Disturbance Management Strategy in the Food Supply Chain in The Middle of Pandemic COVID-19

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Abstract. The COVID-19 pandemic raises problems for the industry on a large scale. Among them, the food supply chain has experienced disruption due to government policies such as the closure of several road accesses and WFH activities as a form of handling COVID-19. This paper aims to analyze disruption and find coping strategies in food supply chain activities. By using the SWOT analysis method. Based on the IFAS-EFAS calculation, it is known that several disturbances that occur in the food supply chain, such as limited transportation access, inadequate production, a decline in value inventory turnover and needs space increased. The output of this research is a coping strategy, namely online marketing and maintaining the stability of food commodity prices, providing innovative rules regarding agricultural land, maintaining product quality and efficient use, increasing the scale of production and distribution as needed, and creating farmer empowerment programs.

1. Introduction

Many things that happen in this world are unexpected and beyond human control. One of the unexpected things was the COVID-19 pandemic which had an impact on various sectors. Various kinds of policies have been submitted by the government to handle Coronavirus cases so that the number of sufferers is not more increase. Among them with enforcing lockdowns, limiting activities outside the home so that both schools, universities, and workplaces take place online.

Besides, the policy of closing several road accesses within a certain time, limiting transportation operating hours, and enforcing policies quantity limitation transportation. The enactment of lockdown can help prevent the spread of the Coronavirus. At the global economic level, the COVID-19 pandemic has disrupted global supply chains, financial market volatility, and shocks to consumer demand. China’s exports fell by more than 17 percent in January and February 2020 and world trade is expected to fall between 13% and 32% by 2020 [1].

The COVID-19 pandemic is a delivering disaster impact on the emergence distraction industry on a large scale. Worldwide production and food consumption are receiving increasing attention. Thus, there is increasing attention to production capacity to meet global food demand [2]. It becomes important to distribute products quickly and efficiently from uninfected distribution centers to retail stores [3].

Several government policies that aim to reduce the spread of the Coronavirus also have an impact on the smooth running of other activities, one of which is a disruption to supply chain activities. COVID-19 emerges as a supply and demand shock that affects the productivity of global SC [4].
In the food supply chain, rice is chosen as an example of the object of study to be discussed because, in addition to being the main staple food in Indonesia, rice has also experienced a downturn in production.

The following is an overview of the structure of the food supply chain in Indonesia in general (the case of rice which has a stock support body).

![Figure 1. Flow of rice supply chain in Indonesia](image)

Each supply chain has a value-adding process, both in terms of place and time through the transportation system, as well as in the form of products (from grain to rice) through the grinding process. As an incentive for the activities of each chain, there is a margin. Thus, the selling price in each chain will be greater than the purchase price plus the handling costs (value-added activities) for each segment of the supply chain.

Reference [5] shows that disruption to the supply chain has a negative long-term impact on the company, and many companies are not able to recover quickly from the negative impact. If a major disaster occurs, the business sector will also be affected, as a result, many supply chains will experience a breakdown and many of them will not be able to recover. This is a serious problem where supply chain activities are very important activities that can have a serious influence on meeting the needs of consumers.

The following is a graph of rice production and consumption in Batu Bara Regency for the last 5 years.

![Figure 2. Rice production and consumption in 2015 – 2019](image)
With declining production statistics and increasing consumption (Figure 2) [6], as well as the changing price of rice every year (Figure 3) [7], it is necessary to deepen and pay special attention to rice commodity prices and projections of future production.

In the process of the food supply chain in the midst of the COVID-19 pandemic, various disruptions were encountered which could affect the flow of the food supply chain not running smoothly. The various disruptions that occur include limited access to transportation to production points, restrictions on production activities due to the limited number of workers for operations, restrictions on transportation to pick up raw materials and to send products, accumulation of goods at ports of origin and destination, decrease in inventory turnover value and space requirements increase, as well as the accumulation of goods in the warehouse due to increased lead-time.

To reduce and overcome the various disturbances that occur in the food supply chain, a coping strategy is needed to overcome and prevent various disturbances that may arise or occur by using a SWOT analysis.

The purpose of this study is to identify internal and external factors using a SWOT analysis approach with four perspectives, namely strengths and weaknesses as well as opportunities and threats. The result of the SWOT analysis is a strategy formulated for overcoming disruption of the food supply chain. The SWOT matrix is selected by determining the weight of the alternative criteria as a strategy formulation.

In the next section, we will discuss some literature on strategic management, then continue with a discussion of supply chains, the disruptions in them, and supply chain management itself. The method used in this research is to use a SWOT analysis accompanied by data collection and direct surveys of the object concerned. The Results and Discussion section will then discuss the results of the research findings. Then in the final section discuss the conclusions of the research that has been done.

2. Literature Review
Strategic management is the science of formulating, implementing, and evaluating cross-functional decisions that enable an organization to achieve its goals [8]. The strategy is a combination of adaptive planning and action. Strategy making includes developing the rules of the game, the desired strategy is something in which managers shape and reshape when events occur both inside and outside the organization [9]. Reference [10] shows that strategy is a comprehensive activity planning that determines critical directions and directions for allocating resources to achieve the long-term goals of the organization.
A supply chain is a network of companies that work together to create and deliver a product to the end-user. In a supply chain, there are usually 3 types of flows that must be managed. The first is the flow of goods flowing from upstream to downstream. Second, is the flow of money and the like that flows from downstream to upstream. Third, the flow of information that can occur from upstream to downstream or vice versa [11].

Reference [12] indicates that supply chain risk is classified into operational risk and disruption risk. The level of dependence and complexity of the current supply chain network makes the supply chain as a whole more vulnerable to disruption. Any disruption that occurs within one of the supply chain players can affect the supply chain network as a whole, such as the cessation of the flow of information and resources from upstream to downstream in the supply chain. This can cause an imbalance between supply and demand. Therefore, risk in the supply chain can be defined as a disruption of the flow of information and resources in the supply chain network due to discontinuation and uncertain variations [13]. In addition, the problem of resource availability and the uncertainty of customer demand contribute to the complexity of the food supply chain system [14].

Reference [15] shows that supply chain management is the integration of planning, coordination, and control of all business processes and activities in the supply chain to meet consumer needs at the lowest cost. The supply chain is more emphasized in terms of product flow and transformation, information flow, and finance from the raw material stage to the end-user. Supply chain management is an approach to managing the flow of products, information, and money in an integrated manner that involves parties, from upstream to downstream consisting of suppliers, factories, distribution agents, and logistic services [16].

The goal in supply chain management is to keep materials flowing from the source of production to the final consumer. On current information, technology information allows demand and supply data to be obtained quickly and can increase the level of detail of a product [17].

SWOT stands for Strengths, Weaknesses, Opportunities, and Threats. SWOT analysis is the identification of various factors that are systematically compiled to formulate a company strategy that is based on the logic that can analyze strengths and opportunities but simultaneously can minimize weaknesses and threats [18]. Reference [19] shows those variables originating from internal factors, including Human Resources (HR), Process, Products (goods), Prices, Places, and Channels of Distribution, Promotion, Consumer Services. Meanwhile, variables that come from external factors include, among others, Economic, Social, Cultural, Political, and Market.

3. Methodology
This research refers to a framework developed by interviewing farmers about the current conditions during the COVID-19 pandemic and literature studies that have been carried out in the previous stage. This framework contains the stages of identifying and designing strategies.

The strategy design process stage is carried out by identifying the strengths, weaknesses, opportunities, and threats in the food supply chain. Then the scoring is to determine the weight of each criterion in determining the chosen strategy.

The next stage is the preparation of internal and external factors using SWOT analysis, namely compiling the strengths and weaknesses as well as opportunities and threats. Then from the preparation of the internal and external factors, the IFAS matrix (internal strategic factor analysis summary) and the EFAS (external strategic factor analysis summary) matrix are compiled. To determine the state of the food supply chain, an IE (Internal External) matrix was developed. Next, a SWOT matrix is compiled which produces four alternative strategies for coping with the food supply chain in determining the right strategy, namely the SO (Strength-Opportunities), ST (Strength-Threats), WO (Weakness-Opportunities), WT (Weakness-Threats) strategy (Table 1) [20].
Table 1. SWOT strategic issues

| Internal | Strength (S): | Weak (W): |
|----------|--------------|-----------|
|          | 1.           | 1.        |
|          | 2.           | 2.        |

| Threat (T): | ST Strategy       | WT Strategy       |
|-------------|-------------------|-------------------|
| 1.          | Use S for avoiding T | Minimize W and avoid T |
| 2.          |                   |                   |

| Opportunity (O): | SO Strategy       | WO Strategy       |
|------------------|-------------------|-------------------|
| 1.               | Use S for make use of O | Overcome W by using O |
| 2.               |                   |                   |

4. Result and Discussion
The results of interviews with farmers and literature studies that have been carried out are used to compile the strengths, weaknesses, opportunities, and threats of the food supply chain. The next step is the preparation of the IFAS matrix as an elaboration of the internal conditions of the food supply chain, which describes the strengths and weaknesses which show the weight and rating of each factor (Table 2) with the results of the strength score in table 2 of 1.44 and the weakness score of 1.17 so that the total internal factor score is 2.61.

Table 2. IFAS matrix for food supply chain

| No | Factors Internal | Weight | Rating | Score |
|----|------------------|--------|--------|-------|
| Strengths |  |  |  |  |
| 1 | Wide distribution area | 0,10 | 3 | 0,30 |
| 2 | Lots of farmland | 0,11 | 4 | 0,44 |
| 3 | The method of selling with technology | 0,10 | 3 | 0,30 |
| 4 | Quality product results | 0,12 | 2 | 0,24 |
| 5 | The role of farmer groups | 0,08 | 2 | 0,16 |
| Subtotal | 0,51 |  |  | 1,44 |
| Weakness |  |  |  |  |
| 1 | Work from home | 0,10 | 2 | 0,20 |
| 2 | Pests in plants | 0,11 | 3 | 0,33 |
| 3 | Farmers by method traditional | 0,10 | 2 | 0,20 |
| 4 | Farmers working hours are limited according to protocol health | 0,08 | 3 | 0,24 |
| 5 | Lower selling price | 0,10 | 2 | 0,20 |
| Subtotal | 0,49 |  |  | 1,17 |
| Total | 1 |  |  | 2,61 |

Table 3. EFAS matrix for food supply chain

| No | Factors External | Weight | Rating | Score |
|----|------------------|--------|--------|-------|
| Opportunities |  |  |  |  |
| 1 | The mapping of locations that have difficulty in marketing food products in agriculture | 0,12 | 4 | 0,48 |
| 2 | Farmers continue to be encouraged to keep producing food with strict health protocols | 0,10 | 2 | 0,20 |
| 3 | There is easy access | 0,11 | 3 | 0,33 |
| 4 | There is convenience transportation for food distribution | 0,09 | 1 | 0,09 |
Steps to formulate the EFAS matrix for mapping the external conditions of the food supply chain through opportunities and threats. This matrix describes the conditions of the food supply chain opportunities and threats faced (Table 3).

The results of the EFAS matrix show the results of the opportunity score in table 3 of 1,30 and the threat of 1,42 to obtain a total score of external factors of 2,72.

After compiling the IFAS and EFAS matrices, then compiling the IE (Internal External) matrix. This matrix is the first step in developing alternative strategies for overcoming disruptions in the food supply chain. The IFAS value of 2,61 is at the average level, namely between 2,00 – 3,00. While the EFAS score is at a moderate level, namely 2,72. The results of the IE (Internal External) matrix compilation show that the food supply chain is in quadrant V, which means the formulation of alternative strategies leads to application strategy growth/stability. Can be seen in Figure 4.

![Figure 4. Food supply chain IE matrix](image_url)

After obtaining a strategy from four perspectives in the SWOT matrix (Table 4), each of the internal and external factors is a sub-criterion. Meanwhile, the results of the strategy formulation in the SWOT matrix are used as an alternative to be selected through pairwise comparison weighting.
5. Conclusion

This research was conducted by using a SWOT analysis to find the right strategy in overcoming disruptions that occur in the food supply chain. This strategy was obtained based on the IFAS-EFAS calculation where through this method it is known that the internal and external factors that affect the food supply chain activities are then derived from these factors. Can be obtained or created a strategy that can deal with existing problems. Based on the research results, it can be seen that the internal factors of strength possessed by the food supply chain are greater than the weaknesses, while from external factors the threats that occur in the food supply chain are greater than the opportunities. So that the right strategy to deal with disruptions that occur in the food supply chain is the ST strategy, namely by using Strength (S) to avoid Threat (T). From the IFAS-EFAS calculation of the food supply chain is in

Table 4. Food supply chain SWOT

| IFAS | Strenghts (S) | Weaknesses (W) |
|------|--------------|----------------|
|      | 1. Wide distribution area | 1. Work From Home |
|      | 2. Lots of farmland | 2. Pests in plants |
|      | 3. The method of selling with technology | 3. Farmers by method traditional |
|      | 4. Quality product results | 4. Farmers working hours are limited according to protocol health |
|      | 5. The role of farmer groups | 5. Lower selling price |

| EFAS | Opportunities (O) | Threats (T) |
|------|-------------------|-------------|
|      | 1. The mapping of locations that have difficulty in marketing food products in agriculture | 1. Lack of supply of food raw materials |
|      | 2. Farmers continue to be encouraged to keep producing food with strict health protocols | 2. Obstructed accessibility and mobility of farmers |
|      | 3. There is easy access | 3. The distribution system is hampered due to the implementation of Large-Scale Social Restrictions (PSBB) |
|      | 4. There is convenient transportation for food distribution | 4. The emergence of new competitors |
|      | 5. The existence of a subsidized shipping service | 5. Increase in commodity prices food |

| Strategy S-O | 1. Make a priority scale for the regions most in a state of food crisis |
|--------------|-----------------------------|
|              | 2. Perform production management |
|              | 3. Creating an online food trading platform |
|              | 4. To distribute foodstuffs evenly to each region |
|              | 5. Conduct distribution with subsidized delivery services |

| Strategy W-O | 1. Creating an effective and appropriate WFH work system |
|--------------|--------------------------------------------------------|
|              | 2. Provide additional supporting facilities for farmers |
|              | 3. Providing education to farmers about the use of technology |
|              | 4. Maximizing every job in every operational hour |
|              | 5. Follow the methods of developed countries with the best agricultural products |

| Strategy S-T | 1. Marketing widely through online sales and maintaining the stability of food commodity prices |
|--------------|--------------------------------------------------|
|              | 2. Creating innovative regulations on the number of farmed lands by providing accessibility and mobility for farmers |
|              | 3. Maintaining product quality and efficient use of food raw materials |
|              | 4. Increase the scale of production and distribution in accordance with the needs of the situation |
|              | 5. Creating a farmer empowerment program |

| Strategy W-T | 1. Pest control with modern methods to increase selling prices through buying and selling online |
|--------------|--------------------------------------------------|
|              | 2. Maximizing communication and smooth information about food raw materials |
|              | 3. Encourage farmers to use technology gradually |
quadrant V which is strategy growth/stability by the total number of IFAS matrices 2,61 and the EFAS matrix 2,72 and from the results of the SWOT analysis the strategy that can be done is by doing online marketing and maintaining the stability of food commodity prices, providing innovative rules regarding agricultural land, maintaining product quality and efficient use, increasing the scale of production and distribution according to needs, and create farmer empowerment programs.

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