# Analysis of Inventory Control and Banana Chips Agroindustry Development Strategy in Bandar Lampung

**M. Irfan Affandi[1] and Sussi Astuti [2]**
[1]Department of Agribusiness, Faculty of Agriculture
Lampung University, Jl. Prof. Dr. Sumantri Brojonegoro No.1 Bandar Lampung
[2]Department of Agricultural Technology, Faculty of Agriculture
Lampung University, Jl. Prof. Dr. Sumantri Brojonegoro No.1 Bandar Lampung
Email: irfanaffandi2006@yahoo.com

***Abstract***

*The study aims to analyze the performance of the inventory control and agroindustry development strategy banana chips. Site selection was done in the chips industry center Bandar Lampung City. Sampling was done offender census on members of banana agroindustry business group. Data analysis methods used was the analysis of economic order quantity (EOQ), SWOT and AHP. The results showed that the control of inventory through the ordering of raw materials and production capacity adjusted to do with intersystem messaging. The production process is generally carried out every 3 times a week with raw material price of Rp 3500,- per comb. Agroindustry development strategy banana chips were utilizing fabric of cooperation with other parties in the application of science and technology in order to produce quality products, banana chips, giving a sense of innovation so that the amount of consumer interest and increasing demand for banana chip, and optimization of infrastructure and facilities wereowned agroindustries effective and efficient.*

***Keywords** : banana chips, inventory, strategy*

## 1. INTRODUCTION

The development of agroindustry in Indonesia still has many problems such as the ability to process the product is still low. This is shown by most of the agricultural commodities that are exported raw materials to processing retention index of 71-75 %. The figure shows that only 25-29 % of Indonesian agricultural products exported in processed form. This condition certainly minimize the added value derived from the export of agricultural products, so that further processing is required for development of agroindustry in this global era.

Lampung is one area that has a variety of fruit production. Lampung Province has the potential to develop industries processing raw materials of agricultural products, especially tropical fruits, known as agroindustries based on natural resources (Effendi, 2005). Banana is one of the mainstays of agricultural commodities to agroindustry in Lampung Province made from banana has potential to be developed prospects in Lampung Province. The supply and availability of raw materials throughout the year causing banana chips can develop agroindustry and agroindustry into one of the mainstays in Lampung Province.

Region Industry Centers chips Bandar Lampung is one of the largest banana chips agroindustrial areas in Lampung Province, where there are approximately 40 registered trademarks in the region and incorporated in the chips industry centers. The region is located in the the village of Segala Mider Bandar Lampung. The researchs aim is to analyze the performance of the inventory control and agroindustry development strategy banana chips.

## 2. MATERIAL AND METHODS

### 2.1. Location and Respondents Research

The experiment was conducted in the chips industry center located in Tanjung Karang Western District of Bandar Lampung. The location chosen for the study because of is the largest center for banana chips in Lampung Province. Respondents in the study were 20 chips industry producers, as well as experts and agencies.

### 2.2. Data Analysis Method

The method of data analysis that used in this study is a descriptive analysis be qualitative and quantitative descriptive analysis.

### 2.2.1. Methods of Economic Order Quantity (EOQ)

One method is a method of inventory Economic Order Quantity (EOQ). This method can be used both for goods purchased or manufactured goods for themselves (Ma'arif, 2003). EOQ model is used to determine the order quantity that minimizes inventory costs and inventory storage costs directly opposite (inverse cost) ordering supplies.

EOQ formula used is :

$$EOQ : \sqrt{\frac{2SD}{H}}$$

where :

*EOQ* : total purchase economical

*D* : the use or expected demand per period of time

*S* : the booking fee per order

*H* : storage costs per period of time (storage fee = 10% × purchase price per unit of raw material)

### 2.2.2. SWOT and AHP Analysis

Internal factors and external factors are obtained from the identification of strengths, weakness, threats, and opportunities and then put in a SWOT matrix to be analyzed. This SWOT analysis illustrates the external opportunities and threats encounteredby agroindustry, which is described to the strengths and weakness. SWOT matrix form can be seen in Table 1. Cross each factor in order to get the strategy SO, ST, WO and WT strategies. Choose the appropriate strategy to quadrant I, II, III, and IV, and then further apply AHP analysis (Saaty, 1983).

Table 1. SWOT Matrix

| **SWOT** | **Strengths (S)**<br>Determine the power factor becomes strengths | **Weakness (W)**<br>Determine the power factor becomes weakness |
|---|---|---|
| **Opportunities (O)**<br>Determine the power factor becomes opportunities | **Strategy (SO)**<br>Create a strategy that uses force to take advantage of opportunities | **Strategy (WO)**<br>Create strategies that minimize weaknesses to take advantage of opportunities |
| **Threats (T)**<br>Determine the power factor becomes threats | **Strategy (ST)**<br>Create a strategy that uses the power to overcome the threats | **Strategy (WT)**<br>Create strategies that minimize weaknesses to avoid the threats |

## 3. RESULTS AND DISCUSSION

### 3.1. Mechanism of Agroindustry Supply Chain Banana Chips

Supply chain consists of multiple elements and parties involved either directly or indirectly. The main objective of the supply chain itself is customer satisfaction which leads to maximum profit the company acquired. Agroindustry supply chain on banana chips in the Bandar Lampung strapless involves multiple parties, such as suppliers of raw materials in the form of farmer partners or regular traders, agroindustry, banana chips, and end customers (Marimin, 2010). Raw materials used in the agroindustry is the banana chips banana fruit "kepok" types. Raw materials obtained from several areas in Lampung Province as Pringsewu district, South Lampung Regency, and Gedong Tataan district. Prices of raw materials are obtained by the owner of the agroindustry of almost the same in each region of between Rp 3500,- to Rp 4000,- per comb, where the price includes applicable fees and costs to the place of production between banana chips. Raw material procurement banana chips made by owner agroindustry does not have a partner mider strapless raw material suppliers. Owner agroindustrial book farmer partners or traders who contained in each region, the next stage is done by the farmer partners or traders start of the search of raw materials to the banana farmers to deliver raw materials to the place of the banana chips banana production process. The agroindustries generally do not have specific management in the procurement of raw materials, banana chips, so the obstacles they sometimes face is the uncertainty in raw material ordering so often in the accumulation of raw materials in the production process banana chips or absence of raw materials as agroindustries will do banana production process. With the accumulation of raw materials that are too long will give adverse impact on the quality of raw materials, while the shortage of raw materials can inhibit the production of banana chips. Image flow pattern in agroindustry supply chain banana chips in Bandar Lampung can be seen in Figure 1.

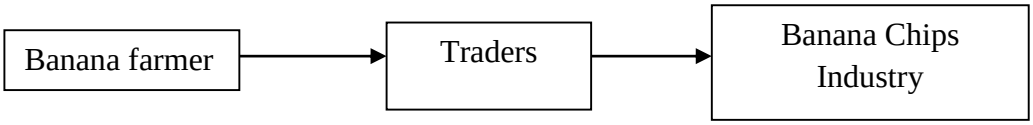


Figure 1. Flow pattern in the agroindustry supply chain banana chips in Bandar Lampung

### 3.2. Raw Material Inventory

Raw materials used in each agroindustries have different amounts. The amount of raw material used depends on the needs of banana chips produced. The raw materials used by the agroindustry in Chips Industry Centers Bandar Lampung comes from several areas in Lampung Province as the Natar Distric, Pringsewu District, and Gedong Tataan District. Raw materials obtained from each region has almost the same price, which amounted to Rp 3500,- per comb or Rp 2100, - every 1 kg, which consists of the price of Rp 1500,- the purchase price of raw materials from farmers, Rp 150 maintenance costs, and Rp 1850,- a booking fee and costs including the cost of loading and moving between to warehouse.

EOQ value describes the number of purchases of raw materials economically. Purchase economical in question is the purchase of raw materials by considering the needs of the necessary raw in the production process, so that the purchase of raw materials are not excessive and no accumulation of raw materials.

### 3.3. Development Strategy

SWOT analysis consists of strengths, weakness, opportunities, and threats will provide an overview of the state-owned agroindustry and will evaluate the various problems that arise in the agroindustry and create strategies appropriate solutions to be applied in the agroindustry (Desnini, 2011). Based on observations with the use of questionnaires and interviews with respondents in the field obtained several environmental

factors that influence the development of agroindustries banana chips in Bandar Lampung strapless. Environmental factors consist of: (1) internal factors include the strengths and weakness and (2) external factors including opportunities and threats.

### 3.3.1. Internal Factor

Internal factors are factors derived from the agroindustry in the form of the power factor and a factor of weakness (Solihin, 2012). Determination of the components and the weight to be participatory from the company based on its influence on the passage of agroindustrial activities banana chips. The percentage of the component depends on the magnitude of the effect of these components and the number of components must reach 100 percent.

Table 2. Matrix internal strategic factors for strength

| Component | Strength | Weight | Rating | Total Score | Ranking |
|---|---|---|---|---|---|
| Product | Quality banana chips produced products (25%) | 0.25 | 4 | 1 | 1 |
| Facilitation | Facilities and infrastructure investment banana chips adequate agro-industry (20%) | 0.20 | 3 | 0.75 | 3 |
| Location | Agroindustry location that is easily accessible location agroindustry consumers (25%) | 0.25 | 4 | 1 | 2 |
| Human resources (HR) | HR with good skills (15 %) | 0.15 | 3 | 0.45 | 4 |
| Record keeping | Agroindustry average revenue banana chips is increasing every year (15 %) | 0.15 | 3 | 0.45 | 5 |

Description rating :
4 = very strong; 3 = strong; 2 = low; 1 = very low

Products produced agroindustry, agroindustry investment,location agroindustry, and human resources as well as recording and bookkeeping operations banana chips are all factors the strength of the agroindustry, banana chips in Bandar Lampung strapless and has a considerable influence on the agroindustry. Changes in these factors will affect the agroindustry banana chips, these effects can be agroindustrial progress or even regress agroindustrial banana chips.

Table 3. Matrix internal strategic factors for weakness

| Component | Weakness | Weight | Rating | Total Score | Ranking |
|---|---|---|---|---|---|
| Product | The physical properties of banana chips product is not durable (25 %) | 0.25 | 4 | 1 | 1 |
| Investation | Facilities and infrastructure investment perishable agroindustry (25%) | 0.25 | 2 | 0.50 | 2 |
| Location | Location distance between the location of the agroindustry with raw material location is quite far (25%) | 0.25 | 2 | 0.50 | 3 |
| Human Resources (HR) | HR minimum number of workers (15%) | 0.15 | 2 | 0.30 | 4 |
| Record keeping | Record keeping production costs are vulnerable to changes in the economy (10%) | 0.10 | 3 | 0.30 | 5 |

Description rating :
4 = Weakness of agroindustry is very easily to solve
3 = Weakness of agroindustry is easily to solve
2 = Weakness of agroindustry is difficult to solve
1 = Weakness of agroindustry is very difficult to solve

### 3.3.2. External Factor

External factors that analyzed are all factors that come from outside the agroindustry in the form factor of banana chips opportunities and the threats (Solihin, 2012). Determination of the components and the weight to be participatory from the company based on its impact on the agroindustry activities banana chips. The percentage of the component depends on the magnitude of the effect of these components and the number of components must reach 100 persen. External factors matrix agroindustrial banana chips can be seen in Table 4 and Table 5.

Table 4. Matrix external strategic factor for opportunities

| Component | Opportunities | Weight | Rating | Total Score | Ranking |
|---|---|---|---|---|---|
| Economic, Social and Cultural | Price of banana chips continues to increase (20%) | 0.20 | 3 | 0.60 | 2 |
| Climate and Weather | Good weather will give a good impact on the quality of raw materials bananas (15%) | 0.15 | 3 | 0.45 | 4 |
| Market | Total market demand for banana chips increase (25%) | 0.25 | 3 | 0.75 | 1 |
| Competitors | Competitors are still relatively small (15%) | 0.15 | 3 | 0.45 | 5 |
| Science and Technology | Establish cooperation with other parties in developing new technologies (25%) | 0.25 | 2 | 0.50 | 3 |

Description rating :
4 = Opportunity owned agroindustry is very easily to achieve
3 = Opportunity owned agroindustry is easy to achieve
2 = Opportunity owned agroindustry is difficult to achieve
1 = Opportunity owned agroindustry is very difficult to achieve

Table 5. Matrix external strategic factor for threats

| Component | Threats | Weight | Rating | Total Score | Ranking |
|---|---|---|---|---|---|
| Economic, Social and Cultural | Policies of the government increased fuel prices and other production materials (25%) | 0.25 | 2 | 0.50 | 2 |
| Climate and Weather | Bad weather and uncertainty will give unfavorable impact on the quality of raw materials as well as delays in the delivery of raw materials (20%) | 0.20 | 2 | 0.40 | 3 |
| Market | The market for marketing promotion activities difficult to do (10 %) | 0.10 | 4 | 0.40 | 5 |
| Competitors | The presence of a competitor who gives cheaper prices (25%) | 0.25 | 2 | 0.50 | 1 |
| Science and Technology | The development of science and technology is hard to follow because of the high costs (20%) | 0.20 | 2 | 0.40 | 4 |

Description rating :
4 = Threat is very easy to resolved
3 = Threat is easily to resolved
2 = Threat is difficult to resolved
1 = Threat is very difficult to resolved

Based on the scores of internal factors and external chips banana agroindustry, the SWOT diagram can be created by summing the total score of the internal and external factors. After that calculated the difference is the total score minus factor of internal strengths and weakness of the total score of the external factors reduced opportunities threats. Weighting for SWOT diagram of internal and external factors can be seen in Table 6. Having obtained the figures from the difference between internal factors and external factors, it can be made a SWOT diagram as shown in Figure 2.

Table 6. Weighting for SWOT diagram of internal and external factors

| Description | Internal Factors | | External Factor | |
|---|---|---|---|---|
| | Strengths | Weakness | Opportunities | Threats |
| Weight × Rating | 3.65 | 3.35 | 2.75 | 2.2 |
| Difference | + 0.15 | | + 0.55 | |

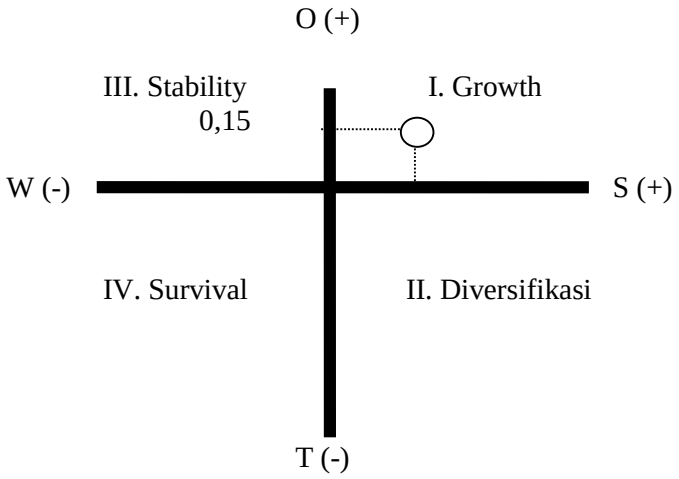


Figure 2. Diagram SWOT banana chips agroindustryin the city of Bandar Lampung

Based on the SWOT diagram is known that banana chips agroindustry in Bandar Lampung is in quadrant I. Quadrant I is a very favorable situation where the company is in good growing conditions in sales, assets, profits, or a combination of all three. The company has the power to harness the power of existing (Rangkuti, 2014). The strategy should be applied in these circumstances is to support aggressive growth policy (Zakaria, 2007). The results of the SWOT matrix analysis agroindustrial banana chips in Bandar Lampung city can be seen in Table 7.

Table 7. Results of the SWOT matrix analysis of agroindustry banana chips in Bandar Lampung

| SWOT | ***Strengths* (S)**<br><br>1. Products produced quality banana chips<br>2. Facilities and adequate infra-structure owned agroindustries<br>3. Agro location within easy reach of consumers<br>4. The HR with good skills<br>5. Revenue agroindustry average banana chips is increasing annually | ***Weakness* (W)**<br><br>1. Nature of banana chips are not durable<br>2. Facilities and infrastructures owned perishable<br>3. Distance between the location of the agroindustry with raw material location far enough<br>4. The minimum amount of labor/ limited<br>5. Production costs vulnerable to economic changes |
|---|---|---|
| ***Opportunities* (O)**<br><br>1. Prices banana chips continues to increase<br>2. Good weather will give a good impact on the quality of raw materials bananas<br>3. Amount increased demand for banana chips<br>4. Competitors still small<br>5. Establish cooperation with other parties in developing new technology Strategies (SO) | **Strategy (SO)**<br><br>1. Minimize the use of facilities and Infrastructure (S2, O2, O3)<br>2. Utilizing strategic location function (S3, O3, O4)<br>3. Development of human resource capabilities (S4, O5, S5)<br>4. Improve the quality, value added and the selling price (S1, O5, O1, S5)<br>5. Doing cooperation in the application of technology (S1, S2,O5) | **Strategi (WO)**<br><br>1. Cooperation application of technology to produce quality products (W1, W3, W4, W5, O2, O3, O5)<br>2. Utilizing infrastructure owned agroindustries (W3, W4, O2, O5)<br>3. Recruitment of qualified employees, especially from within the family (W4, W5, O2, O5) |
| ***Threats* (T)**<br><br>1. Government policy on fuel price hike and other production materials<br>2. Poor and erratic weather will give unfavorable impact on the quality of raw materials as well as delays in the delivery of raw materials<br>3. Activities for the marketing campaign is hard to do<br>4. Presence of competitors that provide cheaper prices<br>5. Development of science and technology is hard to follow because of the high cost | **Strategi (ST)**<br><br>1. Promotion and marketing both inside and outside the agroindustry (S3, O3, T4)<br>2. Establish cooperation with various pihal in the application of technology ( S2, S4, S5, T5)<br>3. Eficiency use of agroindustry infrastructure (S2, S3, S4, T1, T2)<br>4. Use of good raw materials to reduce production costs (S1, S4, T1) | **Strategi (WT)**<br><br>1. Establish cooperation in the procurement of agroindustry infrastructure (W2, W4, W5, T5)<br>2. Promotion of a healthy and competitive manner (W1, T3, T4)<br>3. Care and efficiency use of the means of production (W2, W5, T1, T5) |

Based on the results of the SWOT analysis followed by hierarchical analysis of the importance of the priority strategies to improve the performance of the supply chain, ie, by working with other parties in applying technology to improve the quality of production of banana chips. The application of these technologies need to be implemented either by the owner or by the chips agroindustrial raw material suppliers. The technology applied to farmers and suppliers of raw materials intended for raw materials in the form of bananas produced are of good quality. While the technology is applied to the agroindustry processing banana chips, banana chips contained itself, so as to produce a quality product and banana chips competitive with other agroindustrial products banana chips.

Determine and assess the performance of supply chain priority agroindustry development strategy used to enhance the competitiveness of the analytic hierarchy process method (Schroenher, 2008). AHP is an advanced method of SWOT analysis has been done

before, this method is used to determine the priority of the strategy consists of four levels or levels, namely:

1. First level of the hierarchy stated that the focus of the implementation of efficient supply chain management in the agro-industry.
2. Second level in the hierarchy of factors or criteria stated in the supply chain management strategy, including the availability of raw materials, the application of technology, marketing and sales, as well as the availability of information.
3. Third level in the hierarchy of the target states or actors (actors) from the implementation of an efficient supply chain management, including agro-industry's own banana chips, raw material suppliers, and related agencies.
4. Fourth level in the hierarchy stated ultimate goal of the implementation of supply chain management, including increased product quality, maximize profits, and increase the competitiveness of the agroindustry.
5. Fifth level is an alternative strategy resulting from the SWOT matrix, namely (a) utilizing a system of alliances with other parties in the application of science and technology in order to produce quality products, banana chips, (b) improve the quality of banana chips produced as well as providing innovation sense that the amount of consumer interest and increasing demand for banana chips, (c) utilizing the facilities and infrastructure owned agroindustry effectively and efficiently in order to produce a quality banana chips and high selling power, (d) improve production quality banana chips and provide a sense of innovation different considering the quality of the raw materials that are of good quality bananas, (e) and by working with other parties to the application of science and technology on the use of facilities and infrastructures owned agroindustries, (f) improving the experience and ability of labor and agro-industry owners to build cooperation with other parties in order to follow the development of science and technology, (g) improve the ability of workers conducted in cooperation with other parties in the application of science and new technologies, (h) utilizing a strategic location so that the sale can be made directly at the site of production of banana chips, (i) allocate funds companies to adopt new technologies, (j) to get a hold of hiring quality workers who have the expertise and skill to produce banana chips product competitiveness to increase the selling price of banana chips. The result of weighting the criteria of respondents using expert choice can be seen in Table 8.

Table 8. Pairwise Comparison Matrix between criteria

| | Material Availability | Application of Technology | Marketing and Sales | Availability Information |
|---|---|---|---|---|
| Material Availability | 1,000 | 1,88597 | 2,7589 | 3,0 |
| Application of Technology | 1,000 | 1,000 | 1,8171 | 2,5099 |
| Marketing and Sales | 1,000 | 1,000 | 1,000 | 1,73205 |
| Availability Information | 1,000 | 1,000 | 1,000 | 1,000 |

AHP processing results using expert choice, with a maximum value of 10% consistency which means that the values resulting from calculations using expert choice program can be said to be consistent and can be used. From this fifth level it can be seen that to improve the performance of the agroindustry supply chain should be done by the banana chips banana chips agroindustry itself. Improved supply chain performance is aimed at achieving the main objective of supply chain is to improve product quality banana chips produced to be able to increase the competitiveness of companies to be able to maximize profits.

Based on the results of the SWOT analys is followed by hierarchical analysis of the importance of the priority strategies to improve

the performance of the supply chain, i.e., by working with other parties in implementing technology to improve the quality of production of banana chips. The application of these technologies need to be implemented either by the own eror by the chips agroindustrial raw material supplier. Technology applied to farmers and suppliers of raw materials intended for raw materials in the form of bananas produced are of good quality. While the technologyis applied to the agroindustry are the banana chips, banana chips processing itself, so as to produce a quality product and banana chips competitive with other agroindustrial products banana chips.

## CONCLUSSIONS

1. Controlling inventory by ordering raw materials and production capacity adjusted to do with inter-system messaging. The production process is generally carried out every 3 times a week with raw material price of Rp 3500,- per comb.
2. Agroindustry development strategy banana chips are utilizing fabric of cooperation with other parties in the application of science and technology in order to produce quality products, banana chips giving a sense of innovation so that the amount of consumer interest and increasing demand for banana chips, and optimization of infrastructure and facilities owned agroindustries effective and efficient.

## REFERENCES

Desnini. 2011. Strategies Based Cocoa Agroindustry Cluster Development in Lampung Province to Improve Competitiveness. *Journal of Socio Economics.* 16(1):78-85.

Effendi. 2005. *Processing of Horticultural Commodities* . (www.pdfsearch.com). Accessed on January 24, 2014.

Maarif, M.S. 2003. *Manajemen Operasi*. Penerbit Grasindo. Jakarta.

Marimin. 2010. *.Application in Decision Making Theory Chain Management Supply*. IPB Press, Bogor.

Rangkuti, F. 2014. *Aplikasi Teknik Pengambilan Keputusan dalam Manajemen Rantai Pasok*. PT Gramedia Pustaka Utama, Jakarta.

Solihin, I. 2012. *Manajemen Strategik*. Penerbit Erlangga. Jakarta.

Saaty, T.L.1983. *Decision Making for Leaders : The Analytical Hierarchy Proses for Decision in Complex World.* RWS Pubication, Pittsburgh.

Schroenherr, T. 2008. Assessing Supply Chain Risks with the Analytic Hierarchy Process: Providing Decision Support for the Offshoring Decision by US Manufacturing Company. *Journal of Purchasing and Supply Chain Management*, Vol. 10.

Zakaria, W.A. 2007. Added Value Analysis and Financial Feasibility Tofu and Tempe Agroindustry in Metro City. *Journal of Socio Economics.* 13(1):49-56.