Risk Assessment of the Food Supply Distribution Resilience during Covid-19 Pandemic

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Abstract:
Risk analysis in the form of an early warning system aims to determine the level of threat to an ideal condition. This research succeeded in measuring the level of threat that arose during the covid-19 pandemic against food distribution resilience. This research is a qualitative study using in depth interviews, focus group discussion and document studies in collecting data. The analysis technique uses fishbone analysis to identify threat variables and cost-benefit analysis to measure the level of threat. The findings of this study shows that the level of threat to the resilience of food distribution during the covid-19 pandemic has reached 80 meaning that the threat has reached the medium-high risk category based on standard stipulated by Regulation of the State Financial Audit Agency. It is recommended that by knowing the level of threat to the resilience of food distribution, stakeholders can make a proper policy as an anticipatory measure.

Keyword: *food distribution resilience; covid-19 pandemic; early warning system; fishbone analysis.*

INTRODUCTION

Understanding food security or resilience cannot be separated from the law issued by Indonesian government regarding food security. It was stated in the law that Food Security is "a condition for the fulfillment of food for the state up to individuals, which is reflected in the availability of sufficient food, both in quantity and quality, safe, diverse, nutritious, equitable, and affordable and not contrary to religion, belief, and community culture, to be able to live healthy, active and productive sustainably" (Law No.18, 2012)

The Food Law does not only concerning on food security, but also clarifies and strengthens the achievement of food security by realizing food sovereignty with food self-sufficiency and food safety.

The covid-19 pandemic posed a potential threat to the food crisis in Indonesia. The potential threat of the food crisis was conveyed by the government in mid-April 2020. Furthermore, FAO also stated that the covid-19 pandemic could affect global food security as covid-19 has disrupted the availability of labor and supply chains.

Based on this, a risk assessment is needed so that the level of threat to the security of food distribution during the covid-19 pandemic can be identified and detected. Then the results of identification and detection can be used as a basis for public policy as a form of anticipatory efforts to eliminate the impact of threats that arise for the security of food distribution.

Hulnick stated that there is nothing more important in the world of intelligence than providing strategic warnings to policy makers, thus intelligence contributes in preventing potential threats from occurring in the future (Hulnick, 2005). Although in the end the threat persisted, Betts (1978) opine that the intelligence failure was not only inevitable but also very natural. In the perspective of intelligence the aim of prevention is imperative and the intelligence community should not be surprised. In prevention, intelligence certainly thinks about the causal process, so that if a phenomenon or action occurs, intelligence will certainly predict the impact of the event as the symptoms has already known (Grabo, 2010).

The risk assessment evaluated in this study is in the form of an early warning system of threats to the security of food distribution during the covid-19 pandemic period. The early warning system is an effective tool for measuring the level of food security during a pandemic. The elements assessed in the risk assessment of the threat of resilience to food distribution includes transportation infrastructure and transportation of goods, and also

the behavior of distribution actors in controlling prices and market information. This risk assessment can also be used to identify risks and preventive measures of food distribution in a pandemic condition.

Based on the case study conducted by FAO in China, FAO has identified the main problems that deserve attention during the Covid-19 pandemic, the main problem lies in the logistics sector which involves the movement / distribution of food and the impact of the pandemic on the livestock sector due to reduced access to animal feed and reduced capacity of slaughterhouses due to logistical and labor constraints.

Food distribution is part of the food security system which has an important function to support the affordability of food, because it is a link between producers and consumers, and between food production centers and consumer areas. (Risfaheri, 2020). It is concluded that the problem of food distribution can be caused by physical and non-physical factors. The main physical problem is related to transportation infrastructure and goods transportation. Whereas the causes that are non-physical include the behavior of distribution actors who have the power to control food supply which ultimately aims to control prices and limited market information.

Based on the phenomena abovementioned the main research question to be addressed in this study is what is the risk level of threat that arose during the covid-19 pandemic against food distribution resilience and what countermeasures need to be taken to minimize the risk. FAO concluded that the main problems of food security during the covid-19 pandemic, one of which is the logistics sector in the movement / distribution of food as well as the topology of food distribution problems. (Risfaheri, 2020). So the objective of the study tries to measure the level of threat of food distribution resilience during the Covid-19 pandemic. The contribution of the research will be implemented by providing strategies that should be undertaken by the government to eliminate food security threats arising from these problems.

LITERATURE REVIEW

The theoretical basis that this study uses in identifying problems and finding answers to identified problems is based on the topology of food

distribution problems namely physical and nonphysical problems of food distribution. (Risfaheri, 2020)

An efficient food distribution mechanism is one of the objectives to be achieved in the development of food security. One indicator that food distribution has run as expected is food accessibility and availability of food in the right amount and on time in every place in accordance with the pattern of community needs.
In order to achieve accessibility, the right amount and on time, physical problems play an important role. The main challenge in the physical problem of food distribution is related to transportation facilities and infrastructure as well as the transportation of goods.

Food distribution is the activity of channeling food from point of production (producer farmers) to point of consumption (final consumers). Distribution does not only concern the distribution of food in the country but also concerns international trade in a properly integrated price system. The current condition of land and inter-island distribution facilities and infrastructure needed to reach all consumer areas is currently inadequate, so that remote areas still experience limited food supply at certain times, moreover in areas that experience PSBB, local quarantine and self isolation. This situation will hamper people's accessibility to food, both physically, but also economically, because the scarcity of supply will trigger price increases and reduce people's purchasing power.

Related to the achievement of physical food distribution targets that can be achieved with variable facilities, infrastructure and transportation of goods, then in the condition of the pandemic co-19 the challenges faced by the government in creating food security are increasing. This is because the covid-19 pandemic has limited accessibility to movement of food needs from point of production to point of consumption.

The restrictive policies adopted by the regional and central government to limit the spread of the covid-19 pandemic, such as the people movements restriction policy, local quarantine, self isolation and social distancing have become counterproductive to the ideal achievement of physical food distribution. Distribution of food that people want to get in a timely and appropriate amount is not reached to the

maximum.

The government has identified that the national food distribution system is in a poor position. Many basic needs distribution chains are incorrect (not in accordance with normative conditions).

The poor quality of food distribution in Indonesia can be seen from the wide disparity between commodity prices at the point of production and point of consumption levels. Commodity prices valued at Rp.5.000 at the farm level can jump to Rp. 15.000 when it reaches the consumer level.

Based on the literature review method conducted on several libraries, this study has succeeded in identifying non physical problem/issues of food distribution which are stock 'collusion' which is the motivations of the improper behavior of distribution actors in controlling the market price of foodstuffs in addition to gaining profit from price margins and secondly is the incorrect information which motivation is to manipulate food imports. From a number of forms of import fraud carried out, this study succeeded in narrowing them down to a form related to the Covid 19 pandemic, namely falsification of food demand data.

Manipulation of food demand data is a condition created by distribution actors that aim to create the impression that domestic food shortages are lacking. The following are some examples of cases that have occurred. The case occurred with the aim of manipulating salt absorption data in the Province of East Java (East Java) in 2012. During this time East Java is able to produce salt with a large capacity and is able to meet the needs because it gets supplies from Madura Island as the largest salt producer. Data are made as if salt is absorbed by all in the community, so that it is used as a basis for importing salt to meet national market needs. Even though thousands of tons of salt accumulate in the warehouse.

Another manipulation of food demand data is manipulating per capita rice consumption per year. The magnitude of Indonesia's rice imports, especially since 2002, was allegedly due to manipulation of national rice consumption data by the mark-up of rice consumption so that it became a justification for the government to grant import licenses. Based on the National Socio-Economic Survey, which is used as a reference, the average annual consumption of Indonesian rice per capita is 133.484 kilograms. Yet according to research conducted by HKTI (Indonesia's Farmer Association), consumption of rice per capita is only 110 kilograms per capita per year. Thus, national rice consumption per year reaches 23.1 million tons. When added to the needs of industry, seeds, food reserves and shrinking or scattered rice, the total reaches 29.1 million tons per year.

Referring to the above facts, of course, it is necessary to improve the methodology of calculating production and food availability. So far, Indonesia is still referring to data from the Central Statistics Bureau (BPS). In 2012 BPS released an estimated rice production of 68 tons of dry unhusked rice, equivalent to 39 million tons of rice. Assuming consumption of 139.15 kilograms per capita per year, total consumption of 237.6 million people should be 33 million tons. If the food production data calculation is correct, Indonesia should have a surplus of 6 million tons of rice, so the government does not need to import rice. But the fact is Indonesia actually imports rice in large quantities. Such a method of calculating food needs, ironically, also occurs in almost all commodities such as corn, soybeans, and sugar. Based on these facts, Indonesia's food availability and needs database is still weak, and as the data is used as a basis for making programs, the implementation level can be declared less successful.

In terms of non-physical issues related to limited information. The government has identified problems with food distribution stemming from the lack of sources of information regarding the prices of food commodities that should be easily accessible by the public, both from farmers, traders to consumers.

The government propose to make mobile applications that provide various types of complete information on the development of food commodity prices which is actually not difficult. The development of a database can provide accurate recommendations on the right balance point between the level of food prices, the availability and quotas of import requirements to meet supply shortages.

The information component required by the final consumer as the point of consumption of the farmer as the point of production consists of three components of information, namely information

related to price levels, supply quantities and supply and demand figures.

From the distribution chain, the information chain between farmers as a point of production and final consumers as a point of consumption can be identified and separated by food businesses. Currently, farmers and consumers do not know the ideal market price created by nature by the dynamics of supply (demand) and demand (supply), which they know is only the market price of supply and demand by design which has been conditioned by information holders, namely food businesses.

In a perfectly competitive market, the price level is formed from a balance (equilibrium point) between supply (supply) and demand (demand). However, the real condition of food prices in Indonesia is not solely influenced by the supply-demand balance mechanism, but is also influenced by the distribution chain of food commodities. One factor that has a big influence on the efficiency of the distribution chain is the performance of each distribution actor. Currently, farmers as food producers face a market that leads to oligosopnism (many sellers-few buyers), so that the position of middleman (big traders) is much stronger than farmers and retailers. In trade between regions, the biggest role also occurs in large traders. This condition causes a party in the food distribution chain that has the power to determine the price (price maker), among others, because it has the power to control large quantities of stock.

In the condition of inefficient distribution chains, parties acting as price makers will be very easy to influence food prices, among others, by holding back the circulation of food stocks under their control. This is what motivates business people to create asymmetric conditions of information for farmers and consumers in order to obtain high profits.

If the farmer as the point of production with the end consumer as the point of consumption has information related to the price level, supply and information related to supply and demand both at the point of production and point of consumption level, then the middleman is less likely to become a price maker. Because all food distribution chains have symmetrical information so they can determine their bargaining position.

Figure 1. Fishbone Analysis Variable Threats of Food Distribution Security
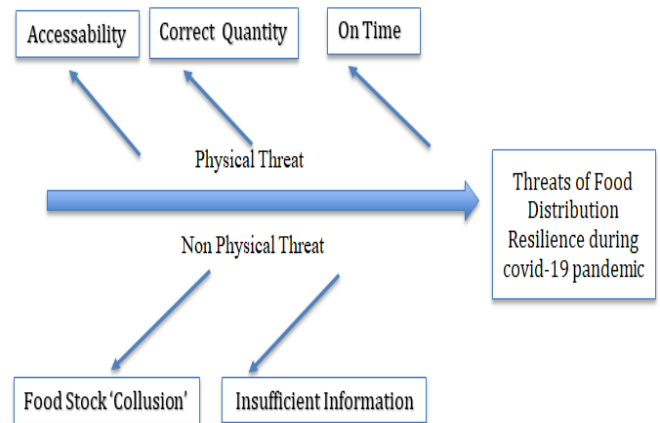
Theoretically, risk is defined as the likelihood of an event that can cause significant losses and hinder the achievement of organizational goals (State Development Audit Agency, 2014). In addition, risk is the effect of uncertain organizational goals that cannot be avoided, depending on organizational characteristics (Hardy et al, 2015). In terms of the definition of an early warning system, Chintya Grabo (2010) in his book entitled Handbook of Warning Intelligence provides a definition of early warning in four interrelated understandings, namely a complete research effort; Assessment of various probabilities; Rating for policy makers; Confidence that results in action. But, relating to an early warning given by intelligence is a success but on the other hand an early warning will be considered a failure if there is no good and right response to the warning.

METHODOLOGY

Data for quantitative and qualitative descriptive research was obtained through literature reviews, observations, surveys of final customer satisfaction as a point of consumption and in-depth interviews. First, the literature review consists of laws and regulations on food security, food distribution during the pandemic and studies and newspaper/magazine articles related to food security. Besides data from result of the test, the documentation is needed to help the researcher run the research. According to Arikunto (2014) stated that the documentation method is used to look for the data concerning matters or the variable that took the form of the note, transcript, book, newspaper, magazine, inscription, notes of a meeting, agenda, etc. Second, the observation includes direct observation /

participatory observation in which the author observes the distribution of food, the availability of food supply and information related to prices, the amount of supply and the level of supply-demand. Finally, in-depth interviews were conducted with a sample of individuals, including public officials, researchers and academics who have capabilities in food distribution. (Gilham, 2000)

As stated previously, fishbone analysis and cost-benefit analysis are carried out to analyze risk, whereas Government Regulation on Audit is used as a guideline. Watson (2004) describes fishbone is a cause-and-effect diagrams as analytical tools to provide a systematic way to examine causes that create / contribute to impacts, while Ciocoiu (2008) states that such diagrams can show the distribution of specific causes and sub-causes, which can be resolved through qualitative and quantitative approaches. In addition, cost-benefit analysis can be used to examine risk ratings and risk level categories. This is in line with Government Regulation No. 60/2008, which states that a cost-benefit analysis must be used to identify organizational risks by considering the costs incurred and the benefits received.

This study uses the Code of State Financial Audit Agency (SFAA) related to the mechanism of making risk criteria. The risk of an event of less than 20% is classified as low risk; Risks between 20% and 40% are classified as small risks; Risks of between 40% and 60% are classified as moderate risk; Risks between 60% to 80% are classified into moderate-high and high risks between 80% to 100%. The impact, depending on the level of risk, can have a significant effect on achieving food distribution resilience. Thus, identifying risks is very important for the long-term success of a food security during the covid-19 pandemic. The identification was carried out through various means such as qualitative and quantitative ranking activities, expert interviews, food security expert Focus Group Discussions and strategic analyst discussions. The following are the results that were successfully compiled in this study.

Table 1. Likelihood Criteria (Hazard) Risk of Food Distribution Resilience during the Covid-19 Pandemic Period

No	Possibility (Hazard) Risk	Risk Level	Weighting
1	Low	20%	1
2	Small	20%-40%	2
3	Moderate	40%-60%	3
4	Modertae-High	60%-80%	4
5	High	80%-100%	5

Risks weighting/ exposure are based on the interviews of the In depth Interview and Focus Group Discussion conducted by researchers to determine the risk weight for each independent variable of the threat of food distribution resilience during the covid-19 pandemic period. Weighting with likert scale is related to the magnitude of the impact weight (Exposure) and likelihood weight (Hazard) resulting from each independent variable threat to food distribution resilience during pandemic period of covid-19.

Accessibility ranks first with regard to the magnitude of the impact given to the resilience of food distribution during the covid-19 pandemic. This is due to the large-scale social restrictions (PSBB) policy adopted by the government. Accessibility's target achievement consisting of facilities, infrastructure and transportation of goods experienced the biggest obstacles during the covid-19 pandemic. Facilities and infrastructure of the final consumer as a point of consumption experiences obstacles in conducting transactions with the middle man as a business person in the food distribution chain. End consumers have experienced transportation facilities and infrastructure difficulties in order to reach food retailers. In addition, many shopping centers and traditional markets have been forced to close because the policies of the central and regional governments are another facility and infrastructure constraint that adds to the magnitude of the impact of accessibility on food needs during the covid-19 pandemic.

The transportation of food goods needs experienced similar disruptions to what has been experienced by the infrastructure and distribution of food needs. The transportation of food needs from the point of production to the middle man and finally to the end consumer, has been disrupted by policies that are

limiting the distribution of basic needs. As for the possibility of such threats to occur, SFAA categorise high with a weight of 5.

Secondly, the stock 'collusion' of basic foodstuffs as variables that had a threatening effect on food distribution resilience during the covid-19 pandemic. This is based on the time series analysis done so far which shows that during the pandemic and feast days, middle men will take the opportunity to obtain large profits by holding stock of food items to increase the profit margins obtained (SFAA, 2020). In addition, the phenomenon of state actors who take advantage by holding back the distribution of food needs to increase import quotas is also predicted to occur. For the level of possibility of occurrence, State Financial Audit Agency (SFAA (2011) categorize it high with risk level of 4.

Timely and information (price, supply level, total supply-demand) is ranked 3 and 4 respectively in the order of the magnitude of the impact (exposure) of the threat variable to the distribution security in the pandemic covid-19 period. According to SFAA analysis, both have an impact weight (Exposure) of 4. This is because both of these variables does not directly interfere with the ideal achievement of existing food security and the disruption created is minor. While the possibility of such threats to occur,

SFAA (2011) categorizes them at medium-high levels with a weight of 4 and finally the right amount with medium category and weighted as 3(three).

Table 2. Weighting of Threat of Food Distribution Resilience

No	Methods	Variables	Exposure	Weighting
1	Interviews	Accessability	Disaster	5
2		Stocks ' Collusion'	Significant	4
3		On Time	Significant	4
4		Information	Significant	4
5		Accuracy of Quantity	Medium	3
6	Focus Group Discussion	Accessability	Disaster	5
7		Stocks 'Collusion'	Significant	4
8		On Time	Medium	3
9		Accuracy Quantity	Significant	4
10		Information	Significant	3

Results

Results of Analysis of the Coefficient Threat of Food Distribution Resilience is presented in table 4 below,

Table 3. Analysis of Coefficient of during covid-19 pandemic.

No.	Type of Treath	Kinds of Threath	Possibility (Hazard)	Impact (Exposure)	Total
1	Physical	Accessibility	5	5	10
2		Accuracy of Quantity of goods	3	3	6
3		Accuracy of Time (On time or not)	4	4	8
4	Non Physical	Stocks Cartle	5	4	9
5		Information	4	3	7
6		Total value of threat: 40/50 = 80	21	19	40

The results of a risk analysis of the threat level of food distribution resilience during the covid-19 pandemic can be seen in table 4 containing a recapitulation of the likelihood and exposure impacts of the threat variables to the resistance of food distribution during the pandemic. The total risk that was successfully calculated was 80. The figure was obtained from the sub-total number of possibilities for each threat variable to occur plus the sub-total impact arising from the threat variable,

then the total sum of the two subtotals divided by the maximum risk that might occur. Sub-total likelihood (Hazard) of threats is 21 and sub-total impact (exposure) of the threat variable to food distribution resilience is 16, whereas the total threat to food distribution resilience is 50. With this figure, the total value of threats to food distribution resilience is obtained. During the pandemic covid-19 period the total is (21 + 19) / 5 which is equal to 80. This number is categorize in the Medium-High level.

CONCLUSION

This research is intended to determine the level of threat faced by food distribution during the covid-19 pandemic by conducting qualitative study to an ideal condition. It is concluded that the level of threat is 80 which is categorized as medium-high. Therefore, the threat of food distribution security or resilience require government's urgent response and attention. It is recommended that stakeholders should develop a strategic policy as an anticipatory measure to eliminate threats to food distribution resilience during the covid-19 pandemic such as to overcome the limited information (price levels, supply quantities and supply and demand figures) by making mobile applications to ensure the right balance point between the level of food prices, the availability and quotas of import requirements to meet supply shortages.

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