# SUPPLY CHAIN MANAGEMENT PERFORMANCE OF CORN IN EAST LOMBOK

(*KINERJA MANAJEMEN RANTAI PASOK JAGUNG DI LOMBOK TIMUR*)

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## ABSTRACT

The improvement of corn farmer welfare is a must that involves struggle by them to keep up their enthusiasm in corn farming. A solution for this challenge is by applying *supply chain management*.

The objectives of research are (1) to analyze supply chain management performance of the corn from producers to cunsumers, and (2) to understand relationship of supply chain management with farmer welfare and corn consumers satisfaction.

Respondents of this research are farmers, intermediate traders, and corn consumers. The farmers were selected using simple random sampling technique, while intermediate traders and corn consumers were selected using snowball sampling technique. Narrative descriptive analysis and Spearman Rank Correlation are used to analyze the data.

It is concluded that (1) Supply Chain Management Performance of the corn is 3.212 in average and remaining between 2.6 and 3.6 and it is in the “almost good“ category and (2) Supply Chain Management is related positively and significantly to farmers welfare and corn consumers satisfaction.

***Keywords****: performance, supply chain management, farmers welfare, corn*

## *ABSTRAK*

*Perbaikan kesejahteraan petani jagung merupakan suatu keharusan mesti diperjuangkan oleh semua pihak agar mereka tetap bersemangat di dalam berusahatani jagung. Salah satu solusi yang ditawarkan bagi pemangku kepentingan adalah menerapkan manejemen rantai pasok (suplly chain management).*

*Tujuan dari penelitian ini adalah : (1) menganalisis keragaan manajemen rantai pasok jagung dari produsen sampai dengan konsumen; (2) menganalisis hubungan manajemen rantai pasok dengan kesejahteraan petani dan kepuasan konsumen pengguna jagung.*

*Resopnden dalam penelitian ini adalah para petani, pedagang perantara dan konsumen pengguna jagung yang dipilih dengan teknik proporsional snowball sampling. Analisis data menggunakan deskriptif naratif dan korelasi rank spearman.*

*Kesimpulan yang diperoleh dari hasil penelitian ini adalah : (1) Keragaan manajemen rantai pasok jagung rata-rata 3,212 berada pada kisaran antara 2,6 dan 3,6 dengan kategori hampir baik; (2) Manajemen rantai pasok berhubungan positif dan signifikan dengan kesejahteraan petani dan kepuasan konsumen pengguna jagung.*

***Kata kunci****: keragaan, manajemen rantai pasok, kesejahteraan petani, jagung*

# I. INTRODUCTION

Some researches have examined supply chain management of agricultural products. Hayman and Saosaovaphak (2012) scrutinized supply chain of corn seed at United Republic of Myanmar. Sari (2012) observed supply chain management performance of organic rice. Anggraeni (2009) had measured supply chain management performance of PT Crown Closures Indonesia. Irmawati (2007) attempted to understand the influence supply chain management performance on PT Government Company VIII Gunung Mas Bogor. A lof of researcher about supply chain collaboration performance of corn in Indonesia, exception corn seed supply chain (Sayaka, 2005; Suharjito, et al., 2010) and corn flour (Hetharia, 2012).

All of these researchers, however, are partial or focused on the performance of a company which plays a role as integrator (Ervil, et al., 2010), and were not yet elaborating all agencies or companies in a certain supply chain segment, from producers to consumers. It is reasonable to consider these as weaknesses.

Any existing model to measure supply chain management performance such as *individual metrics, metric sets, supply chain operational reference* (SCOR), *Economic Value* (EV), *Return on Assets* (ROA), *Preference of Activity* (POA), and *Balanced Scorecard* (BSC) are still partial. Based on theoretical aspect, it is shown that the concept and the model behind the measurement of supply chain management performance are still generic (Anatan and Elitan, 2008). Therefore, it needs further discussion (Pujawan, 2005).

The weaknesses stated above can be dealt by formulating a measurement model which covers all organizations involved within a supply chain segment from farmers to corn consumers by adopting supply chain collaboration theory (Mathuramaytha, 2011), business process integration and competitive advantage of company (Bartezzaghi, 1999), the inclusion of supply chain management and farmer welfare variables (Spekman, et al., 2001), and the adoption of some variable indicators (Irmawati, 2007; Guangying, et al., 2010; and Shafiee, et al., 2011).

The measurement context of supply chain management performance is to empower the goal of supply chain management, which is to increase profit of all companies in supply chain, to ensure collaboration sustainability, and to improve consumers satisfaction such that *balanced scorecard* is modified and developed. The measurement of performance is important to understand how far is the implementation of corn supply chain to be successfully used as the guide for performance improvement in the future.

Farmers represent the main actor in supply chain. Their role is determining the product and capital flows and the sustainability of supply chain collaboration relationship. For better supply chain management, farmers welfare must be improved and struggled to increase as well as traders profit and consumers satisfaction.

This research attempts to analyze supply chain management performance and to understand the relationship of supply chain management with farmers welfare and corn consumers satisfaction.

Considering these ration and research objectives, the research was done are supply chain management performance of corn to improve farmers' welfare and corn consumers' satisfaction in East Lombok.

# II. REVIEW OF LITERATURE

## 2.1. Supply Chain Management Performance Concept

Supply chain management is the integration of many business process activities to improve relationship between companies to achieve their competitive advantage (Whang and Cheung, 2004; Utomo, 2011). Anatan and Ellitan (2008) call it as business network.

Widodo, et al. (2011) define supply chain management as management over material, information and capital flows from the beginning to the end of business chain to optimize the fulfillment of the organizational demand in this supply chain.

Tunggal (2011) quotes the definition of supply chain management from Ross (2008) that describes supply chain management as the management philosophy to seek for competent business function sources either inside or outside companies. These sources may include the business partnership in the supply chain that is made before entering highly competitive supply system, focused on the development of innovative solution and the synchronization of product, service and information flows to create the distinctive customer value.

The difference between supply chain and supply chain management is in SCM the presence of coordination and interdependence inter business actors in a supply chain, which reflects a collective awareness to build mutual business network which benefits each other and depends on each other in order to build a sense of collectivity to produce the utilization rate that provides satisfaction or surplus to final consumers. Each business actors are built by one interest, which is to produce sustainable profit (producer surplus) or to establish interdependent bonding, preservation and growth, free from internal competition within supply chain, but still boasting up competitive advantage of company (Widodo, et al.., 2011).

It is strictly asserted by Hervani, et al. (2005) that supply chain management is coordinating and managing a complex network of developmental activities from finished product until the final customers. Childerhouse and Topwill (2002) and Huang, et al.. (2003) ensure that there is a company playing a role as integrator between business actors of *supplier, firm, distributor* and *customer*. Information media represents an important device for this role.

Supply chain management is a useful device to produce collaboration, and indeed, collaboration is a medium to facilitate technology, information, capital and commodity flows. Mathuramaytha (2011) has proposed a theoretical model of supply chain collaboration with its relation with product competitive advantage and organizational performance. Supply chain management has many benefits such as the reduction of product loss, the improvement of sale, the decrease of transaction cost, and better control over product quality and security, over technological dissemination, and over capital and knowledge between chain partners. Supply chain management has been developed and implemented through whole chains to warrant optimum supply chain management performance (Roekel, et al., 2003). In this research, supply chain management performance is measured by consumer satisfaction, producer welfare, and sustainable supply a commodity from farmers to consumers.

Performance is defined as a measure of achievement by individual or organization based on certain indicator. Therefore, supply chain management performance in this research is considered as a measure of achievement by whole agencies in the supply chain management from corn farmers to consumers.

### 2.2. Measurement Index System of Supply Chain Management Performance

*Balanced scorecard* has been developed further (*the enhanced balanced scorecard*) as a measurement method that integrates the measurement results of financial performance and organizational strength that may be useful to control over supply chain management performance in the future to reflect the balance between short-term and long-term goals, financial and non-financial indexes, and other indexes as the guide in setting the strategy for achievement (Puspita, 2007; Ervil, et al., 2010).

The enhanced balanced scorecard consists of 5 (five) aspects such as customer loyalty, supply chain procedure, future development, financial value and environmental value (Guangyin, et al., 2010). Because this measurement method represents a development from early measurement method of supply chain performance, which is *balanced scorecard*, it is then this index system is introduced by presenting some key factors as business process integration indicators, such as good relationship with customer, operational procedure with low cost, future development, cash flow health, and workforce absorption. Supply chain management indicators include coordination, product flow, service flow and capital flow (Irmawati, 2007), while welfare indicators of corn farmers involve producer surplus, expense and investment saving of farmer household.

## III. RESEARCH METHOD

### 3.1. Research Location and Respondent Selection

Research respondent are corn farmers at two villages of East Lombok District in West Nusa Tenggara Province. These two villages are North Pringgabaya Village and Bebidas Village. The location of research is determined by purposive sampling technique. The number of respondent in each village determined by proportional sampling technique, resulting in 45 farmers at Bebidas Village and 75 farmers at North Pringgabaya Village. The respondent of intermediary traders and corn consumers' were determined by snowball sampling technique, resulting in 20 intermediary traders and 60 consumers of corn.

### 3.2. Data Collection

Data are collected with survey and direct interview with all respondents. The information is enriched by having in depth interview with key persons such as farmer group leaders, field manager of companies, agricultural counselors, intermediary traders, and layer group leader.

## 3.3. Data Measurement and Analysis

(1) Supply Chain Management Performance

Supply chain management performance is measured from six components, which are supply chain collaboration, business process integration, competitive advantage, supply chain management, organizational performance, and corn farmer welfare. Each component is measured with Likert Scale from 1 to 5 points (Solimun, 2010) for some indicators. Each component is weighted proportionally based on the number of indicators, shown in Table 1.

Table 1. The Assessment of Supply Chain Management Performance Index of Corn

| No. | Variables | Weights | Scale Averages | Values |
|---|---|---|---|---|
| 1 | Coordination | 0.400 | X.1 | 0.4 x (Y.1) |
| 2 | Flow of product | 0.200 | X.2 | 0.2 x (Y.2) |
| 3 | Flow of services | 0.200 | X.3 | 0.2 x (X.3) |
| 4 | Flow of capital | 0.200 | X.4 | 0.2 x (X.4) |
| | Total | 1.00 | | SCMPI |

Note:
SCMPI = *Supply Chain Management Performance Index*
Y.1 = the scale-based average of coordination
Y.2 = the scale-based average of flow of product
Y.3 = the scale-based average of flow of services
Y.4 = the scale-based average of flow of capital

Next, the criteria to decide supply chain management performance index (SCMPI) of corn are made as following:
SCMPI is very good if the rate is 4.6 to 5.0.
SCMPI is good if the rate is 3.6 - < 4.6.
SCMPI is almost good if the rate is 2.6 - < 3.6.
SCMPI is bad if the rate is 1.6 - < 2.6.
SCMPI is very bad if the rate is <1.6.

(2) Spearman Rank Correlation Analysis

The correlation relationship of supply chain management with farmer welfare and corn consumer satisfaction was using *Spearman Rank Correlation* in Siegel (1986):

$$rs_{xy} = 1 - \frac{6 \text{ x } \sum di^2}{n(n^2 - 1)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.1)$$

$rs_{xy}$ = the coefficient of Spearman Rank Correlation of X against Y
di = scale-based difference for items Xi-Yi
n = the number of sampling unit (respondents)
Xi = the scale of item of variable Xi
Yi = the scale of item of variable Yi

The analysis process is made easier by the software of SPSS for Widows. The significance rate of the coefficient of Spearman Rank Correlation is estimated by t-test as following:

$$t - \text{statistic} = \frac{rs}{\sqrt{\frac{1 - rs^2}{n - 2}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.2)$$

Moreover, by comparing t-statistic and t-table at confident level of 0.01, it is obtained the decision that:

- If t-statistic ≤ t-table is 0.01, then there is no correlation between two variables;
- If t-statistic > t-table is 0.01, then there is a correlation between two variables.

The relation strength between two variables is classified as following:

Perfect positive relationship : $rs_{xy} = 1$
Very strong positive relationship : $0.80 \leq rs_{xy} < 1$
Moderate positive relationship : $0.50 \leq rs_{xy} < 0.80$
Weak positive relationship : $0.30 \leq rs_{xy} < 0.50$
Very weak positive relationship : $0.00 \leq rs_{xy} < 0.30$
Absolutely without relationship : $rs_{xy} = 0$

## IV. RESULT AND DISCUSSION

### 4.1. The Interdependence between Organizations in Supply Chain Collaboration of Corn

Supply chain collaboration of corn involves many organizations such as Farmer Group, Cooperative, Field Coordinator, Intermediate Trader, Integrator Company/Avalist and General Banks, Layer Chicken Breeder, and Fodder Industry (Figure 1).

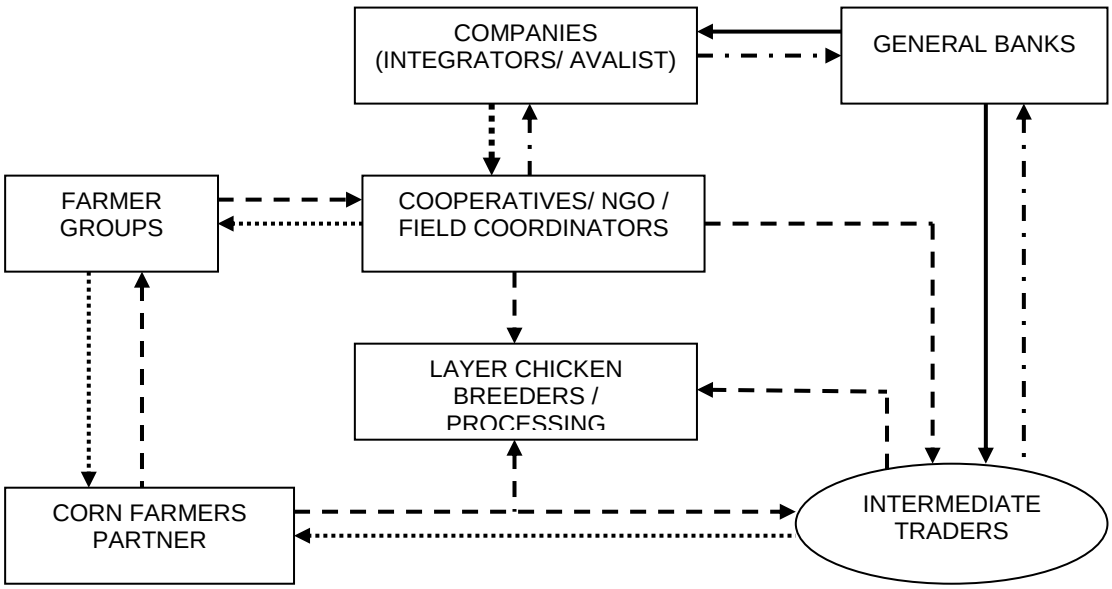


Figure 1. A Scheme of Organizational Interdependence in Supply Chain Collaboration of Corn

= capital flow
= capital and technology flow
= product and loan settlement flow
= loan/credit settlement flow

Figure 1 indicates that capital flow is made from General Banks to Avalist Companies (loan warrantor) which act as the integrator of supply chain collaboration. Capital flow is also streamed toward Private Companies which act as intermediary traders. These companies will transfer the credit to farmers through field coordinators and farmer groups, or directly to the farmers themselves. The credit provided through intermediary traders may be a direct capital flow to farmers, and therefore, the path of capital flow is shorter. The capital return flow follow the opposite direction.

Technology flow moves from company to farmers aligned with capital flow because the credit package follows technology package such as input and structure of agriculture product.

Corn product flow develops from farmers to farmer group, coordinator and company. From the company, those are flown either directly go toward the breeders/ processing industries, or indirectly through intermediary traders. If farmers obtain loan, capital or credit from intermediary traders, the product flow is directly from farmers to intermediary traders, and followed to breeders and processing industries, either food or fodder industries. The field coordinators are cooperative, NGO (non-government organization) or competent individual.

Each path of capital flow, technology flow and product flow is following information and coordination paths. These information and coordination paths represent the core of supply chain management.

Looking closely at Figure 1, it is acknowledged that the paths of capital flow, technology/service flow and information flow between private companies or intermediary traders are shorter such that supply chain is managed more effectively and efficiently. The weakness is that it is difficult to enhance the service scope because it is only limited to below 100 ha.

The result of interview with Field Agriculture Counselor informs that due to the limits and barriers in the field, not every farmer can give accurate information because of the great number of them, the distant of field location from their houses, and the lengthy of times spent in the field, thus making them difficult to meet. In practice, information is obtained from group chief and field agricultural counselors.

Using information obtained from the investigation and verification against the data from farmers and farmer group, it is then Field Agriculture Counselor provides the manager with recommendations as the consideration bases that are used by manager to decide on the proposal of Definitive Plan of Farmer Group. Based on the recommendations of Field Agriculture Counselor, company managers can agree with the proposal made by farmer groups.

After the agreement is reached, the company prepares a contract to decribe the right and duty of each party including the mechanism of credit delivery and repayment (in term of amont and time). The processes, from the submission of proposal to the delivery, may take 2-3 months before planting season. Only the eligible farmer groups are reserved with the agreement for their proposal for loan/capital/credit. The delivered credit can take two forms. One is naturals such as seed, fertilizer, herbicide and pesticide, while other is non-naturals such as the cost of opening and processing the land for Rp. 1,200,000/ ha. Naturals and non-naturals are directly delivered by Field Officer (FO) to the house of farmer group leaders.

Supply chain collaboration between avalist company and farmer groups is empowered by a contract or a covenant determining the right and the duty of each party, such as corn farmer partner and companies.

Implicitly, a contract requires farmers:

(1) to use all production structures they accept into their farming land to increase corn production;
(2) to restrain themselves from shifting or trading the production structures to other parties without acknowledgement of company managers;
(3) to report through group chief to company about harvest schedules;
(4) to sell their production, including the harvested dry corn stem, to field coordinator appointed by company; and
(5) to use a part of production payment to settle the loan by direct debiting by company, and only the remaining of production payment after credit settlement is given to farmers.

There are some duties must be met by company to farmers including:

(1) to provide production structures demanded by farmers based on the proposal in Definitive Plan of Farmer Group or to modify the structures based on its availability in market;
(2) to deliver production structures and cash (*cost of living*) to the house of farmers;
(3) to buy and to pay whole production, or some proportions based on the agreement before harvest; and
(4) to decide upon the place for the extension over of production, and it may be in road but it must be accessible by four-wheels vehicles from farming locations, or other condition based on agreement during harvest.

The collaboration of intermediate traders (private companies) and partner farmers is one that the agreement can be made orally or based on trust without contractual papers or without collateral. The collaborated parties may know well each other and may live at same location where it is possible for private companies to do a supervision if required, such as to understand when the harvest begin. Private company in partnership with farmers is easier to execute the loan repayment because the bureaucracy is not too long and the decision making is easier and faster. Moreover, the number of partner farmers is not many.

## 4.2. Partner Farmers and Other Intermediate Traders

The path of capital, technology/service, information and production flows as stated above are not all operating well. Some psycho-economic factors hinder the flows and cause the divergence. These factors are (1) farmer failure to pay the loan, (2) the unsuitability of production to what expected, (3) the avoidance of farmers from the sale cut value although this cut value is to cover the loan, (4) the unsuitability of plant area width to what reported in Definitive Plan of Farmer Group, (5) harvest failure due to weather and disease, and (6) the attractiveness of higher price from independent buyers, including broker and collector trader.

Capital flow from intermediary companies which acts as the integrator is already shown as in Figure 1. The farmers, however, abuse the contract because farmers do not send the harves through farmer group chief and coordinator to the company which acts as the leader, but sell the products to other buyer, usually

brokers and collectors who often offer higher price than price sale of partner company. Two of three farmers are abusing the credit contract. The impact of this abuse is that partner companies suffers from loss because of lack of to cover overhead cost and operational cost.

This abuse problem is a crucial matter for companies because it gives bad impact on the relationship between actors in supply chain collaboration. Besides problematic relationship with farmers, the most often shown problems are that Field Officer borrows farmers' *cost of living* from group chief and that loan payment is not repaid to the company.

Result of in depth interview with Farmer Group Chief indicates that the delinquency of Field Officer (FO) is causing the field officer to fear of coming to mentor the group, and even, some officers are terminated by the company. Company branch manager supports this fact. Due to the abusive actions by farmers and field officers, the company has lost loan payment. The defaulted credit/loan in 2012 is counted to Rp. 2.844 billions, and it is about 2/3 of the delivered credit, which is totaled to Rp. 4.266 billions.

Two reasons are behind credit default: (1) accidental factor against farmers, such as farming failure due to pest, disease, dry weather, or low production yield such that the production cannot cover the debt, (2) intentional factor by farmers, i.e. the farmers are actually able to pay the debt, but retained from settling the debt due to the intention to abuse credit contract. If the default is caused by first factor, the company gives tolerance and provides chance to farmers to repay in the next planting season. The loss is shared without requiring farmers to pay a fine or an additional cost due to default. If the default is due to second factor, the loss is only against the company. In this context, the company can submit legal suit or do a pressure against farmers to settle the debt. Legal resolution, however, is rarely taken by company. The method that is often taken for debt resolution is or personal approach, such as collecting the debt from farmer group chief or related farmers with hard reprimand.

### 4.3. Supply Chain Management Performance Index

The result of assessment of supply chain management performance index in research location is as following:

Table 2. The Assessment of Supply Chain Management Performance Index of Corn in East Lombok in 2012

| No. | Variables | Weights | Scale Averages | Values |
|---|---|---|---|---|
| 1 | Cooedination | 0.400 | 3.175 | 1.270 |
| 2 | Flow of product | 0.200 | 3.208 | 0.648 |
| 3 | Flow of services | 0.200 | 3.275 | 0.655 |
| 4 | Flow of capital | 0.200 | 3.223 | 0.645 |
| | SCMPI | 1.000 | -- | 3.212 |

Classification: moderate

On Table 2, it can be seen that the average SCMPI is 3.212, or between 2.6 until 3.6 and therefore, it remains in the criterion of almost good or not yet good. The

frequency of each classification is displayed in Table 3 and the almost good classification is rated to 45 (37,5%).

Table 3. The Assessment of Supply Chain Management Performance Index of Corn in East Lombok in 2012

| No. | Classification | Range | Amount | Percentage |
|---|---|---|---|---|
| 1 | Very Good | 4.6 until 5.0 | 14 | 11.67 |
| 2 | Good | 3.6 until < 4.6 | 34 | 28.33 |
| 3 | Moderate | 2.6 until < 3.6 | 45 | 37.50 |
| 4 | Bad | 1.6 until < 2.6 | 19 | 15.83 |
| 5 | Very Bad | < 1.6 | 8 | 6.67 |
| | Total | | 120 | 100.00 |

Of all the observed respondents, those who perceive the supply chain management performance as good classification are 28.33 % or less than one third. Those who perceive as bad and very bad classifications are 22.50 %. Bad and very bad classifications are given by farmers who have unpleasant experience with companies because of unsatisfied to the service given by company management.

Result of research indicates that SCMPI of corn is 3.212 or between 2.6 until < 3.6, and with almost good criterion. The lowest index is coordination by 3.175, while the highest index is flow of services by 3.275 (Table 2 and Table 3). The condition of supply chain management performance is comparable with the perception of respondent about supply chain management, which is mostly moderate.

This result of research is moderate and consistent to pervious research such as: (1) Hayman and Saosaovaphak (2012) who have examined corn seed supply chain in United Republic of Myanmar with conclusion that the application of supply chain management has moderate risk rate. It is still possible for the retail trader (company) to take sustainable profit from market mechanism despite difficult agricultural condition. (2) By using *balanced scorecard* method to PT Unitex Tbk, Puspita (2008) summarized that the achievement of company performance is 58.13% of target, and this condition means that the company performance is not optimal and not yet achieving the predetermined target. (3) Sayaka (2005) in the research about market behavior of corn seed suggests the government to control the seed distribution to prevent farmers from suffering the loss. Finally, (4) Roekel, et al. (2002) expect supply chain management to be implemented and developed in all chains to warrant optimal supply chain performance. So far, these results are still relevant to the result of other research on the application of supply chain management and agricultural products in Indonesia.

a) Suharjito, et al.. (2010) conclude that the risk of corn farmers is shifted to other parties in supply chain through price negotiation mechanism.
b) Sari (2002) observed supply chain management performance of organic rice and concluded that the application of supply chain management is not yet good because business process is not quite smooth and performance is not quite efficient.
c) Abubakar and Jamilah (2007) conclude that market performance for corn marketing in Aceh is not efficient if it is viewed from *return on capital* (ROC) aspect. It is occurred because marketing channel is longer and requiring greater processing and transportation costs.

d) The conclusion of Sadikin (1999) that the impact of price policy is still uncertain and it is left to the mechanism of output (corn) market.

### 4.4. The Relationship of Supply Chain Management with Farmer Welfare and Corn Consumer Satisfaction

The following is the result of Spearman Rank Correlation analysis between supply chain management, farmers welfare and corn consumers satisfaction.

Table 4. The Result of Spearman Rank Correlation Analysis between Supply Chain Management (SCM) and Farmers Welfare (FWF) and Corn Consumers Satisfaction (CCS)

| | | | SCM | FWF | CCS |
|---|---|---|---|---|---|
| Spearman's Rho | SCM | Correlation Coefficient | 1.000 | 0.864** | 0.824** |
| | | Sig (1-tailed) | -- | 0.000 | 0.000 |
| | | N | 120 | 120 | 120 |
| | FWF | Correlation Coefficient | 0.864** | 1.000 | 0.785** |
| | | Sig (1-tailed) | 0.000 | -- | 0.000 |
| | | N | 120 | 120 | 120 |
| | CCS | Correlation Coefficient | 0.824** | 0.785** | 1.000 |
| | | Sig (1-tailed) | 0.000 | 0.000 | -- |
| | | N | 120 | 120 | 120 |

** Correlation is significant at the 0.01 level (1-tailed)
Notes: Significant at obvious level of 0.01
* moderate positive relationship ** very strong positive relationship

The relationship between supply chain management (SCM) with farmer welfare (FWF) and SCM with corn consumer satisfaction (CCS) is showing a very strong positive relationship with Spearman rank correlation coefficient of > 0.8.

The aspect underlying the relationship between SCM and FWF is the direct relationship between supply chain management with input price, capital cost, and output price determinations.

These prices are determined by company management which also act as integrator. This action really influences cost and production which are then determining the income and surplus of corn farming producer. The transferred production technology is also determining production and productivity of corn farming which is then determining production (Sanglestsawai, et al., 2012).

Result of research by Wenno (2010) indicates the significant influence of input price and workforce wage on corn farmer income in Nabire, where the increase of input price and workforce wage will give negative impact on income because the increase of input price and workforces wage will reduce the income of corn farmers. Therefore, the integrator companies have stronger position compared to farmers and there is possibility for the companies to determine input price freely for the partner farmers. It is then directly influencing corn farming income. Good supply chain management is one that gives better service, including providing lower input price to farmers.

Result of Spearman Rank analysis is that $r_{rs}$ = 0.887. Result of t-statistic test shows that this rank is significant at significant level of 99 %. The result of Spearman Rank Correlation Analysis has proved that the empirical data support the hypothesis

that supply chain management has positive correlation with corn farmers welfare. The rate of $r_{rs} > 0.80$ really indicates that the relationship of two variables is very strong. Therefore, it is believed that that hypothesis that supply chain management has positive relationship with corn farmer welfare rate is accepted.

This result of Spearman Rank analysis is also supported by the result of Pearson Product Moment's cross-correlation in Smart-PLS Analysis with rate of 0.859, meaning that the relationship between supply chain management and corn farmer welfare rate is very strong.

Very strong relationship logic can be built through market mechanism and supply chain collaboration. Goldsmith (2001) reveals that (1) the integrator company is a company that provides agricultural input and seeks for a way to capture the profit from the innovation of new product, and (2) supply chain collaboration is made to adopt various cooperation between forward and backward companies to produce vertical control (integration) such that market shares of seed, fertilizer and pesticide are improved. Market strength will increase economic turn over which in turn impacts farer welfare. The result of investigation shows that market management influences badly farmer welfare because the demand of company becomes greater and inelastic According to Hagedorn et al. (2004), farmer welfare loss is caused by lower marketing ability of corn farmers. Most products are sold if market price is below annual average price. Such welfare loss is actually avoidable by scheduling the sale time.

Consumer satisfaction is signified as the degree of how far consumer/ customer is assessing the benefit they accept from service, price and quality of goods they have bought. Hardinis (2009) defines consumer satisfaction as a comparison between what consumer expects and the reality of product ability to meet consumer demand. The consumer is disappointed if the expectation is contrasted with the reality. If the expectation matches with the reality, consumer is happy. Consumer satisfaction is only recognized after consumer uses a product and it may be shown by the repeated consumption, or that consumer is never doubt of using the product again.

Supply chain management requires the consumer to obtain high satisfaction and avoids consumer dissatisfaction by fulfilling what consumer expects by providing the demanded attributes. Good practice of supply chain management will improve consumers satisfaction directly through creating the product which meet the quantity and quality, and match with consumers taste at different market share.

Result of Spearman Rank correlation analysis against the data indicates a very strong correlation relationship with $r_{rs} = 0.875$. Result of t-statistic shows that the relationship is significant at 99 % significant level. Result of Spearman Rank correlation analysis also proves that empirical data have supported hypothesis that supply chain management positively correlates with consumer satisfaction rate.

Therefore, it is reasonable for the company to meet consumer expectation by using the capacity to optimize consumers satisfaction. The effort to satisfy consumers, however, brings cost consequence, which is about how to economize the cost without sacrificing product quality. The price that is afforded by consumer purchasing power will improve consumer satisfaction because it triggers repeated buying and repeated consumption for the company product.

According to McQuitty (2000), company manager must find a way to improve the production. Regular product improvement may give surprise to customer such as by increasing service quality, increasing cleanliness and purity of product, or reducing water content, or even eliminating unfavorable substance and pollution.

The phenomenon proposed by McQuitty (2000) is supported by the result of research by Vuurent et al. (2012) who say that 85 % customers who switch to other company (competitor) are satisfied with the service of previous company. Therefore, consumer satisfaction and service quality is phenomenon with direct relationship. Service quality is indeed an inseparable part of supply chain management. Service quality is treatments given by company employees to customer, and it take several forms such as friendliness, easiness, fast, punctual, and suitable for the demand by each customer.

Providing the service that optimizes consumer satisfaction is a key to maintain the existence of company organization (Ambaroz and Praprotnik, 2008), while consumer satisfaction is the goal of supply chain management. Therefore, the optimization of consumer satisfaction cannot be separated from supply chain management goal.

# V. CONCLUSIONS AND RECOMMANDATIONS

## 5.1. Conclusions

Considering facts, data analysis, and discussion above, it is then concluded that:

(1) Supply Chain Management Performance Index of Corn is 3.212 in average at range from 2.6 until 3.6 with the almost good category.
(2) Supply chain management has positive and significant relationship with corn farmer welfare.
(3) Supply chain management has very strong positive relationship with corn user consumer satisfaction.

## 5.2. Recommendations

Based on the results and discussion above, it is recommended that:

(1) The conclusion of this result of research is useful as the base to formulate the hypothesis of research about the impact of business integration in supply chain collaboration on the outcome of corn farmer welfare in the dry land and wet land ecosystems.
(2) The company as the integrator can use this result to improve supply chain management performance of corn.

## Refereces

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