution and Returning. This business process is placed in the first level of the SCOR hierarchy. The business processes are then decomposed to be forming a lower level (Chotimah et al., 2017). Here is the detail of the data collection through several ways:

Data collected from research objects, including supply chain data including structure, mechanisms, business processes, resources, and supply chain management obtained through interviews, Perception data about supply chain performance measurement metrics, respondent perception data about pairwise comparisons for determining risk priorities and selection of alternative supply chain performance improvement strategies as well as benchmark data to related Cocoa MSMEs. Other data collected from the Plantation Office include data on the area of cocoa plantations in Indonesia, Cocoa Production and Productivity in Indonesia, and Export - Import of Cocoa in Indonesia. Cocoa plantation areas in Madiun, cocoa consumption data, Madiun cocoa productivity data and cocoa related regulations.

Result and Discussion

Cocoa Supply Chain

In the cocoa supply chain in Kare Village, Indonesia which became the members of the supply chain are farmers and collectors. However, currently a new supply chain member is being tested, namely SMEs "Dumilah". The addition of supply chain members aims to increase efficiency in supply chain activities and to bring the market closer to farmers who are in far locations from the cocoa purchasing unit (Alim et al., 2018). As producers, the cocoa farmers are member of chain that initiates the supply chain for cocoa. Farmers have an important role in the cocoa supply chain because they determine the quantity, quality and continuity of the cocoa supply (Anindita et al., 2018). Farmers receive technical counseling on cocoa cultivation based with GAP standard (*Good Agriculture Practice*) in order to increase the cocoa production and quality (Saputra et al., 2019).

Farmers in the Gondo Arum farmer group sell cocoa in the form of dry fermented beans. The SMEs, which will be a member of the supply chain, has just been formed and was located in Kare Village and was directly managed by the Gondo Arum farmer group. With the existence of SMEs in Kare Village, the market is closer to farmers so that farmers can get optimal prices and save the transportation costs. The hope is these small and medium enterprises managed by the Gondo Arum Farmer Group will return the farmers to active in running the community group. The system which will be built by SMEs is to buy and sell cocoa beans in a professional manner to get benefits based on togetherness and mutual cooperation. The price that applies in SMEs is not different from the price that applies in the purchasing unit. The Gondo Arum farmer group gets some profits from the difference between the selling price to the SMEs and the farmer's purchase price less with costs incurred. In the trade

of cocoa beans activity at SMEs, there are some quality control tests. The quality control assessments consist of checking bean count, waste, moldy, moisture, and insect, brown and salty. Quality control activities are carried out by SMEs who have received training and mentoring from the purchasing unit. The cocoa beans purchased or collected at SMEs will be processed into cocoa primary and secondary products (Tanjung et al., 2017).

Supply Chain Management

The business processes in the supply chain include contractual agreements and transaction systems. A contractual agreement contains a mutual agreement between the sides that collaborate both formally and informally. The function of a contractual agreement is to provide an overview of the obligations and limitations that must be carried out by the sides involved and can function in a predetermined period of time (Noviantari et al., 2018).

In general, there is no contractual agreement between cocoa supply chain actors, especially in the upstream sectors. The purchase of dry cocoa beans is carried out freely, there are no rules about the quantity or quality of cocoa beans. Previously, a contractual agreement had ever been applied between the Gondo Arum farmer group and one of the primary processing industries. The agreement regulates the quantity of production, quality of cocoa, price and delivery time. However, the agreement did not work properly because the amount of dry cocoa beans produc- tion did not fulfill the requirements. As a result, the contractwas canceled and the farmers resold cocoa to collectors.The transaction system applied to each member of the sup- ply chain is different. The transaction system that occurs between cocoa farmers and collectors is carried out using a cash system. It means that payments are conducted in cash during the transaction processes. Meanwhile, between collectors and wholesalers are applied a cash on delivery transaction system, which means that the payment is made when the goods are received according to the amount at hand. The industrial or SMEs level, both primary and sec- ondary, usually apply the cash term system. In this system, payments are made based on an agreed time. In this system,payments are made based on an agreed time. The agree- ments made between cocoa farmers, collectors and industry or SMEs are not conducted through a formal contract, but only through verbal agreement which is then recorded in written way. The agreements made are only about the qual- ity of cocoa, the selling price, and the number of sales of cocoa to collectors. However, usually the number of sold cocoa beans is as much as the cocoa beans harvested by farmers according to the harvest period.

Value Added Analysis

To analyze the added value produced in cocoa agro-nutrition in the Kare village, the Hayami added value analysis tool was used. Value added analysis in this research was done using the Hayami method, where the calculation is based on one unit of the main raw material of the finished product (Hayami et al., 1987). Value added analysis of agricultural product processing can be carried out in a simple way, namely by calculating the added value per kilogram of raw material for one processing that produces a certain product. The factors that affect the added value for processing can be grouped into two, namely technical factors and mar- ket factors. Technical factors that influence are production capacity, the amount of raw materials used and labor, while market factors that influence are output prices, labor wages, raw material prices, and the value of other inputs besides raw materials and labor. Another input value is the value of all sacrifices other than raw materials and labor used during the processing process. The supporting concepts in the analysis of the added value of the Hayami method on the process- ing subsystem are a) the conversion factor, which shows the amount of output that can be produced from one input unit, b) direct labor coefficient, which shows the amount of direct labor required to process one input unit, and c) output value, shows the output value generated from one input unit. Here are the three stakeholders which are analyzed its value added through the Hayami method.

Value Added of Farmers (Table 6)

The value added calculation above shows that farmers who sell their cocoa beans in the form of fermentation obtained higher value added ratio that is 77.67%. The value added ratio shows that for every 100 IDR of output produced by farmers there is an added value of 77.67 IDR for farm- ers who sell the cocoa in form of fermentation to collectors (Maulana et al., 2019). The benefits level of farmers who sell in the form of fermented cocoa to collectors is 32.67%. The profit earned by each farmer is based on the quality of the cocoa beans produced (Nuzuliyah, 2018).

Value Added of Collectors (Table 7)

Based on the Table 8, the added value obtained by fermented cocoa collectors is quite low, that is 6.67 %, with a profit rate of 6%. This is because there is no treatment that increases added value to the cocoa beans. Such a this thing happens because collectors act as cocoa distributors for other supply chain members, not as producers, so the added value they get is lower (Mardesci, 2019).

Value Added of SMEs (Table 8)

Table 6. Value added at farmer level

No	Variable	Value
1	Output, kg/ month	400
2	Raw material, kg/month	500
3	Labor, HOK/month	72
4	Conversion factor	0.80
5	Labor coefficient	0.14
6	Output price, IDR/kg	28 000
7	Average wages of labor, IDR/HOK	70 000
	Income and profit, IDR/kg	
8	Raw material price, IDR/kg	5000
9	Other input contribution, IDR /kg	1
10	Output value, IDR /kg	22 400
11	a. Added value, IDR/kg	17 399
	b. Value added ratio, %	77.67
12	a. Labor benefits, IDR /HOK	10 080
	b. Share of labor, %	57.93
13	a. Profit, IDR	7 319
	b. Profitability rate, %	32.67

Source: Primary Data Analyzed, 2020

Table 7. Value added at the collectors level

No	Variable	Value
1	Output, kg/month	250
2	Raw material, kg/month	250
3	Labor, HOK/month	1
4	Conversion factor	1
5	Labor coefficient	0.004
6	Output price, IDR/kg	30 000
7	Average wages of labor, IDR/ HOK	50 000
	Income and profit, IDR/kg	
8	Raw material price, IDR/kg	28 000
9	Other input contribution, IDR/kg	-
10	Output value, IDR /kg	30 000
11	a. Added value, IDR/kg	2000
	b. Value added ratio, %	6.67
12	a. Labor benefits, IDR/HOK	200
	b. Share of labor, %	10
13	a. Profit, IDR	1800
	b. Profitability rate, %	6

Source: Primary Data Analyzed, 2020

From Table 9 can be seen the level of the value added ratio is 28.89% with the level of a gain of 28.37%. This added value is generated due to the processing of cocoa beans into finished and semi-finished products. It is hoped that this SMEs will develop continuity over time so that it can create independence at the farmer level, especially in the Kare Village area (Septiaji et al., 2018).

Table 8. Calculation of value added at the *SMEs* level

No	Variable	Value
1	Output, kg/month	1500
2	Raw material, kg/month	1500
3	Labor, HOK/month	5
4	Conversion factor	1
5	Labor coefficient	0.003
6	Output price, IDR /kg	45 000
7	Average wages of labor, IDR IDR / HOK	70 000
Income and profit, IDR/kg		
8	Raw material price, IDR /kg	30 000
9	Other input contribution, IDR /kg	2000
10	Output value, IDR /kg	45 000
11	a. Added value, IDR /kg	13 000
	b. Value added ratio, %	28.89
12	a. Labor benefits, IDR /HOK	233.33
	b. Share of labor, %	1.79
13	a. Profit, IDR	12 766.67
	b. Profitability rate, %	28.37

Source: Primary Data Analyzed, 2020

Cocoa Supply Chain Performance

Supply chain performance measurement is carried out by benchmarking actual data to relevant competitors at the level of farmers, collectors and cocoa agro-industry. The performance assessment of members of the cocoa supply chain can be seen in Table 9.

Table 9. Cocoa Supply Chain Performance Value

Performance Attributes	Value, %		
	Farmers	Collectors	SMEs
Reliability	38.982	56.072	26.610
Responsiveness	-	23.127	14.500
Agility	-	-	38.121
Cost	47.094	5.084	17.190
Total	76.076	84.283	96.411

Source: Primary Data Analyzed, 2020

The responsiveness attribute value at the farmer level and the agility attribute at the farmer and collector level cannot be calculated. So that the weight normalization is conducted by dividing the weight of certain attributes by the number of attribute weights used (Rakhman et al., 2018). Based on the table above, the cocoa supply chain performance value at the farmer level is the lowest with a performance value of 76.076%. In the value classification, this value is included in the below average category. It is caused by the average age of farmers which has entered the age of 30-50 years and over so that the resulting farmer's performance cannot be maximized according to the expecta-

tions (Azmiyati & Hidayat, 2017). At the collector level, the performance value is 84.283% with the moderate performance classification (average). Meanwhile, at the industrial level, the performance value obtained is 96.411% which is classified as an excellent performance. The low performance of cocoa farmers is caused by poor cultivation techniques. Mostly of farmers have not applied good and correct cultivation techniques due to the many steps that must be taken in maintaining cocoa plants. On average, Indonesian cocoa farmers are still oriented towards getting quick profits so they do not pay attention to quality aspects and care of cocoa plants.

Formulation of Supply Chain Performance Improvement Strategy Priorities

Based on Figure 2, the cluster which is considered gives a highest influence on performance improvement and added value of cocoa supply chain is an industry with a priority value of 0.4433. The Indonesian cocoa industry has an important role in earning foreign exchange and absorbing labor. The cocoa industry in Indonesia has wide connection from both upstream and downstream (Hadinata & Marianti, 2020).

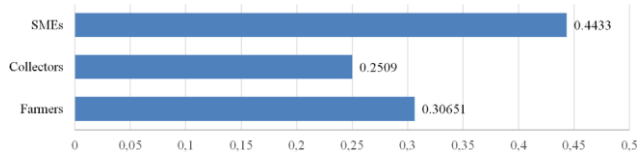

Fig. 2. Actor Cluster Priority

Based on Figure 3, it presents that product quality (cocoa) is the most influential performance indicator on the cocoa supply chain in Kare Village, Kare District with a priority value of 0.29262. It is because product quality is an important aspect in determining cocoa prices and fulfilling consumer satisfaction (Yoga Priantara et al., 2017).

The results of the alternative cluster priority show that the element of increasing income has the highest priority.

Fig. 3. Cluster Priority for Performance Indicators

The incomes of supply chain members in the upstream sector are generally still low, especially for the farmers. The quality of Indonesian cocoa, particularly those produced by the people, is still priced lowest in the international market because it is considered in a poor condition (Rayuddin, 2019). The level of profit obtained by cocoa supply chain actors is still very volatile and not optimal, so there is still an opportunity to increase the members' income of the cocoa supply chain by improving added value (Hidayati et al., 2020) (Figure 4).

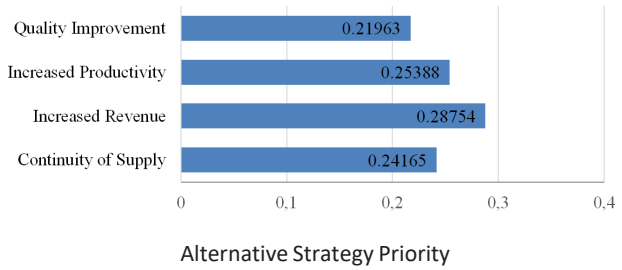

Fig. 4. Cluster Priorities for Alternative Strategies Priority

Conclusion

From the value added analysis result, it was found that farmers value added ratio is the highest one due to the process of fermented cocoa. The farmers who process the cocoa into fermented cocoa obtained more profitability rate. This result signs that farmers and other stakeholders has to find other ways to make their product more valuable in order that it will affect their profitability. The SMEs also obtain quite good profitability rate. This condition happened due to the fact that they processed the cocoa beans into finish and semi-finished products such as chocolate candy, cocoa powder and chocolate drinks. The process to become finished and semi-finished products went through a good process using machines that have been subsidized by the government. The last party that achieved the worst profitability was the collectors. This condition happened since the collectors almost did not do anything to the cocoa products they received from farmers. One of the important parties that need to take more action to enhance the cocoa supply chain is SMEs and it does not mean that the other parties are not important. The combination actions and good cooperation among all parties could make the cocoa supply chain performance even better.

Kare Village, Kare Subdistrict is one of the villages with agricultural potential, one of which is in the planta-tion sector because of its geographic location which is in a highland area, making it suitable for the needs of develop-

ing plantation crops. The cocoa plant in Kare District is the most popular crop for farmers and the majority of farmers cultivate cocoa, because it is considered capable of increasing farmers' income when compared to other commodities. This plant is indeed a very strategic plant to cultivate. Besides that, the condition of the area in Kare Village is very supportive for cultivating cocoa plants. Based on the re- sults described above, the strategic priority for cocoa plan- tation development in Kare village, Indonesia is based on a combination of all criteria, the feasibility of price stability is the first priority. The second priority is technical cultivation skills and the third is post-harvest technology.

The cocoa supply chain mechanism has to be started by farmers and collectors in the upstream sector. Meanwhile, in the downstream sector, the members of the sup- ply chain who play a role are SMEs and final consumers. Analysis of added value in supply chain activities is carried out at the farmer, collectors and SMEs levels. The result of added value shows that collectors have the lowest profit rate among other supply chain actors. This is because the collectors do not process or modify commodities, but only act as distributors to other members of the supply chain. Performance assessment is conducted on the same actorwith added value analysis. The results of the performance assessment show that farmers have the lowest performance value. The low performance of farmers is because cocoa farmers have not implemented good agricultural practices in both cocoa cultivation and post-harvest. Based on the results of the formulation of a performance improvement strategy, the increasing income has the highest priority. Increasing the added value can be implemented by utilizing cocoa processing by-products such as cocoa pulp and cocoa pod husks. The pulp of cocoa can be processed into natal products and cocoa juice, while the pods of cocoa can be used as fertilizer.

Further research is needed regarding all members of the cocoa supply chain, including the primary processing industry and exporters, so that conditions and performance can be identified that are more precise and in accord- ance with the reality of the cocoa supply chain. Weight-ing should be done using three or more expert opinions,so that the weight obtained is better and more accurate. In the future, cocoa plantation development directions needto pay attention to market factors for cocoa commodities, especially those related to the feasibility and stability of the selling price of cocoa at the farm level. Besides that, what also needs attention is the human resource factor related to technical skills in cocoa cultivation, and agricultural extension workers as well as the technological factors that support post-harvest activities.

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