

The Configuration Of Supply Chain Agritourism To Improve The Performance With Dynamic Programming

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Abstract

The purposes of this research is to implementation about the configuration of Supply Chain Agritourism in Mekarsari Tours Garden and result a decision making which must be done by top level management about their supply chain configuration. Because now Mekarsari, the biggest fruit garden in the world, have a lot of type of fruit which must be supply for the customer depend on the season with on time. So Mekarsari must know about their configuration from supplier to customer to improve their performance. The Respondents for this research is selected based on the results of supply chain mapping from the worker in the garden, the top level management until the end customer. Supply chain network is formed consisting of farm workers to the end customers, especially those located in the tourist are of green land zone. The type of data is displayed in a supply chain modeling approach is to use the dynamic system. It's consists of numeric data, the written data and mental models. That data is collected and processed into a design model. The design model is using system dynamics methodology. In compiling the system dynamics model has been used software Vensim Professional Academic Ventana 5.7. The result of this research is a configuration of Supply Chain Agritourism which is developed from the supplier until the end customer in Mekarsari tours Garden. From the Dynamic Programming, the result is a decision making which must be done by the top level management to improve the supply chain performance, especially in the green land zone.

Keywords

Supply Chain, Agritourism, Configuration and Dynamic Programming.

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Introduction

The economic conditions and global competition are increasingly complex which exact of creativity competitive business development in accordance with their high quality. Agritourism is one of the prospective agribusiness which can developed, in accordance with its role in national economic development and the face of global competition. However, the challenges faced in the future development

of agritourism is huge, especially with regard to the readiness of human resources, promotion and support of infrastructure development. Agritourism is a form of tourism activities that utilize agribusiness as a tourist attraction with a view to expanding the knowledge, experience, leisure and business relations in agriculture (Kidston, 2002; Fleischer & Tchetchik, 2005; Agriculture Department,

2004 & 2008; Charlebois, 2008; Koc, 2008; Sagheer, *et al.*, 2009; Phillip, *et al.*, 2010; Bumbalova, 2010; Tew & Barbieri, 2011).

Business in the agribusiness sector also has a factor of uncertainty in the face of supply, demand, delay due to post-harvest treatment, packaging, storage and transportation. This causes less orderly process along the supply chain so that it causes frequent imbalances between supply and demand that can be detrimental to farmers and consumers. Besides, the agribusiness sector (in this case the commodity fruits) have been limited lifespan characteristics (perishable), so the selling is very limited period by the age of fruit itself. To improve supply chain performance in agribusiness, innovation through better coordination between businesses by using supply chain management approach (Braunscheidel, 2005; Govindu, 2006; Matopoulus. *et al.*, 2007; Valenzuela, 2008; Stanton & Burkink, 2008; Sagheer, *et al.*, 2009; Estevez, *et al.*, 2010).

In today's competitive, businesses are required to realize that the competition is happening among supply chain network. Supply chain is a set of three or more entities (organizations and individuals) who are directly involved in the upstream and downstream flows of products, services, financial and or information from a source to the consumer. The businesses in the supply chain should be able to deliver products that comply with the wishes of consumers in terms of quality, quantity, price, time and place. So that collaboration is one of the most important factors in the implementation of supply chain (Simchi-Levi. *et al.*, 2003; Kim & Oh, 2005; Li *et al.* 2005; Wisner & Tan, 2005; Gunasekaran & Ngai, 2005; Kim, 2006). The collaboration emphasis on long-term relationship between supply chain partners with a variety of suppliers

in various levels. However, collaboration in the supply chain is not an easy thing to achieve. Required awareness of all parties to be seriously to implementing (Matopoulos *et al.*, 2007).

The problems are mentioned above, also a problem in Mekarsari which is one of the centers of biodiversity conservation of tropical fruits in the world, especially the superior varieties of fruit are collected from all regions in Indonesia, as well as a place of cultivation research, breeding and multiplication of quality seeds to farmers and then disseminated to the general public. Tourism in the middle of the fruit garden is supported by a variety of rides that draw visitors to nature, such as: travel channel, kids fun valley, country side, melons rides, rides barking, spotted deer conservation, water rides, outbound, and many others

The current research discusses which used of SCM methodology is based on the modeling of dynamic systems are still rare. (Ashayeri, *et al.*, 1998; Anderson, *et al.*, 2000; Angerhofer and Angelides, 2000; Goncalves, 2003; Georgiadis and Vlachos, 2004; Akkermans and Dellaert, 2005; Georgiadis, *et al.*, 2005). So it is necessary to optimize the simulation to eliminate the instability of the supply chain and generate a strong decision making (Sarmiento, 2010). This method has the potential to resolve the complexity of stabilization problem is not only in the concept of supply chain management but also in other fields

Research Problem

From the background that have been raised, agritourism supply chain system is a function of time, where the condition of the system can be changed at any time in the face of demand and delay the stochastic and uncertain situations (Anderson, *et al.* 2000; Angerhofer & Angelides, 2000; Goncalves, 2003; Georgiadis & Vlachos,

2004; Akkermans & Dellaert, 2005; Georgiadis *et al.*, 2005). Therefore, in designing the supply chain configuration, the most simulating which appropriately used in this study is a simulation of dynamic systems developed by Forrester (1961). Through simulation models are built, the relationship between the components that interact in the supply chain agritourism can be observed from various scenarios. It can be evaluated for the later and used as material for policy recommendations, which should be implemented to improve the supply chain performance agribusiness in Indonesia. Therefore, in this research, model development and experiments will evaluate from the effect on the performance of supply chain coordination agribusiness. So that the formulation of the problem in this research.

1. How does the configuration of supply chain agritourism in Mekarsari?
2. How are supplies of fruits in Mekarsari based on the concept of supply chain agritourism?

The Purposes of Research

1. To make the documentation is regarding the configuration of the supply chain in Mekarsari along with mechanisms that occur therein. In addition, this study are also aims to produce an evaluation of the current supply chain to identify the weaknesses found in the system (existing system) that can improve supply chain performance agritourism by using the concept of coordination and conduct an evaluation to compare the scenarios proposed.
2. To determine the level of supply of fruits in Mekarsari throughout the year or seasonally to prevent supply shortages of these fruits

Literature Review

Supply Chain Agritourism

Supply chain is a network of companies that jointly work to create and deliver a product to the hands of the end user (Simchi-Levi, *et al.*, 2003; Moon & Kim, 2005). The supply chain can be engaging a wider activity in the appeal logistics. Wisner, *et al.* (2005) provides another illustration of the Supply chain management is a new concept in the business world where the concept was evolved from just-in-time concept was first developed by Toyota. From the concept of just-in-time is now developing the concept of supply chain management which emphasizes the relationship as a supplier partner. Thus, SCM is not only oriented to the internal affairs of a company, but also the external affairs concerning relationships with partner firms (Li, *et al.*, 2005; Gunasekaran & Ngai, 2005; Kim, 2006; Estevez, *et al.*, 2010).

SCM approach to the agritourism sector is based on; (a) The process of cultivation to produce (horticulture), (b) Transforming raw material (harvest and post-harvest handling), and (c) the delivery of products to consumers through the distribution system. Thus, in the implementation of SCM is not only demanding GAP (Good Activity Practices), but also includes the GHP (Good Handling Practices), GMP (Good Manufacturing Practices) and GTP (Good Trading Practices) (Hobbs & Young, 2000). Supply chain is a dynamic system that evolves over time. So it takes a strong collaboration between business partners involved. That's way to manage Supply Chain more efficiently, dynamics system in the supply chain become a matter a great concern (Anerhofer & Angelides, 2000; Gigler, *et al.*, 2002; Akkermans & Dellaert, 2005; Georgiadis, *et al.*, 2005; Moon & Kim, 2005; Kim & Oh, 2005; Trienekens, *et al.*, 2008; Zhang & Aramyan, 2009)

The Dynamics of Systems

The Dynamics of Systems is a modeling method that was introduced by Jay Forrester (1961) and was developed at the Massachusetts Institute of Technology America. As the name implies, use of this method is closely related to the questions about tendencies dynamic complex systems, ie patterns of behavior generated by the system with increasing time. The main assumption in the paradigm of the dynamics of the system is that the dynamic tendencies are persistent (occurs continuously) on any complex system derived from the causal structure that forms the system. Hence, system dynamics models are classified into causal mathematical model (theory-like).

At first Forrester (1958 & 1961) applying the methodology of system dynamics is to solve the problems found in the industry (the company). The System dynamics models were first addressed to the management of common problems such as fluctuations in inventory, labor instability, and a decline in the market share of a company. Its growth continued to increase since its utilization in matters of social systems are very diverse, committed and utilized by the policy holder. Dynamic programming is a technique of quantitative analysis to make decisions that are interconnected stages. This technique produces a systematic procedure for seeking a decision with the optimal combination. Dynamic programming problem split into several stages of decision, where the decision of one stage will affect the decisions of each of the next stage.

The Method of Collecting Data

This research was conducted in Mekarsari. The study was conducted from February - April 2012. The data which is used in this

study are primary data and secondary data, qualitative and quantitative measures. Primary data is obtained directly by means of observation, interviews, filling questionnaires and expert opinion. Secondary data were obtained from the literature, internet, journals and other supporting documents.

Respondents in this study were selected based on the results of mapping the supply chain. Supply chain network is formed consisting of farm workers to the customers who are at Mekarsari, especially those located in the tourist area of green land zone.

Based on the supply chain network, selected by purposive survey respondents, namely plantation workers, the management of the garden collection are commercial and rare as well as from customers. On the farm workers and the management conducted interviews to determine the configuration of the whole picture of the supply chain in Mekarsari to meet customer demand. From the customer will be the deployment of questionnaires to determine their perception of how the Mekarsari to meet customer demand. The type of data is displayed in the supply chain modeling approach is to use a dynamic system consists of three types of numeric data, the data is written and mental models.

The Method of Data Analysis

Data mental models is written and numerical is processed into a design model of the system dynamics methodology. In preparing the system dynamics models have been used software Vensim Professional Academic ventana 5.7 Simulation of the US. The software is used on the stage of making a causal diagram, flow chart or diagram manufacture sub models (level and rate) of the system under study, a model of the system development

phase, testing phase model assumptions, and the simulation stage.

Furthermore, the model is simulated based on several scenarios that compare between the behavior of the real world and the behavior of the model. The development scenario is based on parameter changes or changes in the structure of the model in the form of a new policy. Based on the procedure of simulation is recommendation alternatif to serve targeted policies that generate behavior of supply chain management performance improvement agrotourism in Mekarsari.

Proposition Model

The proportion in this study is a hypothesis in the dynamic program. Proposition in this study are as follows:

- Proposition 1: If the average customer demand increases, the supply of fruits should also be improved
- Proposition 2: If the supply of fruit increased, the fruit maintenance must also be increased

- Proposition 3: If the average production increases, the supply of fruits is also increased

Result and Discussion

The configuration of supply chain in Mekarsari discussed descriptively. Of the process flow diagram, it can be explained that the supply chain in Mekarsari started at the time of seeding and ends with the customer who comes to Mekarsari to buy seeds or fruits that exist in Mekarsari. In an effort to develop a supply chain management in order to improve the performance in Mekarsari, then use dynamic program. This is based on the nature of the fruits are perishable and changes dynamically. In this study, to analyzed the supply chain from starfruit, rambutan and durian. The reason for choosing these fruits has improved due to the highest productivity among other fruits which depends on the type of crop. To starfruit harvest can be done throughout the year, while for durian and rambutan harvest depending on seasonal.

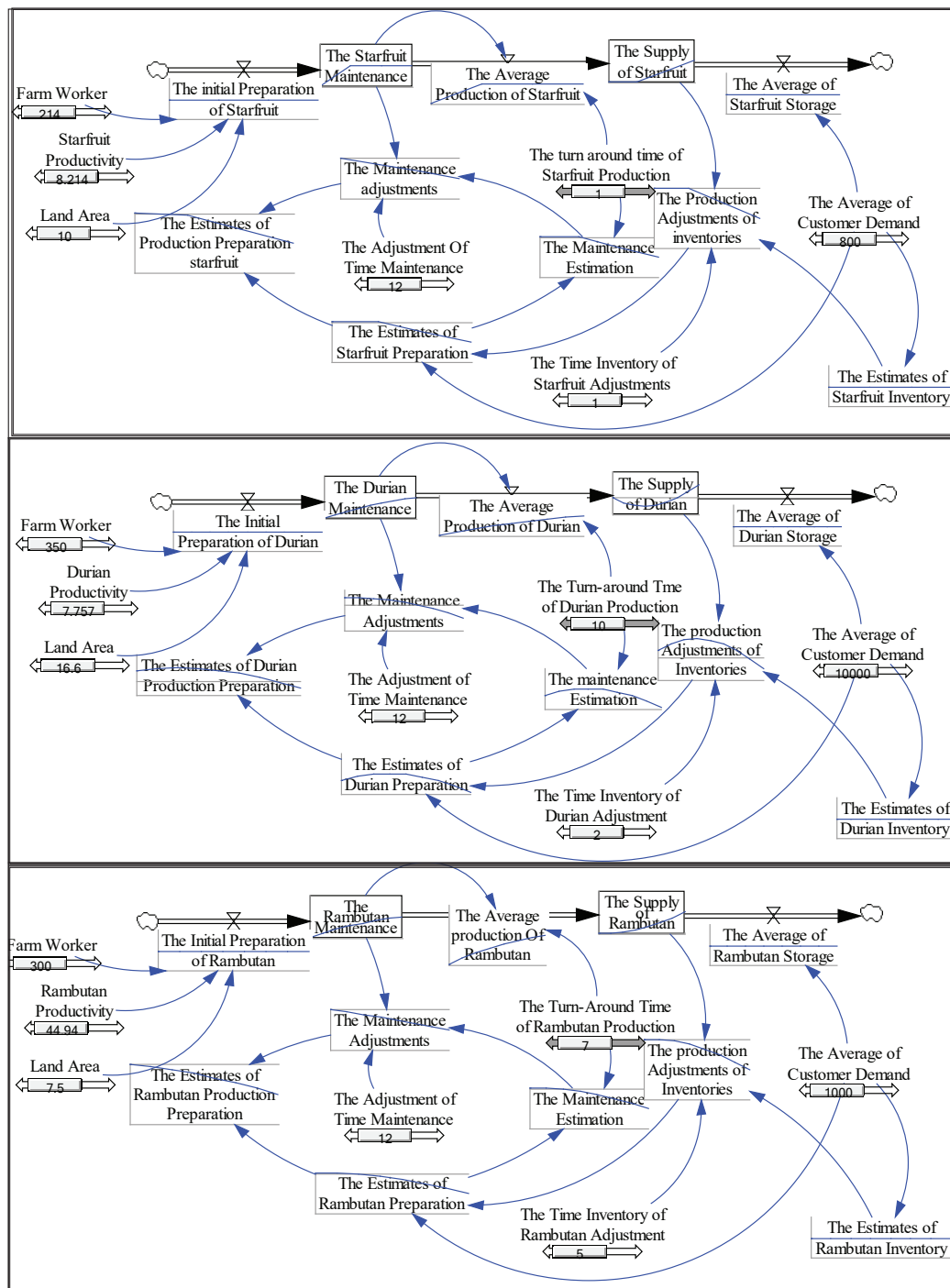


Figure 1 : Dynamic Model of Supply Chain Agritourism

The Output of dynamic programming (for Starfruit) was using software vensim seen that the average production of starfruit increased from week to week. This indicates that the star fruit yields experiencing is able increasing. Similarly, the existing inventory. From the results of the inventory of the existing output

of the average starfruit is increasing for that production, but in week 2 through 4 have a fixed amount of inventory. This is because the nature of starfruit that every month always able to produce a constant amount of crop and the starfruit is a type of fruit throughout the year.

The dynamic program output was using software vensim seen that the average production of the rambutan which is increased from the first week of harvest until the final weeks of the harvest. It indicates that rambutan which is contained in Mekarsari able to produce crops that have increased. But what matters more is from existing inventory. In the first week of harvest is still a shortage supply of rambutan, although the supply shortage is not too much. This is because the initial weeks of rambutan season, the customer will buy the fruit in bulk. And this is also due to the rambutan fruit is seasonal so not every month could produce a harvest. This is in contrast with star fruit. So that the necessary anticipation of management to meet the shortage of supply in the early weeks of the harvest. For example, in collaboration with a third party to meet the shortage of supply of rambutan fruit only in the early weeks of the harvest. However, that need to be observed also turns this rambutan fruit at the end of the harvest has a very excessive amount of inventory. For the management side should try to sell it to outsiders or manage it in the form of preparations such as juice or nata de coco rambutan rambutan. This is already done by the management Mekarsari but still limited to the manufacture of red guava juice, mango, soursop.

The dynamic program output for durian fruit was using software vensim seen that the average production of durian every week has increased. This indicates that the durian fruit crops is suffered from deficits improve week by week. However, when it has seen from the table inventory durian which has seen in the first week up to six weeks to experience a shortage of inventory supply shortage even this has a considerable amount. From the search results in the field turns out this is often the case for durian. This is because the consumer, before the durian fruit is the harvest time they are booked in advance

to the Mekarsari order to be informed when the harvest takes place they get information about durian. Besides of the search field when the durian harvest has arrived then the Mekarsari will conduct an auction of durian. Because at week 1 to 6 the durian harvest is limited. So that customers be very interested to participate in these activities. So the Mekarsari must anticipate one is to cooperate with third parties to provide durian ranging from 1 week till six.

Conclusion

The configuration of supply chain management in the form Mekarsari descriptive analysis in this study starts at the time of seeding. Where nursery in Mekarsari can be divided into two groups, which are managed by the farmers built Mekarsari conducted outside garden area Mekarsari and do in the area of the garden Mekarsari. After the seeding process is carried out maintenance to the harvesting process to meet the demand of the customer. This research support Gigler *et al.* (2002) research which Stated that supply chain design in agricultural commodities like dairy products, fruits and flowers can be complicated, because in each link of the supply chain. Mekarsari in handling the problems that occurred in meeting customer demand is the main one of doing the sorting of each type of fruit. It is including the fruit round or seasonal year. This research also support Trienekens *et al.* (2008) which for the fruit there are different handling for each type of fruit. Because each fruit has a different treatment. After the analysis with dynamic programming to what extent the parties Mekarsari able to meet the customer and when companies act to cooperate with third parties to meet the customer. This research also support Anerhofer & Angelides (2000), Estevez *et al.* (2010), Georgiadis *et al.* (2005), Hobb & Young (2000) which stated that for more efficiently, the

design of supply chain must be fit with the configuration supply chain with used dynamic programming.

From the description and research findings can be submitted several suggestions to the management of the company in an effort to implement supply chain management. The suggestions are the Mekarsari should look when it is appropriate to meet particular customer inventory for seasonal fruit, in order to supply shortages can be anticipated, for example, in collaboration with a third party in the weeks to harvest the fruit shortage of inventory. The other suggestion is the management must know what is the need of customers. It is important as a foundation promotion and development of future business

For future research opportunities academics can be delivered the following suggestions:

Future studies should focus on network configuration broader agribusiness starting from farmers, city, cooperatives, markets, supermarkets until the end customers.

Notes on Contributor

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