Supply Chain Management Utilization Research of Agriculture Industry a Case Study in GAPOKTAN (ASSOCIATION OF FARMER GROUP)

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Abstract. This study aims to provide supply chain management strategy recommendations to GAPOKTAN (Association of Farmer Groups) to meet demand from the chili sauce company. The current process of meeting the demand from the chili sauce company to GAPOKTAN is still running conventionally, where the production planning process and inventory control are still based on the performance of eight farmer groups under the auspices of the Mandiri Jaya Farmer Group Association. Seeing this obstacle, the author tries to analyze it with the value chain method approach to understand the obstacles faced by the association. This study uses a qualitative approach with the in-depth interview method. After getting the results of the interview and the data obtained. The author provides an explanation of the solution using the supply chain management method approach. Some inputs from the changed process flow are even added with this method so that the needs of the association can accommodate requests from the chili sauce company. The association itself will provide more attention to managing, planning, and forecasting for all Farmer Groups under it. Finally, this paper aims to support GAPOKTAN Mandiri Jaya in fulfilling the demand from the chili sauce company.

1 Introduction

The development of Agribusiness in Indonesia is increasing along with the many requests from companies, in this case, produce food products nationally, in this case, sweet potato raw materials become the mainstay raw material in the process of making Sambal Sauce. Several well-known companies in Indonesia are now trying to meet and increase their production, so that this is sustainable with farmers in Indonesia, especially in the West Java region to meet the demand. [1]

To achieve targets and improve farming production, GAPOKTAN (Association of Farmer Groups) was founded by the Indonesian Ministry of Agriculture. GAPOKTAN (Association of Farmer Groups) was created to become a liaison between farmers within one village and outside institutions. GAPOKTAN is expected to help farmers with the provision of agricultural facilities for production, farming, capital investment, and product marketing, and to provide information needed by farmers. [2]

Apparently, GAPOKTAN in the West Java region has become the main supplier of several chili sauce companies. These chili sauce companies need sweet potatoes as one of their main raw materials. Then, with the increasing need for sweet potato raw materials in this chili sauce manufacturing company, this Association experienced problems in controlling inventory, as well as production planning in order to meet the demands and needs of the chili sauce companies.

Farmers' perception of the role of GAPOKTAN can be one of the factors driving farmers' participation or involvement in agricultural activities of GAPOKTAN institutions. In other words, the success of the Association is greatly influenced by the size of the role given through these activities and forms of roles and can not only improve the welfare of its member farmers but also be able to improve their farming. [3]

The author hopes that conducting interviews and research on GAPOKTAN can provide solutions to the flow of farming process in this Agriculture business, in terms of the Supply Chain Management method approach for solutions to the process of obtaining raw materials, production processes, and distribution to consumers.

2 Research Methods

2.1 Current Process in Gapoktan (Association of Farmer Group)

GAPOKTAN Mandiri Jaya is located at Bogor Regency, West Java. The formation of GAPOKTAN Mandiri Jaya in 2007, began with the existence of equal interests among farmers in the Bogor area in terms of
growing food crops, especially root commodities, and in terms of selling harvested crops.

To unite the same interests towards an Integrated Agribusiness, especially in accessing markets and capital, other farmers who are members of food crop farmer groups, livestock farmer groups, and women farmer groups of the agricultural process, merged into one form of Farmers Groups Association called GAPOKTAN "Mandiri Jaya".

The emergence of various challenges, obstacles, and opportunities in accordance with the conditions of the local socio-economic environment, requires the development and incorporation of farmer groups into a much larger organization/institution. The merger of farmer groups into GAPOKTAN (Association of Farmer Groups) is intended so that farmer groups can be more efficient and successful in providing agricultural production facilities, and capital, increasing or expanding agricultural businesses from upstream to downstream marketing sectors, and cooperation in increasing the bargaining position of farmers as the main actors of agricultural business.

GAPOKTAN (Association of Farmer Group) is a rural farmer organization formed based on deliberation and consensus to increase economies of scale and business efficiency. The Association is formed on the basis of (1) common interests among its members; (2) being in an agricultural area of mutual responsibility among its members; (3) Having a dedicated management cadre to mobilize farmers; (4) having cadres or leaders accepted by other farmers; (5) Have activities that can be utilized by most members, and (6) have encouragement or motivation from local community leaders.[4]

Currently, GAPOKTAN Mandiri Jaya is running using conventional methods, seeing from the existing mechanism below, it is directed only at Production, Planning, and Inventory Control. Overall, only 8 farmer groups have joined GAPOKTAN Mandiri Jaya, where the process of planting sweet potatoes is carried out by the 8 farmer groups. It can easily be seen in Figure 1, which explains the process flow of sweet potatoes distribution from farmer groups to chili sauce companies.

2.2 Current Value Chain Analysis of Gapoktan (Association of Farmer Group)

Currently, GAPOKTAN Mandiri Jaya manages eight Farmer Groups that produce sweet potatoes. These sweet potato farmers serve two different markets: Business to consumers and business to business. GAPOKTAN Mandiri Jaya identifies the two markets based on the quality of the sweet potatoes. Chili Sauce Company demanded larger sizes of sweet potatoes, whilst the smaller ones headed up to retail markets.
This Value Chain explains the work from the side of GAPOKTAN in terms of selecting sweet potato crops from 8 farmer groups incorporated in it to the process of supplying them to the chili sauce company.

Starting from a) inbound logistics, whose raw materials are obtained from 8 farmer groups in the form of sweet potatoes, then the Association conducts b) Operations by planning from production in the process of meeting the inventory of raw materials which includes the selection of selected raw materials, then the process c) outbound logistics, at this point doing packaging, which will be prepared for the Chili Sauce company. In point d) This marketing process GAPOKTAN Mandiri Jaya arranges marketing to the Chili Sauce Company. e) Service here is more about the GAPOKTAN process in meeting the needs of the Chili Sauce Company in terms of support agents and Mechanical Marketing Agents so that the sweet potato harvest from the farmer groups under its auspices can run well at the request of the Chili Sauce Company.

The current condition of GAPOKTAN does not have a supply chain management strategy. Thus, this is one of the main causes of why GAPOKTAN is unable to meet the demand from chili sauce companies. Farmers only plant shoots with the same amount every farming season and do not have a plan for future farming. They also do not have forecasting to predict demand from chili sauce companies.

2.3 Research Method

In planning to add the use of Supply Chain Management in GAPOKTAN, the authors try to approach policymakers inside the organization of GAPOKTAN Mandiri Jaya. This approach is beneficial for obtaining information and identifying problems at the beginning. Data collection is a way of collecting the data needed to answer the problem. In collecting data, the researchers used three types of methods, namely:

1. Observation
2. Interview
3. Documentation

From the 3 methods above, the identification of the problem can be seen in the picture below.

From the data obtained, it is known that the current supply chain mechanism running in GAPOKTAN Mandiri Jaya still uses production planning and inventory control process. This process does not make a satisfactory contribution to the chili sauce company which needs certainty from the amount of crop sources to produce chili sauce. The number of sweet potatoes as one of the staple ingredients for making chili sauce often does not meet the required amount that the company needed.

Furthermore, after conducting interviews, the author conducted a literature review to strengthen the theory and get accurate input using the supply chain management method approach, the results of the interview and this literature review helped the author to give suggestions for 8 farmer groups that provide their products to the GAPOKTAN Mandiri Jaya, to effectively run supply chain management inside their organization. The expected results of this discussion can be fully beneficial for GAPOKTAN Mandiri Jaya.

From the sequence of research methods above, it is hoped that the author can provide recommendations to farmer groups and GAPOKTAN Mandiri Jaya using mechanisms with a Supply Chain Management approach by paying more attention to the flow of the production process from upstream to downstream, thus meeting the demand from the Chili Sauce Company.

3 Literature Review

3.1 Supply Chain Management

Supply chain coordination is defined as maximizing profits for all stages of the supply chain by sharing information with all key players at each stage of the supply chain network.[7] These entities include goods providers, manufacturing destinations, carriers, distribution hubs, dealers, and clients which in turn involves planning, sourcing raw materials, manufacturing and assembly, and delivery to end users. The subsystem of the supply chain network is supply, production, and distribution.[8]

The Supply Chain requires companies to partner in specific practices, attitudes, visions, and orientations. Finally, consumers are potentially exposed to the effects of feature fatigue and, consequently, feature selection involves complicated decisions. Therefore, the first objective of the study is to identify the best corporate decisions in adopting features by considering market pressures, supplier vision, and the risk of consumer feature fatigue.[9]

The supply chain is an activity that connects companies with their suppliers to produce and distribute products to customers. Supply chain can also be interpreted as the distribution of product flows that includes all the processes of converting raw materials into final products. Supply chain forms an interconnected network in company operations in the form of human resources (HR) ranging from raw materials to producing finished products and distributed to customers. Supply chain consists of entities that are the constituents of existing processes in a business,
namely suppliers, manufacturers, distributors, retail outlets, and customers.

- Supplier or supplier is an entity that provides raw materials or first materials in the form of raw materials, raw materials, and spare parts to make products.
- Manufacturing is an entity that has a role to produce products from raw materials to finished products.
- Distributors are entities that have a role to distribute finished products from manufacturing sites to retailers or directly to consumers.
- Outlet retailers are entities that have warehouses to stockpile products before being distributed to retailers.
- Customers are targeted entities in the business. [10]

In other words, the supply chain can also be interpreted as a method of a comprehensive supply system from production to consumers. For example, syrup products whose initial production chain comes from sugarcane farmers then to factories, processing (to become ready-to-consumer products), bottling (packaging), distributors (widespread product distribution), retailers (to be sold commercially), and then to consumers. Optimal supply chain management can be an advantage for companies because of the minimal cost of managing an overall product. In addition to sales strategies, the supply chain also needs to be considered to increase a company's profits.

Because in addition to increasing revenue, the focus on controlling the production of goods also needs to be considered, especially since the costs in the supply chain are expensive. Good supply chain control can reduce operational costs so that companies have more profit, compared to sales strategies (assuming a supply chain system that is not optimal) that suppress sales without optimizing the supply chain.

A good supply chain can be applied through 6 strategies, namely: first, applying diverse supplier sources to determine the cheapest price; second, applying selected suppliers to apply constant product quality; third, vertical integration by integrating suppliers and production companies from one source group of companies; fourth, joint ventures so that companies have stronger power and connections not only in the supply chain but also in sales; fifth, Keiretsu networks are done by forming coalitions to determine fewer suppliers while integrating suppliers and companies; Sixth, Virtual Companies by bringing together companies and suppliers in accordance with the desired product, this is done through digital media so that there is no need for too large costs and more flexibility. [11]

### 3.2 Value Chain

The value chain is a set of business activities carried out by a company to create, produce, and market products or services to customers. [12] Value Chain consists of two types of activities, namely primary activities and supporting activities. Primary activities consist of five types of activities, namely inbound logistics, operations, outbound logistics, marketing, sales, and service. Supporting activities consist of four types of activities, namely procurement, technology development, human resource management, and firm infrastructure. [13]

The value chain provides insight into each stage of the business process and helps companies to identify capabilities and weaknesses that may exist in the process. By understanding the Value Chain, companies can improve the efficiency and effectiveness of their business processes and thus increase the added value of the products or services produced. [14] Value chain provides benefits to business units in the form of increased efficiency and productivity, reduced costs, increased value for consumers, differentiation from competitors, strengthened relationships with business partners. In the value chain, companies interact with various business partners, such as suppliers and distributors. By understanding these relationships, companies can strengthen relationships with their business partners and improve the overall performance of the value chain. [15]

Value chain in agribusiness business is a series of processes or activities that involve the production, processing, and distribution of agricultural products from upstream to downstream. The agribusiness value chain includes several stages, including: a) Production stage: this stage includes tillage, planting, crop maintenance, and harvesting agricultural products, b) Processing stage: this stage involves processing raw materials into finished products, such as food processing, wood processing, textile processing, and so on, c) Distribution stage: this stage involves the activity of delivering products from producers to consumers, either through direct or indirect distribution channels, d) Sales stage: this stage includes product marketing activities and product sales to consumers. [16]

In the context of GAPOKTAN, the value chain can be defined as a series of activities carried out by GAPOKTAN’s members in the process of production, processing, distributing, and marketing of agricultural products.

Here are some elements of the value chain in the GAPOKTAN: a) Production: GAPOKTAN members carry out agricultural production, such as planting rice, corn, soybeans, and so on, b) Processing: After harvesting, GAPOKTAN members process raw materials into finished products, such as rice flour, and other preparations, c) Distribution: Products produced and processed are distributed to local, regional, or national markets through various channels, such as distributors, agents, traders, and retailers, d) Marketing: Association members market their agricultural products through various channels, such as traditional markets, modern markets, online stores, and so on.

In addition, GAPOKTAN can also hold product promotion events and utilize social media to market their products. [17] In the value chain, it is important for Association members to understand the needs of their market and customers. By understanding this, they can produce quality products that match market demand,
and develop effective marketing strategies to increase sales of their products.

One strategy so that value chain can run efficiently through forecasting. Through forecasting, demand volatility can be predicted.[18] However, the problem faced by farmer group regarding forecasting is that these farmer groups do not forecast accurately, so they are unable to meet the demand from chili sauce Company.

### 3.3 Production, Planning, Inventory, and Control (PPIC)

The production, planning, inventory, and control process (PPIC) has been developed for decades. The task of traditional production planning and control is to plan and produce the products according to management’s orders and policy. It includes the following stages: master production schedule, material requirement planning, capacity planning, shop floor control, and inventory management and control. Under the increasing complexity and globalization of the manufacturing environment, production planning and control (PPC) plays a key role in linking strategic and operational levels by providing several tools and models.[19] For the PPC, the role of production planning is to determine the optimum sequence of operations or location for each operation and derive an optimal schedule to perform each operation to increase maximum efficiency.

In other words, production planning would be the answer to these three questions: ‘where,’ ‘when,’ and ‘how much work’ in manufacturing. In using the maximum principle for these problems, it becomes necessary to solve a two-decision variable problem. A search technique such as the simplex pattern search, appears to be suitable for obtaining an optimal solution to this type of problem.[20]

Process choice is a major part of operations strategy and plays a key role in aligning operations decisions with the production environment. Process choice has been categorized and labeled in several ways in the literature. A widely adopted terminology, which we used in our study, entails four categories, namely, job shop, batch shop, line flow, and continuous flow shop. The characteristics of the markets served by a manufacturing firm are primary determinants of process choice.

A manufacturing firm may decide to compete in a market characterized by uncertainty related to product variants and low volumes. In this environment, process choice should emphasize flexibility and the capability to produce high-performance design, as done by job and batch shops.[20]

Propositions: Current PPIC process in GAPOKTAN (Association of Farmer Group) still depends on traditional processes. Which means that the whole process is not yet being planned. Production is done within the same number of crops without planning for future demands. Inventory is not planned to follow demands but is only made to store harvested crops.

There is no control to achieve a certain number of harvested yields. On top of that, if demands are over the capacity of produced yields, GAPOKTAN (Association of Farmer Group) must find more yields from other farming groups. No operations strategy has been made over the years. This process is inevitably non-profitable for the GAPOKTAN itself. Hence, a structured PPIC process should be implemented to increase GAPOKTAN’s efficiency and furthermore, future income.

### 3.4 The Dynamic Capability Theory

The discussion in this dynamic Capability Theory approach explores how the Association company can create, modify, or expand resources through effective / efficient Supply Chain Management to influence Supply Chain Management. Based on this argument, it is imperative for companies to develop the ability to create, modify, or expand their internal and external resources (generated through close cooperation with supply chain players) to influence their performance and those of the supply chain players. The author approaches the forecasting method to provide the best data for Farmer Groups in processing sweet potato plantings. Thus, farmer groups can meet demand from the market.[21]

### 4 Result and Discussion

In this section, the authors try to discuss and create a formula that can be used by GAPOKTAN Mandiri Jaya into overcoming problems to meet the demand from the chili sauce company. By discussing and approaching the Supply Chain Management Method. The author displays movement patterns that can be used by GAPOKTAN Mandiri Jaya in the supply chain process flow so that the use of methods provides a better discussion for all Farmer Groups under the auspices of GAPOKTAN Mandiri Jaya.

![Fig. 4. Process Flow of Sweet Potato Raw Material Distribution Recommendation](image-url)
GAPOKTAN's buyer and supplier. The chili sauce company is GAPOKTAN's largest recurring buyer, while the farmer groups supply their crops to GAPOKTAN Mandiri Jaya. Here, GAPOKTAN Mandiri Jaya act to manage farmer groups and as an intermediary distributor that connects farmers and Chili Sauce Company.

Though so, the current process flow within GAPOKTAN (Association of Farmer Group) does not include forecasting in it. Hence, GAPOKTAN (Association of Farmer Group) only collects harvested sweet potato crops from its farmer groups regardless of the demand from Chili Sauce Company. GAPOKTAN (Association of Farmer Group) collects the crops then perform the quality control procedure to supply the chosen sweet potatoes to chili sauce companies and distribute the rest of the crops to the retail market. Thus, if the supply does not meet Chili Sauce Company's requirement, GAPOKTAN (Association of Farmer Group) will ask another GAPOKTAN (Association of Farmer Group) to append their harvested crops to meet Chili Sauce Company's demand. This process has been running in the loop for several years without further notice. This process is not efficient enough since it does not support the maximum capacity of its farmer groups.

Furthermore, to maximize and increase efficiency from its farmer groups, forecasting should be added to the supply chain process. Forecasting is created by seeing the demand from Chili Sauce Company and the farmer groups' performances from several years back and applying it for future requirements. With forecasting, GAPOKTAN (Association of Farmer Group) could give guidance to its farmer groups regarding how many shoots should be planted to fully meet chili sauce companies' demand.

After approaching The Dynamic Capability Theory which intersects with SCM, changes can be made by making more comprehensive forecasting to meet the needs of market demand, GAPOKTAN can better ensure supplies.

Forecasting carried out will help GAPOKTAN to predict demand so that the company can carry out production and distribution activities effectively and efficiently. Some forecasting methods that can be used by GAPOKTAN (ASSOCIATION OF FARMER GROUP) are; a) the Moving Average Method, this method uses the average of historical data movements in a certain period to predict future values; b) the Exponential Smoothing Method, this method calculates an exponential moving average over historical data, which gives greater weight to the most recent data; c) Regression Method, this method utilizes the relationship between the independent variable (such as time, price, promotion, etc.) with the dependent variable (demand) to predict future value; d) Trend Analysis Method, this method identifies trend patterns in historical data and uses that information to predict future values; e) Seasonal Analysis Method, this method predicts demand based on seasonal patterns or the influence of certain seasonal factors (such as holidays, weather, etc.); f) Combination Method, this method combines several forecasting methods to obtain more accurate results.

5 Conclusion
The conclusion from this study is that farmers who are members of GAPOKTAN Mandiri Jaya must include forecasting in the value chain strategy. Several methods can be used in forecasting, namely Moving Average, Exponential Smoothing, Regression Method, Trend Analysis Method, Seasonal Analysis Method, and Combination Method. Through forecasting, GAPOKTAN can plan and manage cock planting activities more effectively. Thus, GAPOKTAN can have crops that can meet the demands of the industry, especially the sauce industry.

References
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