

ISBN : 978-602-14623-4-8

# Proceeding

## International Conference Strengthening Indonesian Agribusiness: Rural Development and Global Market Linkages

IPB International Convention Center, Bogor - Indonesia,  
25 - 26 April 2016

Editors :  
**Amzul Rifin**  
**Meine Pieter van Dijk**  
**Diederik P. de Boer**  
**Huub Mudde**  
**Johan van Rooyen**  
**Siti Jahroh**

Organized by  
**Department of Agribusiness, Faculty of Economics and Management,**  
**Bogor Agricultural University - Indonesia**  
in collaboration with  
**NICHE NUFFIC Programme - The Netherlands**

Organized by :



DEPARTMENT OF  
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BOGOR AGRICULTURAL  
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PROCEEDING

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- Hamid Jamaludin Muhrim

### Published By :

#### **Department of Agribusiness, FEM-IPB and NICHE Programme**

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ISBN : 978-602-14623-4-8

## FOREWORD

With deep satisfaction I was writing this foreword to the Proceedings of International Conference with the theme of **Strengthening Indonesian Agribusiness: Rural Development and Global Market Linkages** held in IPB International Convention Center, Bogor Agricultural University, Indonesia, on 25 -26 April 2016. This conference marked the end of the NICHE Project which started in 2011.

Diverse papers and discussion represent the thinking and experiences of mixed and various scholars of their particular interest and fields. Of valuable was the presence of prominent scholars who brought their newest findings out of their research works. Their contributions helped to make the conference as outstanding as it has been.

Special thanks are due to the invited speakers Prof. Meine Pieter van Dijk (Maastricht School of Management (MSM) Netherlands), Dr. Daniel Sherrard (Earth University, Costa Rica), Dr. Nunung Kusnadi (Agribusiness Department, Bogor Agricultural University), Oliver Olson, MBA (Director Global Education Programs at Maastricht School of Management), Huub Mudde, M.Sc (Agricultural Counselor, Embassy of the Kingdom of the Netherlands), Prof. Johan van Rooyen (Agricultural economics at Stellenbosch Univeristy, South Africa), Ir. Wildan Mustofa, MM (Hikmah Farm, Pangalengan West Java), Joshua Bray, M.Sc (Sydney University, Australia) and Dr. Nerlita M. Manalili (Managing director NEXUS Agribusiness Solutions, Philippines and SEARCA Consultant Agribusiness). We would like also to thank the editor of the proceeding, Dr. Amzul Rifin, Prof. Meine Pieter van Dijk, Diederik P. de Boer, PhD, Huub Mudde, M.Sc, Prof. Johan van Rooyen, Siti Jahroh. Phd, Triana Gita Dewi, M.Sc, M. Rizqy Mubarak, M.Si, and Hamid Jamaludin, SE for the layout of the proceeding.

It is my hope that this proceeding will contribute to the development of agriculture and rural development in the world and in Indonesia especially.

### **Dr. Dwi Rachmina**

Head of  
Department of Agribusiness  
Faculty of Economics and Management  
Bogor Agricultural University

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# THE DEGREE OF INTEGRATION OF THE COFFEE SUPPLY CHAIN IN LAMPUNG PROVINCE

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## ABSTRACT

*The Coffee supply chain in Lampung Province had problems in fulfilling customers' satisfaction. Customers were not satisfied with the coffee quality. This problem occurred due to the lack of communication and coordination along the supply chain. Therefore, it is necessary to conduct the study about supply chain integration. The aim of this study was to analyze the condition of coffee supply chain and the degree of supply chain integration by using The Arcs of Integration concept. The respondents in this study were the members of coffee supply chain. Two different models of coffee supply chain, Nestle's and Indocafco's, were analyzed by factor and discriminant analysis. The result revealed that in general, the degree of coffee supply chain in Lampung was Periphery Facing. The members of supply chain integrated their business activities to supplier and customer, but were not extensively. The degree of Nestle's coffee supply chain was more extensive than Indocafco's. Our conclusion suggests that coffee supply chain should integrate business activities more broadly to supplier and customer. Indocafco should cooperate with supplier and customer since the degree of Indocafco's supply chain was Inward Facing.*

**Keywords:** *supply chain integration, coffee supply chain, Arcs of Integration*

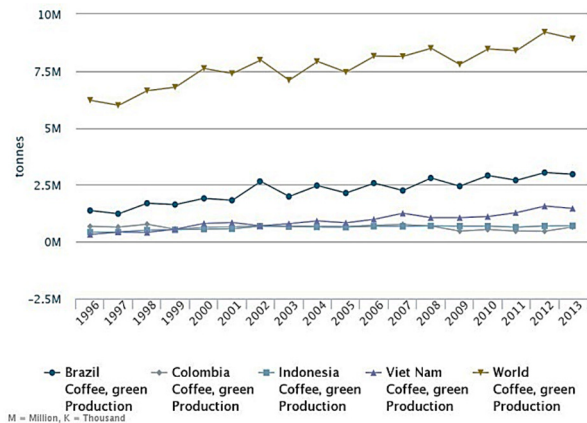
## INTRODUCTION

Coffee is one of the plantation crops. Coffee is an annual plant that can live for 20 years. The variety of coffee in Indonesia is varies. In general, the type of coffee that is well-known is robusta and arabica coffee. The coffee which is much preferred by coffee lovers are Arabica coffee. Arabica coffee is a traditional coffee that has a delicious taste, good aroma, and lower caffeine level, yet its price is higher than the other type of coffee. In Indonesia, from seven types of coffee, six types of Arabica coffee are produced or cultivated in different areas in Indonesia. Types of Arabica coffee are Gayo coffee from Aceh, Mandailing coffee from North Sumatra, Kintamani coffee from Bali, Mangkuraja coffee from Bengkulu, Java coffee from Java Island and Toraja coffee from Toraja.

Brazil, Vietnam, Indonesia, and Colombia were the major coffee producers in the world.

Indonesia's coffee production was in the third position among coffee producers around the world. Indonesia's climate and location are suitable for growing coffee plants. Arabica coffee is more sensitive to growing conditions, so its price is higher than other types of coffee. However, Indonesia has many kinds of Arabica coffee, showing that coffee is very suitable to be cultivated in Indonesia so that the number of Indonesia's coffee production is high.

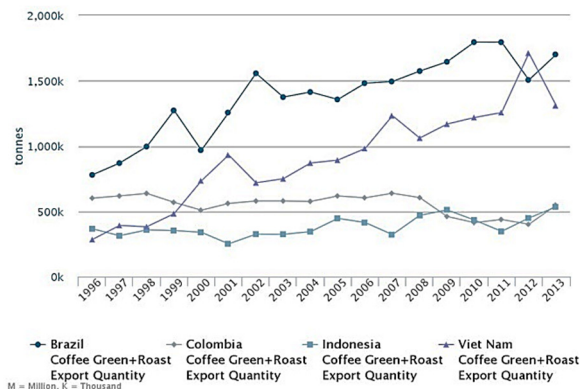
Figure 1 is a graph of production growth rate of coffee in each major coffee producing country in the world. Based on this chart, it showed that the world's coffee production has increasing growth trend. The trend of coffee production growth rate in Brazil and Vietnam were increasing, while Indonesia and Colombia had a constant trend of production growth rate. Indonesia's coffee production contributed to the world's coffee production as much as 7.83 percent.



**Figure 1. The Trend of Coffee Production Growth Rate among Major Producing Countries in The World from 1996 to 2013**

Source: FAOSTAT, 2016

Four of major coffee producers in the world were also the major coffee exporters. Those countries were Brazil, Vietnam, Colombia, and Indonesia. They were the biggest coffee supplier for all countries where its people were coffee lovers such as the European Union countries and the United States of America, those were the major coffee importers in the world.



**Figure 2. The Growth Rate Trend of Coffee Export Quantity Among Major Coffee Exporting Countries in The World from 1996 to 2013**

Source: FAOSTAT, 2016

Figure 2 is the growth of export quantity graph of coffee by the four main coffee exporting countries. It was the same as the trend of coffee production growth rate as Figure 1 showed. Brazil and Vietnam had an increasing trend, while Indonesia and Colombia had a constant pattern. Indonesia and Colombia have been competing in fulfilling coffee demand in the world. Their

position continued to change every year. Indonesia's export value of coffee was in the last place among the four major coffee exporting countries (FAOSTAT, 2016). It showed that the price accepted by Indonesia was not high enough, thus it could make some losses for Indonesian coffee exporters.

The value of Indonesia's coffee which was the lowest could occur because the quality of Indonesia's coffee was not good and could not meet the customer's demand. Low input quality and limited processing technology led to problem of coffee quality in Indonesia. The coffee plantation in Indonesia was still dominated by small plantation cultivated by small farmers. The farmers processed their coffee bean which has been harvested by using traditional technology. The manufacturing process of coffee bean into coffee powder started from drying, peeling, and sortation was still accomplished by the farmers traditionally. Indonesian coffee producers still have constraint in coffee processing technology, particularly on the roasting stage. Therefore, the quality of Indonesia's coffee bean was not the same as customer expectation.

In addition, there were still many Indonesian coffee farmers who did not replant their old coffee plants with the new one. The productive age of coffee plants is up to 20 years. There were also still many farmers who kept their coffee plants growing for more than 30 years. It caused the production of coffee bean was not optimal which led to low quality of harvested coffee bean. The continuity and consistency of coffee quality, either coffee bean or coffee powder was not sustained. It caused the value of coffee in Indonesia was lower than other major coffee exporting countries.

The demand for coffee is potential and prospective. Nowadays, drinking a cup of coffee has been a new lifestyle which has generally developed in society, especially among workers. Therefore, as a major producing and exporting countries in the world, Indonesia should be able to fulfill the demand and reach customer's satisfaction. The presence of large processing companies brought a positive impact for Indonesia. The coffee processing in Indonesia

could be supported overall by the presence of them. The company operates advance technology that the quality of coffee powder would improve and the possibility of Indonesia's in entering international market would also increase.

Lampung Province was the major coffee producing area in Indonesia as this province's productivity was ranked fourth as the biggest coffee producers in 2013. The total production of coffee in Lampung Province was about 886 kg/hectare (Ministry of Agriculture 2016). In Lampung province, there are two big coffee exporter companies supplying coffee to their customer from the partner farmers through middleman, thus they formed a supply chain. The coffee supply chain in Lampung Province had a purpose of meeting the end customer's demand. The end customers on this supply chain were customers in foreign country. There were several requirements about coffee quality that customers want. The exporters as a member of the supply chain have known the information about end customers' taste. They understood it because they received the information directly from the end customers for their criticism and suggestions. That information should be informed to the producer who was the partner farmers as the exporters' input is supplied by the partner farmers. The end customers' want the coffee quality to be important information that should be delivered to other supply chain members. However, in reality, the quality of coffee powder produced by this supply chain was not suitable to what the end customers' want.

At this time, the competition is not only faced by the individual company but also by all members of the supply chain. Integrating business activities can make the three flows going smoothly along the supply chain, especially the information flow about product quality. Therefore, some studies need to be conducted. The purpose of this study was to analyze the condition of coffee supply chain and the degree of coffee supply chain integration in Lampung Province between every members of supply chain as a whole supply chain. Moreover, the purpose of this study was to analyze the comparison

between the degrees of two big coffee exporters' supply chain integration in Lampung Province.

## METHODS

Primary data in this study was collected through interview with respondents by using questionnaire. The sampling method applied in this study was purposive sampling. There were 78 samples in this study. The samples are all members of coffee supply chain in Lampung Province, included exporters, middlemen and farmers.

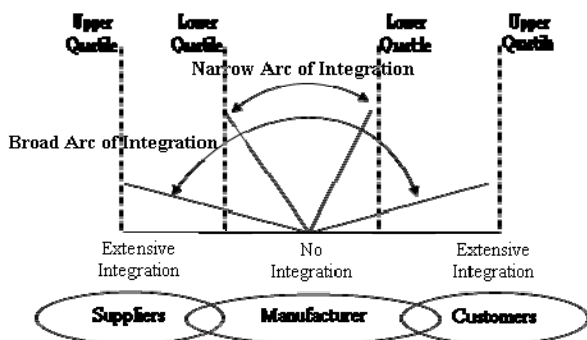
The coffee supply chain in Lampung Province consisted of Nestle's supply chain and Indocafco's supply chain. Nestle and Indocafco are the exporters of coffee. Those supply chains would be analyzed in this study. The first step in this study was analyzing the overall condition of coffee supply chain. It would be analyzed descriptively. And then, the degree of coffee supply chain integration in Lampung Province would be analyzed later.

Supply chain integration is a condition which describes how the coordination or integration between the members of supply chain. If the business activities are integrated each other, the three flows will smoothly flow along the supply chain (Bowersox et al., 1999; Frohlich and Westbrook 2001; Lockamy III and McCormack 2004; Benton and Maloni 2004; Zailani and Rajagopal 2005; Schoenherr and Swink 2011; Leuschner et al., 2013; Çerri 2014). The company will be difficult in maximizing their profit if they do not integrate their business activities to their supplier and customer. One of business activities which is very critical to integrate is information sharing (Bowersox and Morash 1989; Lawrence and Lorsch 2000; Mentzer et al., 2001; Katunzi 2011).

The integration degree of coffee supply chain would be measured in this study. At first, the overall coffee supply chain integration in Lampung Province would be measured. Then Nestle's supply chain and Indocafco's supply chain integration would be analyzed separately and compared based on the result of the analysis

of degree of coffee supply chain integration in Lampung Province.

Measurement of supply chain integration degree was conducted by using factor analysis and discriminant analysis based on Arcs of Integration concept. Arcs of Integration concept describes the degree of supply chain integration or how far each supply chain member integrates their business activities to other supply chain member (Frohlich and Westbrook 2001). Figure 3 below shows Arcs of Integration concept.



**Figure 3. Arcs of Integration**  
Source: Frohlich and Westbrook, 2001

The narrow arc of integration is an area which the supply chain members do not integrate their activities to supplier and customer while the broad arc of integration is an area which supply chain members integrate their activities to supplier and customer. Arcs of Integration was divided into five types of supply chain integration degree based on an area in Figure 3. Five types of supply chain integration degree are listed as follows:

1. Inward facing; a degree of supply chain integration which the supply chain members does not integrate their activities
2. Periphery facing; a degree of supply chain integration which the supply chain members integrate their activities at least to supplier or customer, but not extensively.
3. Supplier facing; a degree of supply chain integration which the supply chain members integrate their activities extensively to supplier, and not extensively to customer.
4. Customer facing; a degree of supply chain integration which the supply chain members

integrate their activities extensively to customer, and not extensively to supplier.

5. Outward facing; a degree of supply chain integration which the supply chain members integrate their activities extensively to supplier and customer.

To measure the degree of coffee supply chain integration, business activities which could be integrated to supplier and customer along the supply chain should be decided. It was called as an integrated activity. Each of integrated activities described the integration process between the supply chain members, either the integration process to supplier (backward integration) or to customer (forward integration). The integrated activities which were used in this study are listed below:

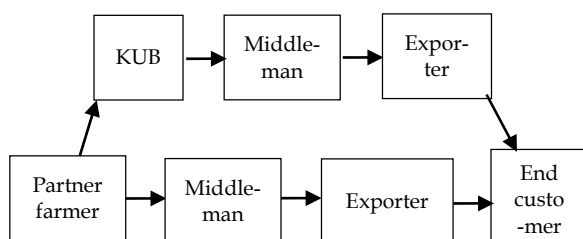
1. Sharing of production plan
2. Sharing of other plans except for production plan
3. Sharing of information about inventory level
4. Facilitating transportation or logistic
5. Solving problem and sharing technology
6. Supervising and customizing the input or output quality
7. Transparent in financial matter and reducing cost
8. Sharing of information

The degree of supply chain integration would be measured by using factor analysis. Forward integration would be Factor 1 and backward integration would be Factor 2. The degree of supply chain integration would be measured on Likert Scales from 1 (no integration) to 5 (extensive in integrating the business activities). The Likert Scale score was an input in factor analysis. The factor analysis would determine groups of samples or respondents based on their types of supply chain integration degree. To make sure that the result of factor analysis was valid, discriminant analysis would be employed in this study. The validity of result could be known from "overall percent of grouped cases correctly classified" scored by using discriminant analysis. The bigger the score, the better the validity of degree of coffee supply chain integration for each respondent or sample.

## RESULT

### THE COFFEE SUPPLY CHAIN IN LAMPUNG PROVINCE

The supply chain consists of members having different role. The members will be together in the supply chain structure. Figure 4 shows the structure of coffee supply chain in Lampung Province.



**Figure 4. The Structure of Coffee Supply Chain in Lampung Province**

The member of coffee supply chain in Lampung Province in overall consisted of coffee farmer which had a role as producer; middleman and KUB (Kelompok Usaha Bersama) which played a role as middleman or distributor; and exporter with role to distribute the coffee to customer in foreign countries. All members of coffee supply chain had a role in distributing three flows along supply chain. The flows are product flow, financial flow, and information flow. The product flows from partner farmers to the end customer. Financial or money flows from end customer back to partner farmers. The information flows in two ways along the supply chain.

The partner farmers cultivated coffee on their farms and sold it to KUB or exporter directly. The farmers came to the training held by KUB. KUB was a group which formed by one of the coffee exporters in this supply chain. Exporter established KUB to be able to support or develop the farmers directly. KUB's activities were receiving or buying coffee from partner farmers and selling to the exporters and also conducting trainings to partner farmers.

The exporters were the members of coffee supply chain which had major role in coffee supply chain since the demand for coffee depended on the capability of exporters in

capturing or creating the end costumers' taste and informing it to the previous supplier. The supply chain has a main purpose. The purpose is to meet the demand and reach customer's satisfaction. Therefore, the exporters should be able to fit what customers need and what customers want so that the coffee supply chain can increase its demand.

The final product which had been produced by coffee supply chain in Lampung Province was coffee powder. The coffee powder was sold and exported to customers in foreign country. The end customer on this supply chain was coffee bartender and retailer. To meet end customer's want and end customer's satisfaction, the member of this supply chain should cooperate, coordinate, and collaborate or integrate all supply chain's business activities each other.

### THE DEGREE OF OVERALL COFFEE SUPPLY CHAIN INTEGRATION

The degree of coffee supply chain integration in Lampung Province is essential to identify, whether all supply chain members have been integrated each other or not. It would be used as an evaluation to increase supply chain's capabilities within the competition. The degree of coffee supply chain was measured by using factor analysis based on Arcs of Integration concept, then was validated by discriminant analysis. The result would be determined based on Likert Scale score for each integrated activity.

The result showed that in partner farmer level, about 42 percent of farmers did not integrate their business activities to supplier and customer, thus they were classified as inward facing group. There were quite a lot of farmers who performed this type since there was no obligation to sell the product or other obligation which was imposed on farmers in the contract between farmers and their customers (KUB). Partner farmers were just noticed as partner of KUB or exporters, but did not have to sell the product to them and integrated their business activities. As much as 51 percent of farmers were integrating their business activities yet were not too extensively to supplier and customer. They were classified as periphery facing group. Most

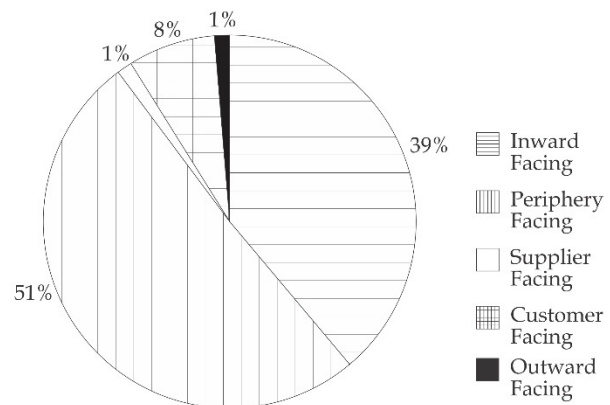
partner farmers implemented that type of supply chain integration degree. There was just 1 percent of partner farmers who were in supplier facing group which were integrating the business activities very extensively to their suppliers. And also, only 6 percent of partner farmers integrated their business activities very extensively to customers (customer facing).

The exporter formed a group to be a middleman which connected the exporter to the supplier. The group was named KUB. But, KUB still run their business as middleman performing marketing, distribution, etc. All KUBs implemented were customer facing type. KUB was very extensive in integrating their business activities with their customer because they were exporter's middleman. The exporter formed KUB and KUB had to make a report intensively to them. Because of that, KUB's business activities were integrated extensively with the customer. The exporter asked KUB also to get closed to the supplier.

In retailer level, all retailers in this supply chain implemented periphery facing type. All retailers integrated their business activities to supplier and customer but were not too extensively. In exporter level, 50 percent of the exporters implemented outward facing type and the other applied inward facing type. Nestle as an exporter company implemented outward facing, while Indocafco implemented inward facing in integrating their business activities. From the result of the overall coffee supply chain integration degree measurement, the degree of overall coffee supply chain could be known. Figure 5 shows the percentage of overall coffee supply chain integration degree in Lampung Province.

Based on Figure 5, the type of overall coffee supply chain integration degree in Lampung Province was periphery facing because the percentage value of the periphery facing type was the greatest, as much as 51 percent. The lower percentage value of supply chain integration degree was inward facing type as much as 39 percent, then customer facing type as much as 8 percent, and the lowest were supplier facing and outward facing as much as 1 percent for each type

of supply chain integration degree. The result of coffee supply chain member grouping into the type of supply chain integration degree had been validated. The result of the validity test showed that coffee supply chain member grouping had been classified correctly as much as 96.2 percent. The output of this validity test can be seen in Annex 2 which was found to be good or valid or almost perfect. It showed that coffee supply chain member grouping had been validated correctly.



**Figure 5. The Percentage of Overall Coffee Supply Chain Integration Degree in Lampung Province**

#### THE COMPARISON BETWEEN NESTLE'S COFFEE SUPPLY CHAIN INTEGRATION DEGREE AND INDOCAFECO'S COFFEE SUPPLY CHAIN INTEGRATION DEGREE

There were two coffee supply chains in Lampung Province. They were Nestle's coffee supply chain and Indocafco's coffee supply chain. They were incorporated into coffee supply chain in Lampung Province. Nestle and Indocafco had role to be exporter in this supply chain. The Nestle's coffee supply chain and Indocafco's coffee supply chain were different. There were no KUB in Indocafco's coffee supply chain. KUB was middleman which formed by Nestle, so KUB was only found in Nestle coffee supply chain, either as middleman or distributor.

The member of Nestle's coffee supply chain consisted of farmers, KUB, retailer, and exporter; while the member of Indocafco's coffee supply chain consisted of farmers, retailer, and exporter. The degree of their coffee supply chain integration would be compared based on the

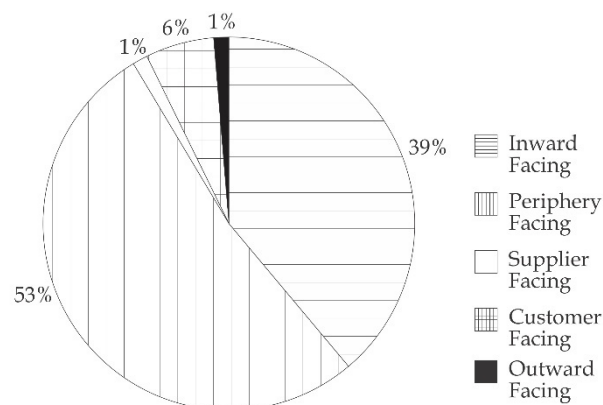
result of the degree of overall coffee supply chain integration measurement which had been explained.

The amount of partner farmers which incorporated with Nestle was more than the number of partner farmers incorporating with Indocafco. Their partner farmers implemented different types of supply chain integration degree. In general, Nestle's partner farmers integrated their business activities to supplier and customer, but were not too extensively, thus they were grouped in periphery facing type. As much as 53 percent of Nestle's partner farmers were in periphery facing type; 43 percent were in inward facing type; 3 percent were in customer facing type; and one percent was in supplier facing type. While the partner farmers of Indocafco were not integrating their business activities to supplier and customer generally yet they implemented inward facing type as much as 38 percent. About 37 percent implemented periphery facing, and 25 percent performed customer facing. The partner farmers did not integrate their business activities with Indocafco because there was no agreement on contract between them. And also the exporter did not supervise or support the farmers. It was different with what Nestle did to their farmers. Nestle supervised and supported their partner farmers through KUB.

KUB is a group formed by Nestle as a middleman between farmers and Nestle. There were two KUBs which were members of this supply chain. Those KUBs integrated their business activities to customer extensively (customer facing). In retailer level, all retailers which were Nestle's partner were in periphery facing type. It was the same as retailer which was Indocafco's partner. Nestle integrated their business activities very extensively to their supplier and customer (outward facing), while Indocafco implemented inward facing that there was no integration between business activities and their partner.

In general, the degree of Nestle's coffee supply chain integration was periphery facing which was the type that supply chain member integrated their business activities, but was not too extensively, to their supplier and customer. It

was about 53 percent of coffee supply chain members which cooperated with Nestle implemented periphery facing, 39 percent implemented inward facing, 6 percent implemented customer facing, one percent applied supplier facing, and the remaining of it performed outward facing. Figure 6 shows the percentage of Nestle's coffee supply chain member in Lampung Province based on their types of supply chain integration degree.

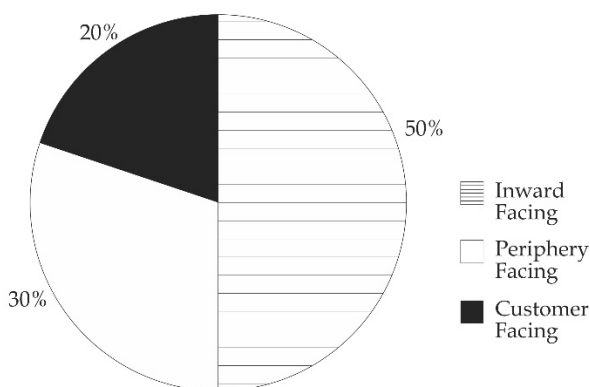


**Figure 6. The Percentage of Nestle's Coffee Supply Chain Integration Degree in Lampung Province**

Indocafco's supply chain integration degree was inward facing in general. Almost all Indocafco's supply chain members did not integrate their business activities at all to their supplier and customer. It was about 50 percent of Indocafco's supply chain member implemented inward facing. Thirty percent of supply chain member implemented periphery facing while 20 percent of them applied customer facing. There were no supply chain members which implemented supplier facing type. Figure 7 shows the percentage of the degree of Indocafco's supply chain member integration based on their type of supply chain integration degree.

Based on the result of coffee supply chain integration degree measurement, Nestle's coffee supply chain was found to be better than Indocafco's coffee supply chain. In general, member of Nestle's coffee supply chain has integrated their business activities to supplier and customer as a partner although it was not too extensive. It can be found from the coordination and collaboration which was performed between

the supply chain members. In this case, Nestle had been supervising the three flows which flew along the coffee supply chain. Nestle did it through KUB which formed by themselves. While Indocafco's coffee supply chain was not good enough as there were no integration between supply chain members in its business activities in general. Therefore, it could disrupt the smoothness of the three flows along the supply chain because supply chain is a system where communication, coordination, and integration between supply chain members are needed. There was no supply chain member implementing extensive type of supply chain integration degree in integrating their business activities to supplier and customer or outward facing type except Nestle as an exporter. It was unfortunate because the implementation of outward facing type is the best strategy in distributing three flows in supply chain to reach customer's satisfaction.



**Figure 7. The Percentage Of Indocafco's Coffee Supply Chain Integration Degree In Lampung Province**

## CONCLUSION AND RECOMMENDATION

### CONCLUSION

1. The degree of the overall coffee supply chain in Lampung Province was periphery facing.
2. The degree of Nestle's coffee supply chain was better than the degree of Indocafco's coffee supply chain.
3. The degree of Nestle's coffee supply chain integration was periphery facing, while the

degree of Indocafco's coffee supply chain was inward facing.

### RECOMMENDATION

The member of coffee supply chain in Lampung Province should integrate their business activities more extensively to supplier and customer. Later, Indocafco should participate in supervising and assisting the other members of this supply chain as a partner.

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### Annex 1. Factor Analysis Output of The Degree of Integration of the Coffee Supply Chain

#### Factor Analysis: x1a, x1b, x2a, x2b, x3a, x3b, x4a, x4b, x5a, x5b, x6a, x6b, x7

Principal Component Factor Analysis of the Correlation Matrix

Unrotated Factor Loadings and Communalities				Rotated Factor Loadings and Communalities Varimax Rotation				Factor Score Coefficients				
Variable	Factor1	Factor2	Communality	Variable	Factor1	Factor2	Communality	Variable	Factor1	Factor2		
x1a	-0.845	-0.095	0.724	x1a	0.704	-0.477	0.724	x1a	0.120	-0.045		
x1b	-0.827	-0.074	0.689	x1b	0.676	-0.482	0.689	x1b	0.111	-0.051		
x2a	-0.820	0.271	0.746	x2a	0.446	-0.739	0.746	x2a	0.008	-0.170		
x2b	-0.855	0.087	0.738	x2b	0.593	-0.622	0.738	x2b	0.067	-0.109		
x3a	-0.584	0.535	0.627	x3a	0.096	-0.786	0.627	x3a	-0.095	-0.239		
x3b	-0.718	0.343	0.633	x3b	0.322	-0.727	0.633	x3b	-0.024	-0.185		
x4a	-0.369	0.613	0.512	x4a	-0.118	-0.706	0.512	x4a	-0.141	-0.246		
x4b	-0.251	0.480	0.293	x4b	-0.121	-0.528	0.293	x4b	-0.115	-0.189		
x5a	-0.836	0.154	0.723	x5a	0.535	-0.661	0.723	x5a	0.045	-0.131		
x5b	-0.706	-0.273	0.573	x5b	0.714	-0.252	0.573	x5b	0.157	0.029		
x6a	-0.687	0.183	0.506	x6a	0.403	-0.586	0.506	x6a	0.020	-0.127		
x6b	-0.525	-0.586	0.620	x6b	0.781	0.104	0.620	x6b	0.230	0.154		
x7a	-0.512	-0.142	0.283	x7a	0.482	-0.225	0.283	x7a	0.097	0.002		
x7b	-0.568	-0.512	0.585	x7b	0.764	0.020	0.585	x7b	0.213	0.124		
x8a	-0.579	-0.305	0.428	x8a	0.638	-0.145	0.428	x8a	0.153	0.052		
x8b	-0.555	-0.494	0.552	x8b	0.743	0.015	0.552	x8b	0.206	0.119		
Variance 7.0313 2.2006 9.2320				Variance 4.9880 4.2440 9.2320								
% Var 0.439 0.138 0.577				% Var 0.312 0.265 0.577								

### Annex 2. Discriminant Analysis Output of The Validity Test

			Predicted Group Membership					Total
			0	1	2	3	4	
Original	Count	0	30	1	0	0	0	31
		1	2	37	0	0	0	39
		2	0	0	1	0	0	1
		3	0	0	0	6	0	6
		4	0	0	0	0	1	1
	%	0	96.8	3.2	.0	.0	.0	100.0
		1	5.1	94.9	.0	.0	.0	100.0
		2	.0	.0	100.0	.0	.0	100.0
		3	.0	.0	.0	100.0	.0	100.0
		4	.0	.0	.0	.0	100.0	100.0

a. 96.2% of original grouped cases correctly classified.

ISBN 978-602-14623-4-8



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