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International Conference on Food, Agriculture and Natural Resources, IC-FANRes 2015

Strengthening Food and Natural Resources Technology and Policy for Sustainable Agriculture

Introduction

International Conference of FANRes 2015 at the University of Jember, East Java, Indonesia was organized by Faculty of Agriculture, and Agricultural Technology Faculty of the University of Jember in collaboration with Faculty of Environmental Science, Prefectural University of Hiroshima (PUH) Japan, Kyungpook National University (Korea), Hankyong National University (Korea), Kasetsart University (Thailand), Universiti Putra Malaysia, Andalas University, and also Brawijaya University, supported by partners especially PTPN X, the leading national agriculture-based company in Indonesia.

Through this conference, we provided an appropriate platform for discussion and information transfer of current researches achievements, new technological innovation, and practical application in related field to the development of food and natural resources for sustainable agriculture. This conference aimed at providing a forum for presentation and discussion of the current and new developments in food and natural resources for sustainable agriculture, along with dissemination of relevant information among scientists, engineers, technologists and other professionals coming from different countries. Beside this activity, the committee would also provide a forum for FANRes Network declaration, which would be signed by the representatives of all faculty members joined to the network.

More than 250 participants joined as invited speaker, oral presenter, poster, and participant for this conference and came from several countries such as South Korea, Japan, Malaysia, Thailand, Sri Lanka, Germany, and Indonesia. Around 200 papers were presented as oral and poster presentation during this conference, and more than 50 papers were selected for this present issue of publication.

The insight and hard work of the members of both the technical and organizing committees have made this conference possible. Each member of the committee made significant contribution towards the success of the event, and we thank everybody for their valuable support. Finally, on behalf of the conference advisory board and organizing committee, We would like to express our sincere thanks and appreciation to all the participants, colleagues, as well as University of Jember administration for their indispensable support in organizing this scientific meeting.

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Raw Material Procurement on Agroindustrial Supply Chain Management: A Case Survey of Fruit Processing Industries in Indonesia

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Abstract

In sub-system of Indonesian agribusiness, fruit processing industries are major component of agroindustrial activities. In term of economic development, these fruit processing industries contribute significant amount to employment and income generation. The objective of this research was to evaluate present condition of procurement system as a part of supply chain management in fruit processing industries. Based on a purposive sample survey in in East Java province, Indonesia, this research paper illustrated raw material procurement factors and problems encountered in these fruit processing industries. The data used for analysis was obtained through a survey conducted in the study area. Direct visit to 63 the fruit processing industries and discussion with key persons were implemented to reach deep information. Most fruit processing industries used more than one raw material supplier to reach more alternatives and more guarantees to procure large quantity of raw material. Most of big industries used contract system in raw material procurement to reduce risk because of large amount of raw material requirement for large number of production. Continuity and resource of raw material were identified as very strong and strong factors in raw material procurement of fruit processing industries.

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Keywords: raw material; agroindustry; supply chain; fruit processing

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1. Introduction

Agroindustrial sector as a sub-system of agribusiness has unique advantages of utilizing agricultural raw material in agro-product processing. These fruit processing industries, one of agroindustrial sector, are commonly available in East Java. These industries can be seen as an important to create employment and generate income particularly in fruit producer areas.

Related to agroindustrial system, some problems associated with the food industry found in other countries, are the shortage of raw material, quality, lack of continuous supply of seasonal raw material, inadequate trained labor force, costly imported packing material, infrastructure and technological deficiencies (Hicks, 1991). The study in Philippine, Aquino (1991) revealed that some of the frequency problems of large food processing industries are lack of adequate raw material, poor quality of available supply, and variety of fruit and vegetable.

Suryaningrat (2003) explained that raw material is the most important factor for sustaining processing activities in an agroindustrial system. Especially for big processing industries undertaking a large amount of processing, raw material issues, including quantity, quality and continuity, are a critical factor for supporting their daily activities. Related to food supply chain, they have some unique characteristics. Food supply chains can be distinguished into “fresh agricultural products” such as vegetables or fruits, and “processed food products” such as convenience food or soft drinks (Apaiaha et al., 2006). It has a large variety of different supply chain partners such as retailers, wholesalers/distributors, various traders, processors, marketers/storage, and farmers or farm as raw material suppliers (Roth et al., 2008).

In term of specific characteristic of food supply chain network, agri-food chain for processed food product (such as portioned meats, snacks, juices, desserts, canned food products). In these chains, agricultural products are used as raw materials for producing consumer products with higher added value. In some industries spends approximately 60% of total income from sales on procurement of material such as raw material, intermediate parts, and components (Krajewski et al., 2007). Furthermore, procurement of goods and services constitutes up to 70% of product cost (Ghodsypour and O'Brien, 1998).

Regarding to the procurement process, out of the 23 factors of supplier selection on raw material procurement process considered, Dickson (1966) concluded that quality, delivery, and performance history are the three most important criteria. Weber et al (1991), based on a comprehensive review of vendor evaluation methods, surmised that price was the highest-ranked factor, followed by delivery and quality. It is important for industrial producers to contract suppliers to guarantee the supply of raw materials with the right volume, right quantity, right quality, at the right place and at the right time. Furthermore, they coordinate the timing of the supply of goods with suppliers to match capacity availability (Jack G.A.J.et al, 2007).

Suryaningrat (2015) found that common problems in processed cassava industries such as formality of raw material procurement contract with wholesalers or retailers to maintain information about price, number and quality of product because of high numbers of raw materials requirement. In term of contract system in food industries, Grimm J.H. et al, (2014) explained that trust between focal firm and direct supplier and also trust between direct supplier and sub-supplier were critical factor to support long term relationship of procurement system. Guritno et al (2015) found that in term of fresh vegetable, supplier has a strong bargaining power, because they have many suppliers (more than 50 farmers) to support customers.

These facts indicate that procurement of raw materials and components is one of the most important components of a supply chain, which facilitates any organization for achieving its goal of increasing the value creation by minimizing the cost. In procurement management, supplier selection is one of the important decision-making areas that enhance the purchase value in term of cost, quality and on-time delivery of the items purchased. Furthermore, companies are also facing tough competition from their rivals. Regarding problems of agroindustrial supply chain above, the analysis of supply chain should ideally take place or be evaluated within context of complex network of food chain. This study was to evaluate the flow of raw material, role of actors and critical factors in procurements activities of fruit processing industries.

2. Methodology

This study identified the determinant factors in fruit processing industries. A questionnaire was addressed to obtain required data from the selected industries (63 fruit processing industries) in East Java as a central fruit production in Indonesia. Field visit and intense discussion were also implemented to reach detailed information from key persons. The questions were related to procurement of raw material procurement activities. Correlation analysis was used to determine factors which have strong relationship among basic component factors and total performance as determinant factors. The total score of industries are represented the industry performance. The detail factors of basic components in Procurement of Raw Material factors are: (1) resource, (2) quantity, (3) quantity, (4) continuity, (5) purchasing power, (6) quality, (7) raw material handling, (8) storage, (9) scheduling of raw material, (10) inventory, (11) capacity and (12) organization. Respondents were encouraged to include other useful information based on their individual experiences and knowledge. The results of correlation (r) with total performance of fruit industries were classified into very strong (more than 0.80), strong (0.61 – 0.8), medium (0.4 – 0.6) and weak (less than 0.4).

3. Result and Discussion

3.1. Methods of Raw Material Procurement

Pujawan (2010) mentioned that in supply chain mechanism, three aspects should be well managed are material flow from upstream to downstream, financial flow from downstream to upstream, and information stream from both upstream and downstream. The detail of supply chain process of raw material procurement in fruit processing industries shows in the Figure 1.

In basic components of agroindustrial system, raw material is the first factor, which has strong relationship with processing activities as a continuing process. Especially of big industries (BIs) with large amount of production process, procurement of raw material is very crucial factor in daily process particularly in processing activities.

In case of material flow, filed survey (Figure 1) revealed that most of BIs obtained their raw material from market similar with small and medium industries (SMIs). This means that fruit market as a raw material market for agroindustries has important role to provide raw material for both SMIs and BIs. Compare with SMIs (38%), most of big industries used contract system in raw material procurement to reduce risk because of large amount of raw material requirement for large number of production. Besides, it was give guarantee of raw material procurement in BIs including quantity, quality and continuity. On the other side, most of BIs also used middlemen as raw material supplier in this activity compare with SMIs (18%). Most of BIs used more than one raw material supplier to reach more alternatives and more guarantees to procure large quantity of raw material. This is same result to Ghodsypour and O'Brien, 1998 that most of industries supported by more than one supplier to procure raw materials needed. Some criteria were also needed to decide supplier in raw material procurement system of industries. In certain season one of big industry in Probolinggo district should contact to some suppliers from other district (Lumajang and Malang) to obtain enough quantity of raw material. On the other side, one banana pure industry in Surabaya obtains the raw material from their own farm in Mojokerto. Because of limited quantity, this industry also obtained the raw material requirement from farmers. When the industry considered to supply the raw material requirement from other source, the industry complained that "price agreement" was the crucial problem in contract system especially with the farmers.

SMIs made more communication to the farmers but BFPs made more communication to middleman (Figure 1) in raw material procurement related to price, quality and time to delivery. Particularly for jackfruit chips producers in Malang and Probolinggo, the BIs explained that communication is very important to obtain certain kinds of jack fruit and quality requirement of raw material.

In term of information flow in raw material procurement, activities were started from both side of farmers and industries. Information was from farmers, whole sellers, middlemen, fruit market and central market including availability of raw materials and quality of products as industries required. This information has strong relationship with industrial capacity including order status and quantity would be supplied to fruit industries for processing activities. A commitment through contract system was strongly needed in this mechanism to support transparent

information flow from all supply chain actors. This also in line to earlier result in cassava supply chain mechanism (Suryaningrat, 2015). The accurate data of price, quality and availability as information were also required to support supply chain activities. All of this information flow mechanism should be supported by good communication tools as supporting facilities.

In case of financial flow, it was started from fruit processing industries to other actors such as central market, fruit market, middlemen, whole sellers and farmers. Payment process between store and production (industry) was conducted in cash and credit. It was frequently that the credit payment process between actors and industries was conducted after selling process (sold). Payment from industries to collectors and from big or small collector to farmers was also frequently conducted in cash. Only some of them conducted in credit payment or extended payment. All of payment process tends to “trust” concept as a commitment among them to build long term relationship among actors in supply chain mechanism. This is in line with Grimm J.H. et al, (2014) that trust between actors in supply chain should be raised up to maintain a long term relationship in supply chain mechanism

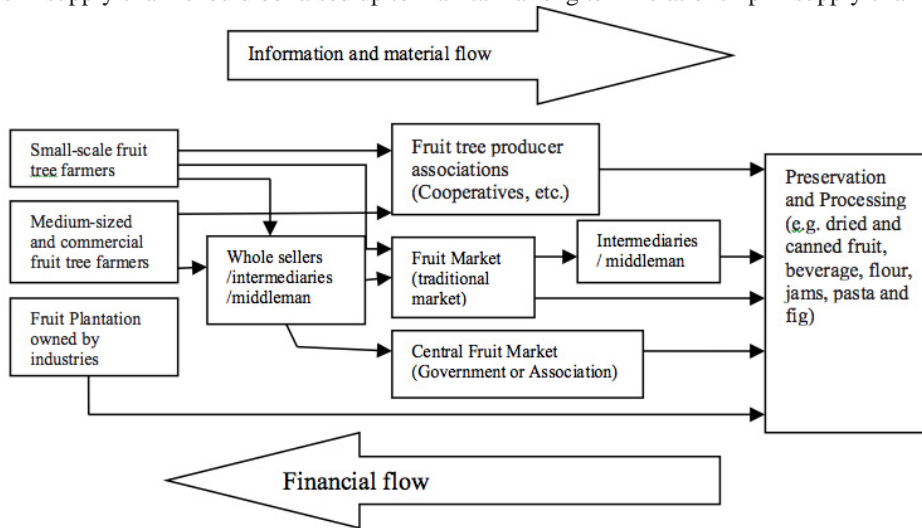


Figure 1. Raw Material Procurement Supply Chain of Fruit Industries

3.2. Strong Factors in Raw Material Procurement Activities

Table 1 shows that continuity and resource have very strong and strong relationship ($r=0.81$ and $r=0.70$) with total score as a performance in fruit industries. This indicates that continuity and resource of raw material was strongly required by BFPIs to support processing activities.

Table 1 show that continuity has very strong relationship to total performance of procurement system in fruit industries. As a basic in raw material aspect in agroindustrial products, this result also illustrate that continuity of raw material should be in the first place before quantity and quality. It also means that industries should maintain continuity of raw material to support processing activities. This was related with basic characters of agroindustrial raw material including seasonal, perishable and variable. Contract system was common method to the industries to maintain continuity of raw material supply from suppliers.

Other identified strong factors are raw material handling, storage, scheduling, inventory, capacity and organization. These indicate that all strong factors gave direct influence to the procurement activities as part of supply chain management. Industries should also pay more attention to these factors because of direct influence to processing activities. Quantity, purchasing power, and quality were identified as medium relationship factors tend to be strong factors. In this case, fruit industries stated these factors in contract system to maintain long term relationship of raw material procurement activities. This is in line to Jack G.A.J.et al, 2007 that contract system with suppliers was to guarantee the supply of raw materials with the right volume, right quantity, right quality, at the right place and at the right time.

Table 1: Relationship Between Raw material Factors and Total Performance

Raw Material Factors	Relationship with total performance	
	r	Criteria
Resource	0.70*	Strong
Quantity	0.43	Medium
Continuity	0.81**	Very strong
Purchasing power	0.55	Medium
Quality	0.56	Medium
Raw material handling	0.60*	Strong
Storage	0.60*	Strong
Scheduling of raw material	0.71*	Strong
Inventory	0.71*	Strong
Capacity	0.71*	Strong
Organization	0.77*	Strong

4. Conclusions

In fruit processing industries fruit market as a raw material market for agroindustries has important role to provide raw material for both SMIs and BIs. Most of BIs used more than one raw material supplier to reach more alternatives and more guarantees to procure large quantity of raw material. Most of big industries used contract system in raw material procurement to reduce risk because of large amount of raw material requirement for large number of production. Continuity and resource have very strong and strong relationship ($r=0.81$ and $r=0.70$) with total score as a performance in fruit industries. This indicates that continuity and resource of raw material was strongly required by BFPIs to support processing activities.

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