

EFFICIENCY ENHANCEMENT OF FLOWER INDUSTRY SUPPLY CHAIN MANAGEMENT

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Abstract

The global supply chain of perishable products, i.e. flowers, is a multifarious interrelated structure and has underlined the problems. This research aims to find the characteristics of supply chain management of cut lotus flowers, analyze and create the supply chain management model of the cut-flower lotus, and apply the best lotus supply chain management model to practices of cut-flower lotus farmers. Mixed methods research was used consisting of quantitative and qualitative research methods. This phenomenological research was conducted by studying the phenomena and human experience using descriptive statistics. Purposive sampling was used to determine 22 cut-flower lotus farmers in Nakhon Pathom as a sample in the study of efficiency enhancement of supply chain management. The results found that the supply chain management structure of cut-flower lotus had 3 patterns, with the characteristics of the upstream, midstream, and downstream. The first pattern was the distribution of the lotus flowers that farmers cut the flower and sorted out the sizes of lotus flowers for middlemen

to buy and sell to retailers in each region. Then, the retailers distributed to consumers. The second pattern was the distribution of the lotus flowers that farmers cut the flowers and sorted out the sizes of lotus flowers for retailers to receive the products at farms and then distribute to consumers in the market. The third pattern was the distribution of lotus flowers by lotus farmers. This style was rare. The cut-flower lotus farming can be applied to the agro-tourism business for tourists to study the way of life, community, culture, and lotus farming, including participate in activities within the lotus farm, such as collecting lotus flowers, raising fish, boating, and folding lotus flowers. This is another way to generate income for lotus farmers and communities sustainably.

Keywords: supply chain management, cut-flower lotus, lotus farm, agricultural tourism

Introduction

Normally, the supply chain of perishable products, i.e. seafood, vegetables, fruits, and flowers, is a multifarious interrelated structure where numerous linkages signifying irresistible relations, procedures, assets and members with contradictory interests exist (Pintuma and Aunyawong, 2021; Shareef et al., 2020). It is more serious during the social isolation period of the COVID-19 age. The COVID-19 crisis has underlined the problems of global supply chains well illustrated by many industries (Aunyawong et al., 2021), especially the flower industry. Flower growers, florists and all the other actors of the flower supply chain had sold fewer flowers than the previous period, particularly in developing countries such as Colombia, Thailand, India and Kenya (Carton and Parigot, 2021). Therefore, comprehending and analyzing the flower supply chain having sheer difficulty from uni-dimensional interest is, to some extent, impractical and frequently offers deceptive concepts (Shareef et al., 2021).

Today planting flowers, such as rose, jasmine, lotus, chrysanthemum, etc., can be the main competitive occupation for many farmers in agricultural countries in ASEAN (Hoang, 2020), including the international tourist destination in agricultural tourism (Setthachotsombut & Aunyawong, 2020). As a result, these study focuses on the development of cut-flower lotus supply chain in Thailand. The lotus is water plant, the nature of the plots, therefore, must have water traps like rice fields. Some lotus species, such as scared lotus, use a little water to fill in the pot to grow. Planting with a little water, moreover, accelerates to flow faster in a lowland area along the river with many types of farming. Some areas turned to plant cut-flower lotus or local trade or also called lotus farming. Lotus farming can be easier to maintain than rice farming due to a few annoyances from insects, using less water, and having a 3-month planting period in giving more flowers and collecting flowers for sale. The lotus flower blossoms more during the summer and less during the winter. While in the rainy season, they give a lot of flowers, mostly abortive flowers which are useless. The lotus flowers will be collected every day or every other day. It depends on the product available at that time. The lotus flowers can be harvested in the form of buds, seeds, and leaves and can be processed into other products. In the world, there are various types of lotus farming. For instance, in Thailand most of them are Sattabut lotus, with white petals and Sattabongkoch lotus with dark pink petals. The wholesale price is 3 baht per flower, while the small flower price is 1.50 baht. However, the price will rise on Buddhist holy day. Both of these types of products are needed both in Thailand and abroad (Suwanro, 2021)

Since rice products has decreased more than the proportion of the decrease of rice farming areas, farmers are interested in investing in agricultural cut-flower lotus farming. Moreover, due to lotus farming easier to maintain than rice farming, few diseases and pests, and using less water, the farmers may turn to do lotus farming to avoid problems of lack of water, unstable rice prices, and flood in many lowland rice fields, causing damage continuously. Rice farming is not good as it should be. Lotus farming would be better suited. Lotus farming is therefore a new alternative that is suitable for rice fields. It allows farmers to harvest and generate incomes on a daily basis and has a long harvest period, not need to invest every year. Lotus is a plant that can generate incomes for farmers. Productivity can be distributed in general, both retailers and wholesalers in the middle market. Farming cut-flower lotus, besides, is also another choice that can help turn the unsuccessful farmers' lives from farming rice by changing the rice fields to be lotus fields.

From such importance, the study therefore realized the significance of supply chain management model development of cut-flower lotus and discovered the characteristics of supply chain management of cut-flower lotus. In addition, the study developed the supply chain management model of the cut-flower lotus to be a guideline for improving the cut-flower lotus supply chain, building career, and generating incomes for farmers sustainably. The study, therefore, aims to find supply chain management characteristics of cut-flower lotus, analyze and create the supply chain management model of cut-flower lotus, and apply the best cut-flower lotus supply chain management model to practices of cut-flower lotus farmers.

Research Methodology

Research on efficiency enhancement of supply chain management of cut-flower lotus was conducted by Participatory Action Research (PAR). The study was mixed methods research, comprising quantitative and qualitative research methods. This research was phenomenological study to investigate the phenomenon and human experience (Pimonratnakan, 2017) by studying the efficiency enhancement of cut-flower lotus supply chain management of farmers.

Population and sample

The population used in this research was cut-flower lotus farmers, those involved in cut-flower lotus products, and those involved in cut-flower lotus supply chain. The study determined 22 participants using purposive sampling, which were the total number of farmers in the list of cut-flower lotus growers in Nakhon Pathom Province, Thailand

Data collection

For quantitative study, the questionnaires developed from Hiranphaet (2018), as research instrument, were distributed to the cut-flower lotus farmers, those involved with cut-flower lotus business, and those involved in cut-flower lotus supply chain. The questionnaire was divided into 2 parts: the background information of respondents and the level of opinion on the cut-flower lotus supply chain management characteristics and patterns contained 15 questions. The questionnaire was passed to the inspection of Index of item objective congruence (IOC) by the agricultural expert and two experts in supply chain management, a total of 3 experts.

For qualitative study, key informants of in-depth interview were interviewed with questions based on supply chain management of cut-flower lotus products. In this regard, the questions were sent to key informants in advance for giving them the opportunity to share their work experiences independently. The interviewer added the supplementary questions to expand more details or check the confidence. Other data collections included non-participant observation, note taking, and reflection record. Data were collected from discussions with informants on specific issues. The interviewer asked open-ended questions so that the interviewees had the opportunity to express their opinions. Questions used in the questionnaire or the interview were defined neutrally. These questions were used in studying opinions, attitudes, feelings, perceptions, beliefs, and behaviors in order to find an unclear answer so as to display the supply chain management pattern of cut-flower lotus.

Data analysis

Quantitative data was personal factors and cut-flower lotus supply chain management patterns and develop cut-flower lotus supply chain management system. It was analyzed using descriptive statistics: frequency, percentage, mean and standard deviation to describe the characteristics of data collected in the form of tables, texts, charts and figures by considering SCOR Model management process to link the related work processes within the cut-flower lotus supply chain. For qualitative data, content analysis was used to consider the data obtained from questionnaires and then the data analysis was presented through essay. From interviewing the group of cut-flower lotus farmers, the data were analyzed qualitatively on cut-flower lotus supply chain management in each aspect. Then, the analysis results on cut-flower lotus supply chain management in each aspect were presented based on the concepts, theories, and data gathered. After that, data collected from fieldworks, the observation and interview, were analyzed, summarized, and discussed by capturing the traits and classifying the main events with separated issues in line with the research objectives. Finally, the report was presented through analytical description.

To check the data reliability, the study used data triangulation to prevent the lack of data reliability. If the data obtained was not enough, additional data was collected. The added data could be collected by examining different data and times, different places, and different persons in which each person would give the same data or not. If not matching, the researcher interviewed at different times and locations to confirm and find data for the clarity (Pimonratanakan, 2018).

Results

Most of the sample lotus farmers were female, aged 56-60 years, had more than 10 year experience in farming cut-flower lotus, planted lotus as the main plant, 19 farmers, graduated elementary education level - secondary education level, had more than 10 rai of cultivated land, had an average productivity of over 1,000 kilograms per year, and had an average monthly incomes of 10,001 baht - 15,000 baht.

The exploration for supply chain management characteristics of cut-flower lotus in Nakhon Pathom found that the farmers popularly planted white lotus, also known as Sattabut or Sattabongkoch lotus, representing 100 percent, which was grown according to the market needs, representing 77.27 percent. The farmers planned the planting period in accordance with the time that can be harvested during the Buddhist festivals, accounting for 100 percent. The supply of lotus species from the neighbouring lotus fields for cultivation was accounted for 63.64 percent. Most farmers used the chemical fertilizers, accounting for 81.82 percent, and bought chemical fertilizers from retailers for the cultivation, accounting for 72.73 percent. Most farmers spent less than 3 months of planting time to the highest yield in the first lot, accounting for 100 percent. Most farmers made lotus farm 1 time, yielding less than 1,000 kilograms per rai, accounting for 100 percent. Most farmers harvested lotus flowers for distribution every other day, accounting for 81.82 percent. Merchants bought directly at lotus farms, accounting for 86.36 percent. The transportation by buyer's car accounted for 81.82%, and most of cut-flower lotuses were purchased to sell at Pak Khlong Talat which was the centre for selling flowers in Thailand, in accordance with the research of Kanchanacharoen (1990), cost and return on investment of lotus cultivation for cut flower, accounting for 81.82 percent.

From the exploration of the supply chain management characteristics of cut-flower lotus, there was a link of the related work processes between farmers and those participating in the cut-flower lotus supply chain. Figure 2 depicted 3 characteristics of cut-flower lotus supply chain.

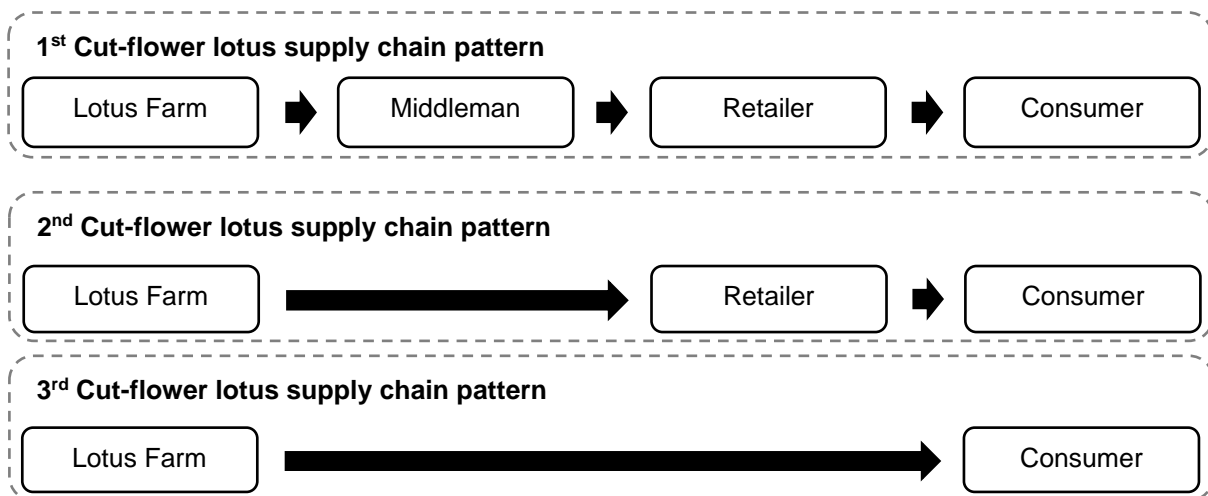


Figure1. Cut-flower lotus supply chain Model

Figure 1 represented that the distribution process within the cut-flower lotus supply chain had 3 patterns as follows: The first cut-flower lotus supply chain pattern was the distribution of lotus flowers cut and separated their sizes by lotus farm for middlemen to sell to retailers in each region. Then, retailers distributed to consumers. 2nd Cut-flower lotus supply chain pattern. The second cut-flower lotus supply chain pattern was the distribution of lotus flowers cut and separated their sizes by lotus farm for retailers to pick up the products at the lotus farm and then sell to consumers in the market. The third cut-flower lotus supply chain pattern, not many,

the distribution of cut-flower lotus by farmers had areas near ago tourism sites or near the floating markets. Farmers made it as part-time career in addition to cutting to sell to middlemen or retailers. In this pattern, farmers could sell at a relatively high price as the market price in general.

The analysis and creation of supply chain management model of cut-flower lotus by considering the SCOR model management process found that the process analysis and evaluation, including the work process was the application of the SCOR model concept through the mechanism of 4P management (Performance, Process, Practice, and People). The effectiveness used 5 goals (Reliability, Responsiveness, Agility, Cost, and Asset Management Efficiency) and 6 processes (Plan, Source, Make, Deliver, Return, and Enable) to analyze problems and development opportunities under cut-flower lotus supply chain. Such supply chain model was shown in Figure 3.

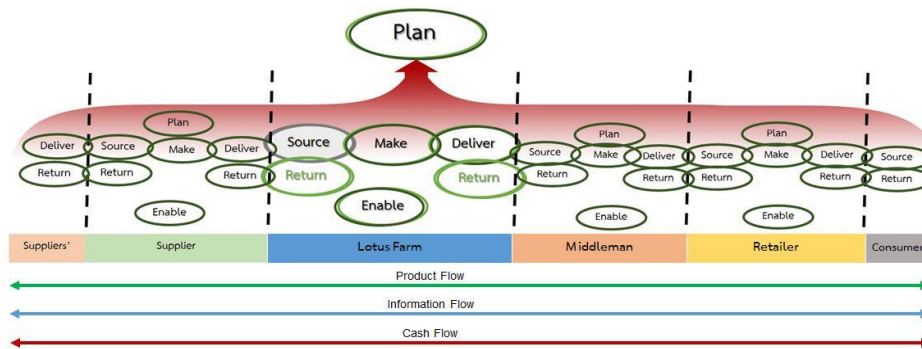


Figure2: SCOR model of cut-flower lotus supply chain management

(Adjusted from Supply Chain Council, 2012)

From Figure 2, the supply chain management model of cut-flower lotus, having the full supply chain characteristics from upstream to downstream, consisted of raw material suppliers, cut-flower lotus farmers, wholesalers, retailers and consumers. For the supply chain system, cut-flower lotus farmers would farm and be responsible for harvesting and separating the sizes of the lotus flowers. After that, the products were distributed to retailers in various markets in line with the consumers' needs by wholesalers or middlemen receiving lotuses from lotus farmers. From the process analysis, the model in driving cut-flower lotus supply chain could be divided into 3 groups: 1) The operations of increasing value and income, comprising processes of source, make, and delivery, 2) The control, coordination, and driving, including processes of plan, cultivation, and basic processes to support the plan and distribution, and 3) the operations of return, covering the processes of returning the lotus flowers in the case that purchasers could not sold out in the practice of wholesalers or retailers. The details could be explained as follows.

The 1st process: Lotus farming plan was the process of determining the needs and actions that most farmers would examine religious dates to plan the start of the lotus farming so as to obtain products on the specified date and meet the consumer needs in the market, approximately 2 months to achieve the supply chain objectives, including planning for the purchase of chemical

fertilizers after 45 days of cultivation which was limited the amount of orders according to the amount needed to be used each time. Some farmers did not store the fertilizers as inventory. They would plan to spray medicines every weekend plan to deliver products to middlemen coming to buy lotus flowers in front of the farm with bundles of lotuses in basket for transportation. Moreover, after collecting goods, some farmers delivered products to the market with no plan in returning these lotus flower goods, if the products were not sold out or not quality.

The 2nd process: For the source of raw materials, such as chemical fertilizers, medicines, and pesticides, lotus farmers would purchase them from retailers within their community. If they needed a large quantity, raw materials would be purchased from the chemical fertilizer distribution company. Sometimes farmers used bio-fertilizers from generic dung in the community. For sourcing the lotus seeds, farmers have been shared from neighbouring lotus farms by selecting the species that would be cultivated in line with the market needs at that time. In Thailand, there were popular species, such as White Sattabongkoch and Pink Sattabongkoch.

The 3rd process: The cultivation and production processes to get the lotus flowers in the form prepared for distribution had no lotus collection before receiving orders from middlemen. Each market needed the different lotus sizes, such as consumers in the local market did not pay much attention to the size of the flowers, so farmers often used small flowers to distribute to consumers in the native market. For consumers in the central market, they needed medium-to-large lotus flowers so as to be practical alternatives. The farmers separated and sold flowers of different size, as shown in Figure 3.



Figure3: The separation process of lotus flower sizes

(Source: Farmer's Lotus Screening Plant, 15th February 2019)

The 4th process: For delivery process, lotus farmers would wait for middlemen to pick up the products in front of the lotus farm by completing the package for transportation using lotus leaf for wrapping and plastic for preventing bumps between the lotus flowers and the package. In addition, the lotus leaf helped to control the internal temperature, not allowing the lotus to wither too quickly due to the hot weather in Thailand. However, those coming to pick up lotus flowers for transport to the market also had transportation techniques by shipping during the evening and night so that the sunlight did not directly affect the lotus flowers. Pick-up truck

transportation was used to convey products to the markets in various regions, as shown in Figure 4.



Figure 4: Lotus flower pick-up truck transportation

(Source: Farmer's Lotus Plant, 15th February 2019)

The 5th process: The process of guaranteeing the cut-flower lotus products terminated the responsibility for the products since the pick-up truck delivery process was finished. After that, the wholesalers or the persons who bought the product would be responsible for all products, including the quality of the products, product warranty, and customer complaints related to product features. These lotus flower products would not be returned, if the defective products were purchased, including no collecting, inspecting, selecting, classifying, bringing back into the process again, using renewable materials, recovering directly, eliminating waste, repairing, and restoring the expired products (James, 1998 ; Fortes, 2009 ; Ninlawan et al., 2010)

The 6th process: For the process of preparing coordination for distribution and access of the lotus flower product purchasers, the farmers would have local and foreign buyers contacting to purchase lotus flowers by exchanging information for communication between each other, including coordination for planning to harvest and purchase during various festivals. In applying the best lotus supply chain management model to the practices of cut-flower lotus farmers, the study discovered the prototype farmers who adopted the business practices together with the cut-flower lotus farming. This could generate incomes for farmers in 2 ways, specifically lotus farming that farmers would have incomes from collecting lotus flowers for distribution and lotus farming as an agro-tourism location. Lotus farmers would provide tourists with the cultivation knowledge and sufficient ways of life in the community. To manage this type of tourism, the environment needed to be prepared for being tourist attraction with pavilions for tourists visiting lotus agriculture so that tourists could participate in lotus flower folding activities for use in Buddhist ceremonies, join boating activities in lotus farm, and collect lotus flowers in the lotus farm. The activities 'expenses depended on the type of activity that tourists wanted. This agro-tourism business would make the lotus farmers enhanced incomes for their households, reducing children's relocation for occupation in the city. The results found that the lotus farmers were interested in changing the operation by adopt the supply chain management model so that they were successful in agro-tourism.

Conclusions and Discussion

The results found that cut-flower lotus supply chain model has 3 patterns: upstream, midstream and downstream, consisting of cut-flower lotus farmers, middlemen, retailers, and consumers. There is the product distribution model that middlemen bought 3-size lotus flowers - small, medium, and large - with the different prices. Most medium and large lotus flowers are delivered to the flower markets in central Thailand, whereas, for small lotus flowers, retailers sell them in rural tourism or village tourism and local markets. The characteristics of the full cut-flower lotus supply chain have 5 important elements according to the SCOR Model - plan, source, make, delivery, and return - that must be defined the process for the consistency (Aunyawong et al., 2020; Phrapratanporn et al., 2019; Pintuma et al. 2020; Sinthukhammoon et al., 2021; Waiyawuththanapoom et al., 2020; Waiyawuththanapoom et al., 2021). Each section has a scope to be implemented.

Plan is related to the planning of supply and demand due to their uncertainties (Srisawat & Aunyawong) which comprises things that need to be managed, such as assessing the ability of raw material sources, collecting and prioritizing requirements, inventory planning, demand for product distribution, production, raw materials, overall production capacity, distribution channels, operational planning, the decision to make or source, supply chain layout, resource and production capacity long-term planning, business planning, developing innovative products or cancelling the production of the original products, and production lines (Sommanawat et al., 2021; Tirastittam et al., 2020). The operation in planning will specify the overview in various parts of the supply chain before being implemented in several sections. This is a network of related organizations through links in numerous processes that creates value in the form of products or services delivered to the end consumers (Nualkaw et al., 2021). These activities are related to almost all types of businesses. They are an important basic cost that affects the total cost of the product. Connection of units or points in producing goods that starts from the upstream of the raw materials to the final point contains the upstream management of the cut-flower lotus supply chain, comprising suppliers of production factors, such as lotus fertilizer, insecticide, lotus seeds, and manufacturers who are lotus farmers as human capital (Wisedsin et al., 2020). Midstream management of cut-flower lotus supply chain consists of wholesalers or middlemen who come to buy lotus flowers from farmers. Finally, downstream management of the cut-flower lotus supply chain includes retailers and customers. In the practices of increasing value and income, consisting of source, make, and deliver. Lotus farmers implement a plan of lotus farming very well in terms of source, cultivation, and delivery because most lotus farmers are local agriculturalists. They have made the lotus since the ancestral generation. In marketing, farmers contacts the middlemen to buy products on the day after harvest every other day since the collected lotus flowers will have 3 sizes, i.e., large, medium, and small. Due to the collection of lotus flowers in various sizes for different usage purposes and for the beauty of the vase preparation to decorate the desired location, the lotus prices are different. Moreover, in increasing the value and income of lotus farmers, it can also manage the existing lotus farm can be managed to be an agro-tourism location for tourists to study the ways of community life, cultures, and lotus farming, including participation in activities within the lotus farm, such as collecting lotus flowers, raising fish, boating, and

folding lotus flowers so that the community remains a traditional ways of life and conserves houses, cultures, and traditions transferred to the young generation, as revealed by. This is another way to sustainably generate incomes for lotus farmers and communities. Control, coordination, and driving will consist of the cultivation planning process. The market mostly needs White Sattabongkoch Lotus for using in the religious rituals. As a result, every lotus farmer popularly grows White Sattabongkoch Lotus. Some farmers have the cultivation mixed with Pinkish Purple Sattabongkoch Lotus so that consumers have the option of consumption. For basic processes to support planning and distribution, in general, every farmer will plan the cultivation to obtain products that fits the Buddhist festival because most Thais are Buddhists (National Statistical Office, 2014). The lotus planting must be planned before harvesting about 2 months and the lotus will maximally yield in the first lot. Regarding the return, the maintenance of lotus flowers before delivery to the middlemen is the duty of the farmers to collect lotus flowers, separate sizes of lotus flowers, and pack lotus flowers in a condition prepared for delivering to the market. When the lotus flowers are conveyed to the pickup truck, the farmers' responsibility towards lotus products is terminated. That is to say, farmers will not accept return of all products. The responsibility for damage will belong to the middleman or conveyer because the lotus flowers will be inspected by the middleman before taking the products on the pickup truck and lotus flowers are considered agricultural products that can be easily spoiled. The delivery, therefore, needs special care. Moreover, if lotus flowers are not sold out within the specified period, they will rot naturally. This is considered irrelevant to lotus farmers.

For recommendations, the group or cooperative of cut-flower lotus farmers should be established to manage and prepare information to support the plan and procurement and planning excellently so that farmers can negotiate the purchase efficiently with a cheaper price. This group of farmers will result in production efficiency and adequate support to consumers' needs every day since the coordination among lotus farmers brings about the harvesting plan according to the quantity that the wholesalers needs each day. The cut-flower cooperative, gathering the products, has the power to negotiate prices with the wholesalers coming to buy lotus flowers. As a result, merchants buying lotus flowers can plan purchases and transportation efficiently.

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