# 8. Implementation of supply

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# Implementation of Supply Chain Integration To Improve Competitive Advantage of Cocoa Commodity : A Case of Cocoa Supply Chain In Mamuju Regency,Indonesia

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## ABSTRACT

One of the problem of cacao commodity industry in Indonesia, including Mamuju Regency is the partially integration along supply chain from upstream to downstream, which demonstrates a noticeable difficulty in terms of competitiveness. Therefore, objective of this research are to improve competitive advantage of cocoa in Mamuju trough implementation supply chain integration (SCI). In order to reach the objective, we used the adductive research approach by using a survey method. Primary data was collected from 80 cocoa farmers, 20 cacao traders and 20 input supplier. This data was then analyzed using Relative Importance Index (RII), correlation analysis, and ANOVA analysis. The result of this research shows that to implement SCI on cacao supply chain, sharing of information between cacao farmers, cacao traders share their market information and cultivation techniques informations to cacao farmers, and input supplyer share their input information to cacao farmers were the most important factors of internal integration (II), custemer integration (CI), and supplyer integration (SI) elements respectively. For the three element of SCI, just CI have strong and positive relationships with CA and also have significantly affect on CA The research concludes that important factors for implementing SCI element in cacao supply chain is sharing informatiuon between cacao farmer, cacao traders and input suppliers. Eventough all of the three elementsof SCI can lead to improve competitive advantage of cacao commodity, but CI element is a foundation of the SCI to improve the competitive advantage.

**KEY WORDS**
Competitive advantage, cacao supply chain, supply chain integration, internal integration, customer integration, and supplyer integration

## INTRODUCTION

Cocoa is one of the most reliable commodities and plays important roles in contributing to the national economy. Some of these roles include: 1) being an item of foreign trade, 2) as a job creator, 3) as a main source of income for some members of society, 4) encourages the cocoa industry, 5) regional development, as well as 6) environment conservation. Indonesia is the third largest producer of cocoa in the world which produced 19.4

percent of the world's cocoa in 2014. The largest producer of cocoa in the world is Ivory Coast with a total production of 35 percent followed by Ghana which produced 21.5 percent to the world's cocoa in 2014.

The largest producers of cocoa in Indonesia are located in Sulawesi, including South Sulawesi, West Sulawesi, Central Sulawesi, and South East Sulawesi with a collective dedicated plantation area of 984,040 hectares which yields 460,024 tons of cocoa annually. West Sulawesi, the main center of cocoa production, has several cocoa producing regencies. The largest of them being Mamuju with 68,236 hectares of land or about 69,22 persen of total plantation area in West Sulawesi and an annual production of 54,797 tons [1]. Mamuju is a promising prospect for developing cocoa commodities in West Sulawesi due to the land availability, worldwide increasing demand of cocoa, and the establishment of new international cocoa markets. However, in order to fully take advantage of the markets, Mamuju cocoa must be able to compete with cocoa produced by other countries. According to the datas of Center for Agricultural Data and Information System cocoa from Mamuju are unable to compete with foreign producers due to most of cocoa plantations are owned by local farmers. with long traditional supply chain management from farmers to local trader to local market until received by buyer (chocolate industry) sometimes with low competitive advantage (e.g. high prices and low qua) Regarding the issue of the low competitive advantage of cocoa in Mamuju, literature has confirmed that the objective of a integration supply chain is to gain competitive advantage by improving the customer service, lower costs, and higher profits [3,4,5].

Supply chain integration (SCI) analysis in the agricultural industry has become a trending topic for many researchers in developing countries [6]. Various studies have reported that SCI has been widely adopted in non-agricultural industries to improve corporate competitive advantage. However, there has not been any empirical effort to apply these findings to the cacao commodity supply chain. Moreover, the SCI have three elements, namely internal integration, customer integration, and supplyer integration. The effect of the three elementsof SCI on competitive advantage of agriculture commodity such cacao have not been examined by prevous research. In addition, cacao commodity supply chain in Mamuju have unique characteristics such as the large number of local small farmers involved in cacao farming with spread location through rural areas, weak forward and backward links, asymmetric market and information structure and inefficient supply chain operation systems [7]. Therefore, the research questions that arise are how to implement SCI on the cacao supply chain in Mamuju, and how the impact the elements of SCI on improving competitive advantage of cocoa commodity in Mamuju?

The aims of this research are to identify the factors of the SCIs elements that have important role to implement SCI on cacao supply chain; analyze the effect of the three elements of the SCI on competitive advantage improvement of cocoa commudity in Mamuju. The results of this study are expected to help members of cacao commodity supply chain in making decisions to improve supply chain integration in order to improve competitive advantage of cocoa in Mamuju. This study also hopes to add to the existing literature on implementing supply chain integration in the traditional cocoa supply chain and to serve as a source of information for future studies.

## MATERIALS AND METHODS

*Research Design and Strategy:*

This research adopts an adductive approach (inductive and deductive), although there is more emphasis on the deductive approach. This is to analyze the causal relationship between elements of SCI, and competitive advantage in the cocoa industry in Mamuju. This research also uses the multiple-case method with aims to obtain information from various but similar situations related to the research problem in an effort to determine whether the findings of one case are present in another in order to justify generalization. The adoption of this method is crucial because it offers a path to answer the research question and evaluate research findings in order to create a conclusion and triangulation [8].

*Population and Sample:*

The population of this research is cocoa suppliers and the units of analysis are farmers and traders. Given that the population size of this research in unknown and geographically spread, the method used to determine the sample is the multi-stage cluster sampling technique. Two districts were chosen based on the high number of farmers and large farming areas. Next, five villages were chosen from each district based on characteristic similarity, and eight farmers from each village were chosen randomly as respondents. Here also, after the initial selection of the 80 farmers, the snowball method was used to select the other main actors in the cacao supply chain who had transactions linked to the farmers. Based on the recommendations provided by the farmers, we selected 20 cacao traders and 20 cacao input suppliers, and so that the total respondent number was 120 individuals

*Data Collection Techniques:*

For this research, the data of cocoa SCI was collected. Very little information and data were available, and most of the available secondary data are general information on production, acreage, and cocoa farmers' households. Such information is not sufficient in reaching the goal of this research, so primary data collection was required in order to obtain accurate and up-to-date data. Therefore, surveys were deemed most appropriate to be used in this study case. According to Piboonrungroj [9], generally surveys are very popularly used in SCI research and are a relatively inexpensive method for measuring SCI dimensions. For this study, the collection of primary data was done using a combination of direct observations and interviews. In-depth and structured interviews were m with the help of questionnaires as a method of collecting primary data. The questionnaires were filled with multiple-choice questions and open questions. The multiple choice questions gave the respondents an opportunity to respond to a question with a 3-point likert scale based on their perceived importance. The open questions gave the respondents the opportunity to answer the questions freely based on what they know, experience or practice. Given that the primary data collection was done with the assistance of a questionnaire and this questionnaire used must fulfill two basic criteria: validity and reliability.

Primary data collected through structured interviews shows business characteristics (scale and ownership status, duration of operations, purpose and marketing area), internal integration (collaborating between farmers in making a program, sharing information, holding regular meetings, integrating operations), supplier integration (sharing technical information with suppliers, cooperating with suppliers, suppliers delivering goods in a timely manner), and customer integration (customer satisfaction, contact with customers, delivering products to customers in a t ly manner, feedback quality from customers), plantation performance (production, productivity), and competitive advantage (price/cost, quality, time-to-market, sales growth). In addition, structured interviews were also supported by semi-structured interviews (in-depth interviews) by key informants (cocoa farmers association, and local government staff) regarding potential constraints and opportunities in the implementation of SCI in the cocoa supply chain in Mamuju Regency.

*Data Analyzing Techniques:*

The data analysis techniques used in this study include:

(1) Descriptive analysis in the form of percentage, mean value and charts showing the scope of SCI in the cocoa value chain.

(2) Relative Importance Index (RII) was used to analyze the factors of three elementsof SCI (internal integration, supplier integration and customer integration) that important considered in cacao supply chain

(3) Pearson Correlation statistic test was used to determine the relationship between three elements of the SCI and competitive advantage improvement of cocoa

(4) ANOVA test was used to determine which three elements of SCI have the largest effect on improving competitive advantage of cocoa

## RESULTS AND DISCUSSION

*Supply Chain Integration Factors of Private Cocoa Plantations:*

RII was used to identify the important factors of SCI on cocoa supply chain (II, IC and IS). The calculation results and ranking of importance for each of the three integration elements can be seen in Table 1.

**Table 1:** RII and Ranking Factors of Supply Chain Integration Elements on Cocoa Supply Chain

| Integration Elementsand Their Factors | Mean Value | RII | Ranking |
|---|---|---|---|
| Internal Integration (II) | | | |
| Cooperating with other farmers regarding cultivating techniques | 3.22 | 0.76 | 4 |
| Sharing of information between farmers | 3.48 | 0.874 | 1 |
| Flexibility in producing cocoa | 3.36 | 0.833 | 3 |
| Periodic meetings between farmers | 3.43 | 0.852 | 2 |
| Every farmer has his own individual plan | 2.96 | 0.763 | 5 |
| Customer Integration (CI) | | | |
| Farmers and sellers hold routine meetings | 3.42 | 0.856 | 4 |
| Farmers are capable of delivering their produce quickly to sellers to sell | 3.46 | 0.862 | 2 |
| Farmers cooperate with sellers in developing a program/activity to increase cocoa production | 3.4 | 0.845 | 6 |
| Farmers and sellers cooperate to estimate market demand growth of cocoa | 3.43 | 0.853 | 3 |
| Farmers are capable of consistently satisfying sellers with their cocoa quality | 3.19 | 0,788 | 8 |
| Traders share their market and cultivation techniques information to farmers | 3.49 | 0.868 | 1 |
| Farmers have a long-term relationship with sellers | 3.34 | 0.824 | 7 |
| Sellers socially interact with farmers | 3.41 | 0.851 | 5 |
| Supplier Integration (SI) | | | |
| Suppliers routinely contact farmers with production material needs | 3.38 | 0.838 | 3 |
| Suppliers form partnerships with farmers | 3.42 | 0.846 | 2 |

| | | | |
|---|---|---|---|
| Suppliers are capable of delivering production materials to farmers in a timely manner | 3.22 | 0,794 | 9 |
| Suppliers cooperate with farmers in developing a program/activity to reduce costs in the cocoa production process | 3.26 | 0.798 | 7 |
| Farmers offer advice regarding quality to suppliers | 3.36 | 0.832 | 4 |
| Suppliers are capable of satisfying farmers with production materials provision | 3.25 | 0.804 | 6 |
| Suppliers are capable of offering guidance on better cocoa cultivation to farmers | 3.19 | 0.788 | 10 |
| Suppliers share their input information to farmers | 3.49 | 0.867 | 1 |
| Suppliers socially interact with farmers | 3.3 | 0.81 | 5 |
| Suppliers and farmers have a long-term relation | 3.2 | 0.79 | 8 |

Table 1 shows that almost all factors of SCI elements are considered important by the respondents (RII > 0.5). However, every SCI element contains factors considered priorities by the respondents. For II, the factor considered most important in sharing of information between farmers (RII = 0.874), followed by periodic meetings between farmers (RII = 0.852), and flexibility in producing cocoa (RII = 0.833). This shows that to implement SCI on cacao supply chain, these three factors must be given as the first priority in the II element. Next, the factors considered most important in the CI element are sharing market information and cultivation techniques with famers when needed (RII = 0.868), followed by farmers are capable of delivering their produce quickly to sellers to sell (RII = 0.862), and farmers and sellers cooperate to estimate market demand growth of cocoa (RII = 0.853). This shows that to implement SCI on cacao supply chain, these three factors must be given as the first priority in the CI element. As for the SI element, the factors considered most important are suppliers sharing information with farmers when needed (RII = 0.867), followed by suppliers form partnerships with farmers (RII = 0.838), and suppliers routinely contact farmers with production material needs (RII = 0.836). This shows that to implements of SCI on cacao supply chain, these three factors must be given as the first priority in the CI element. From the three SCI elements, it appears that sharing of information is a top priority factor. This found is consistent with the previous research. Otchere et al [10] who study implementation of supply chain integration within the cacao industry in Ghana, and they found that lack of information sharing between supply chain actors is the major challenges in implementating and using of supply chain integration. Mappigau et al. [11] who explore the root problems of collaborative practices between the different actors on native beef cattle supply chain in Indonesia, and they found that sharing of information is an important component in the implementation of the supply chain integration. Furthermore, enhanced transparency, through an information sharing mechanism linking supply chain partners, is one of the most critical drivers of supply chain success. Kohli and Jensen [12] who measure the impact of factors collaboration on the operational effectiveness of SC collaboration. They found that critical information sharing can happen only if there is confidence among SC partners to trust each other and develop formal guidelines and communication channel. Next, they suggested that improvement of information sharing with supply chain partners, including; (a) encouraging inter-organizational integration by collaborative work buetween the farmers which allows the sharing of resources, responsibilities, risks and reward; (b) allowing some incentive mechanism which encourage employees to be involved and committed in the positive relationships with customers and suppliers, (c) recognizing, a customer focused approach where co-creation of value with the participation of customers and suppliers to manufacturing, distribution and even after-sales services, (d) establishing long term, trust-based, transparent and strong relationships with supply chain partners, because trade is somehow limited, but relationships built on trust are harder to be destroyed, (e) providing a IT infrastructure which enables the real time diffusion of information within the organization, (f) arranging internal and external meetings which concentrate on the latest situation of supply chain activities and relationships. Koçoğlu et al. [13] study influence of SCI on information sharing and supply chain performance (SCP) and the role of information sharing in formatting SCP in Turkish manufacturing firm. They found that role played by SCI is critical in information sharing process as it reinforces connectedness, coordination and collaboration among SC members. The collaboration in supply chain means different companies involve themselves in the flow of products and information from the raw materials to final consumer in order to fulfill the customer needs.

*Relationship between Supply Chain Integration and Competitive Advantage of Cocoa:*

The regression statistic analysis between SCI and competitive advantage of cacao commodity can be seen in Table 2.

**Table 2:** Correlation Analysis of Supply Chain Integration and Competitive Advantage of Cocoa Commodity

| Integration Element | Integration Element | | | |
|---|---|---|---|---|
| | II | CI | SI | CA |
| Internal Integration(II) | 1 | | | |
| Customer Integration (CI) | 0.309 | 1 | | |
| Suppliers Integration (SI) | 0.267 | 0.515 | 1 | |
| Competitive Advantage (CA) | 0.012 | 0.621 | 0.593 | 1 |

Table 2 shows a positive relation between SCI elements and competitive advantage. However, when comparing SCI elements individually, it is clear that not all SCI elementshave a strong positive relationship. Strong positive relationships appear when comparing CI and CA (0.621) as well as SI and CI (0.515).

To understan he impact significant of SCI on competitive advantage of cacao commodity, an ANOVA test was run. The results of this test are shown in Table 3.

**Table 3:** ANOVA

| *Integration Element* | *Coefficient* | *Standard error* | *P-Value* |
|---|---|---|---|
| Intercept | 10.867 | 3.426 | 0.024 |
| Internal Integration (II) | 0.202 | .080 | 0.142 |
| Customer Integration (CI) | 0.436 | .053 | 0.023 |
| plier Integration (SI) | 0.217 | .065 | 0.091 |
| Multiple R : 0.326 | | | |
| R Square :0.543 | | | |
| Adjusted R Square : 0.318 | | | |
| Standarderror: 0.495 | | | |

The following formula was formed based on the coefficient shown in Table 3:

CA = 10.867 + 0.202 II + 0.436 CIP + 0,217 SI+ e

This formula shows the significant values of all the variables. The interpretation of the formula is as follows: bo = 10.867 (constant value representing competitive advantage), b1 = 0.202 (parameter value or regression coefficient which shows that for every 1 increase in II, CA will increase by 0.202 times, assuming that the other variables are constant; CI and SI = 0), b2 = 0.436 (parameter value or regression coefficient which shows that for every 1 increase of CI, CA will increase 0.436 times, assuming that the other variables are constant; II and SI = 0), and b3 = 0.217 (parameter value or regression coefficient which shows that for every incre e of 1 in SI, CA will increase 0.217 times, assuming that the ther variables are constant; II and CI = 0).

The regression statistic between II, CI, SI and CA show the multiple R = 0.436 is relatively weak, the R Squa of approximately 0.543 is relatively strong, and the standard error = 0.495 is high. ANOVA indicates that, the three elements of SCI (II, CI and SI) together lead to improved competitive advantage. However, the elements individually show that II and SI do not have signicantly effect to an improve of the CA (P-value=0.142 and 0.091 > 0.005). On the other hand, CI does have significantly affect on competitive advan e (P-value =0..023 < 0.005), This is consistent with the previous research. Otchere et al. [10] who examined supply chain integration practices hat could lead to improved competitive advantage of cacao commodity commodity in Ghana. They found that the three elementsof supply chain integration together lead to improved performance and com etitive advantage but just CI element does have significatly affect on competitive advantage They argued that performance improvements are not assured with just one aspect of SC integration, and have therefore proposed that implementing complete inte on both upstream (SI), operations (II), and downstream (CI) is better than concentrating on only one aspect. Hosseini et al. [14] investigat the impact of supply chain integration on competitive capability of Iranian Food Industry. They found that supply chain integration has direc ositive influence on competitive capability. In more depth, integration with suppliers and wit stomer have direct negative impact on competitive capability elements of c eadership and differentiation. Flynn et al [15] who study the relationship between three dimensions of SCI, operational and business performance, and they found that internal and customer i gration were more strongly related to improving performance than supplier integration. On the other hand, internal integration has no direct impact on competitive capability but the internal integration influences on cost leadership and differentiation indirectly through integration with suppliers d integration with customers. From ther literature review, Maleki1 and Machado [16] m ioned that firm position determines whether CI or SI integration has more effectiveness. CI integration helps firms to secure the distribution channels of their products, especially in markets with increased uncertainties. Second, it can offer a way to control efficiency gains and cost reduc ns in the SC Third, CI can offer important benefits in addition to large new sources of revenue. While, SI integration refers to the degree to which a firm can partner with its key suppliers to structure their interorganizational strategies, practices, procedures and

behaviours into collaborative, synchronized and manageable processes in order to fulfil customer requirements. On the other hand, Atasevena and Nairb [17] who undertakes an extensive investigation of the relationships between supply chain integration and various performance dimensions using a meta-analytical methodology, concluded that supplier integration enhances product quality, while customer integration has a positive effect on market success

*Conclusion:*

*Based on result of analysis:*

1. Besed on implementatition of the three elements of SCI on cacao supply chain (II,CI, and SI), for II element, sharing of information between farmers was the most important factor (RII = 0.874), for CI element, cacao traders share their market and cultivation techniques informations to the farmers was the most important factor (RII = 0.868); and for the SI element, cacao input suppliers share their input information to the farmers was the most important factor (RII = 0.867).
2. There is a. strong positive correlation between CI and CA (0.621) as well as SI and CI (0.515).
3. For all elements of SCI, just CI element does have significantly affect on competitive advantage of cacao commodity

*Study Limitation And Future Research:*

This study contributes to the literature by exploring the relationships/dependencies among three elements of SCI and their impact on improvement competitive advantage of cacao commodity commodity. However, the study have several limitation. First, First, The sample size and location for the study is relatively small, which maybe a cause for possible result analysis of data less and also conclusion may not be representative of cacao commodity SCI integration in sentra cacao production areas. The future study can also analysis the relationships/dependencies among three elements of SCI and their impact on improvement competitive advantage of cacao commodity in the other area in order to obtain more useful information and a more representative and accurate conclusion. Second, cacao farmers are actor who have lower begaining posisition than the other actors in traditional cacao supply chain practices. The effect of elementsof SCI on improvement of bergaining position of cacao commodity farmers. which have been ignored from this study. The future study can also analysis the relationships/dependencies among three elements of SCI and their impact on improvement bergaining posision of cacao commodity farmers. Third, results of this study shows that integration among farmers and integration farmers with suppliers do not influence on competitive adventage. More researches are need to find out the impact of this SCIs elementson competitive advantages of cacao commodity.

In addition to theoretical contribution, this study result at making a several contribution to practice. First, in order to gain and improve competitive advantage of cacao commodity, the main actors of cacao commodity suplpy chain consist of farmers, traders, and supplier should improve their sharing information. Such the sharing information leads to have integrated their relationships. Second, in improving competitive advantage of cacao commodity in Mamuju Regency, the local policy makers should pay special attention to facilitate main actor of cacao commodity supply chain to implement all the three elementsof SCI, start from functional integration through internal integration of farmeres to external integrations with supplyer and traders.

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