



Food Cold Chain in Indonesia during the Covid-19 Pandemic: A Current Situation and Mitigation

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Abstract

The spread of the corona virus (COVID-19) has had a massive impact on all business sectors in Indonesia. Food cold supply chain is a business sector that is quite badly affected. This is because the food cold chain requires special treatment to maintain its quality, has a relatively short life and cannot be returned. This article discusses the impact of the COVID-19 pandemic and its social impacts such as social restrictions and area lockdown on the business of food cold chain. It also discusses mitigation that needs to be done to anticipate related issues such as food supply-demand, food safety and some transportation challenges.

Keywords: COVID-19, food cold chain, food safety, supply-demand

Abstrak

Penyebaran virus Corona (COVID-19) telah berdampak besar pada semua sektor bisnis di Indonesia. Rantai pasokan dingin makanan adalah sektor bisnis yang sangat terpengaruh. Ini karena rantai dingin makanan memerlukan perawatan khusus untuk mempertahankan kualitasnya dan memiliki umur yang relatif singkat dan tidak dapat dikembalikan. Artikel ini membahas dampak pandemi COVID-19 dan dampak sosialnya seperti pembatasan sosial dan penutupan area pada bisnis rantai dingin makanan. Juga dibahas mitigasi yang perlu dilakukan untuk mengantisipasi masalah terkait seperti permintaan-penawaran, keamanan pangan, dan tantangan transportasi.

Kata kunci: COVID-19, keamanan pangan, permintaan-penawaran, rantai dingin makanan

Introduction

Cold chain applications require the availability of several special facilities, both in the storage and distribution processes. In the storage process, it is necessary to have cold and freezing storage machines; while in the distribution process it requires a refrigerated transport fleet (carriers, airplanes and vehicles). As elsewhere, the cold chain business in Indonesia is a major supporter of various industrial sectors such as the food processing industry, the fishing industry, retail networks, the pharmaceutical industry and meat industry (Capricorn Indonesia Consult, 2019). Indonesia has a huge potential market for cold chain businesses. This is supported by a huge user and consumer industry sector, which shows a

significant increase every year. The industrial sectors of users such as livestock, fisheries, processed food and chemicals, the pharmaceutical industry and medicine are important keys to development in Indonesia. This can be seen from its contribution to Indonesia's gross domestic product (GDP) during 2018. Based on information from the Indonesian Central Statistics Agency (BPS, 2018), in that year, the livestock sector GDP contributed 5.4% or US\$ 15.4 billion of Indonesia's total GDP of US\$ 321.8 billion, the fisheries sector contributed 2.6% of total GDP, the food and beverage industry contributed 6, 2% and the chemical, pharmaceutical and drug sectors account for 1.6% of Indonesia's total GDP.

The food cold chain commodities can be classified into two categories based on the source of supply and the products derivatives. For the source of supply category, Tobing (2015) divided food cold chains into five sources such as water based for beverages, grains and paddy, dairy, animal protein and fruit and vegetables sources (see Figure 1).

The majority of cold chain food derivative products from each source of supplies are products that are perishable, fragile and have a short product life. So that the process of production, distribution and storage requires special treatment such as refrigeration, specific packaging and strict quality controls. Some processes require cooling machines below 18 degrees Celsius for products such as meat, cheese, seafood and milk so that the age of the product is longer and slows the process of reducing the quality of food. Other products such as fruit and vegetables require supermarkets to maintain room temperature cool enough and to spray water keeping the freshness and quality of the product.

Since the spread of COVID-19 in Indonesia in March 2020 with all the chain effects ranging from social restrictions, lockdowns and closing of several links in supply chains such as ports, airports and terminals have changed the logistics movement of all products including cold chain products. The impact of the COVID-19 pandemic on food cold chains occurs along the supply chain of cold chain products from

upstream to downstream. The pandemic has changed the way of treatments dealing with food cold chain from the source of supply, the storages, distribution and transportation and the way in serving consumers. This article discusses the impact of COVID-19 Pandemic on the cold chain food business process in Indonesia that have not been much paid by considering several current issues such as supply-demand issue, food safety and food transportation challenges and mitigations.

Methodology

Cold-Food Supply-Demand Issues

The development of the cold chain business in Indonesia, which is predicted to be a prospect in the coming years, has changed dramatically since the pandemic of COVID-19. Business sectors supporting cold chain in Indonesia, from storage to distribution sectors, experienced a large decrease due to lockdown policies and large-scale area restrictions that have been issued by the Indonesian government since the COVID-19 outbreak. For example, 3 months after the first announcement of the COVID-19 victims, logistics companies has experienced more than 50% decline in overall business performance (Eisya, 2020). As an instant result of the COVID-19 pandemic, there would be the decline in economic growth in 2020 to 2.3 percent, lower than the 2020 state budget target of 5.3 percent.

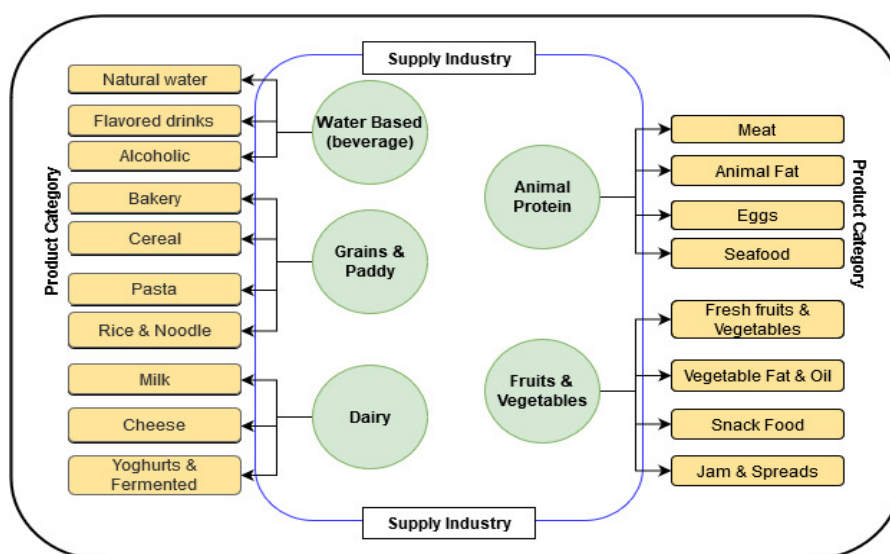


Figure 1. Food cold chain source and derivatives
Modified from Tobing (2015)

Consequently, the cold chain business and supporting business sectors in Indonesia will also be affected. For instance, disruptions or shocks occurred along the supply value chain, mainly disruptions in material supply, scarcity of material stock, and overstock (some finished goods) because of the low demand. A previous study indicates that high or low inventory could be the respond of shock demand (Kesavan, Kushwaha, & Gaur, 2016). Supply-demand is the most important element of business processes of the plan, source, make and delivery in the basic principles of supply chain management (Chae, 2009; Trkman, McCormack, De Oliveira, & Ladeira, 2010). The interruption of demand aspects in the supply chain will have a negative impact on all stakeholders that exist along the supply chain channel. This happens because in the supply chain, all stakeholders in the chains are integrative and collaborative (Li & Chan, 2012; Simatupang & Sridharan, 2005).

In the cold food chain perspective, the weakened demand of food chain product would impact significantly on the matters of storage. A study by Hobbs (2020) shows that supply and demand shocks caused by large-scale restrictions between local areas have impacted significantly on the movement of the products along the chains. During COVID-19, for example, on the sector of supply for frozen commodities, cold storage in a number of locations throughout Indonesia also experienced excess capacity (over capacity) for

some frozen commodities such as seafood, chicken, fresh fruits and vegetables (Capricorn Indonesia Consult, 2019). This is due to the decrease in consumer purchasing ability which has an impact on the decline in selling prices for cold chain commodities. Low demand on the level of customer consumption of food chain products causes the storages (on the store cold-shelves and on the warehouse and manufacturer's cold storage) store excessively because of low turnover. This will result in two things in cold food chains such as decreasing quality of cold chain products and increasing storage costs. Cold chain food is one product that needs special treatment because some of them are easily damaged (agile) and has a short shelf life (Tsironi, Giannoglou, Platakou, & Taoukis, 2015). The quality of food cold chain would decrease by time in a shorter period than other commercial products. Consequently, the value of cold chain food would also decrease which is in the end of the day reducing the profit or even losing the money of the food. According to King & Venturini (2005), there are 3 key elements of a high-quality food supply chain: information, financial and products flows (see Figure 2).

As shown in Figure 2, financial and product flows are two pairs of sides of a coin that are interconnected so that if aspects of product flow are blocked because of weakening demand, it will affect proportionally with the flow of money that flows otherwise.

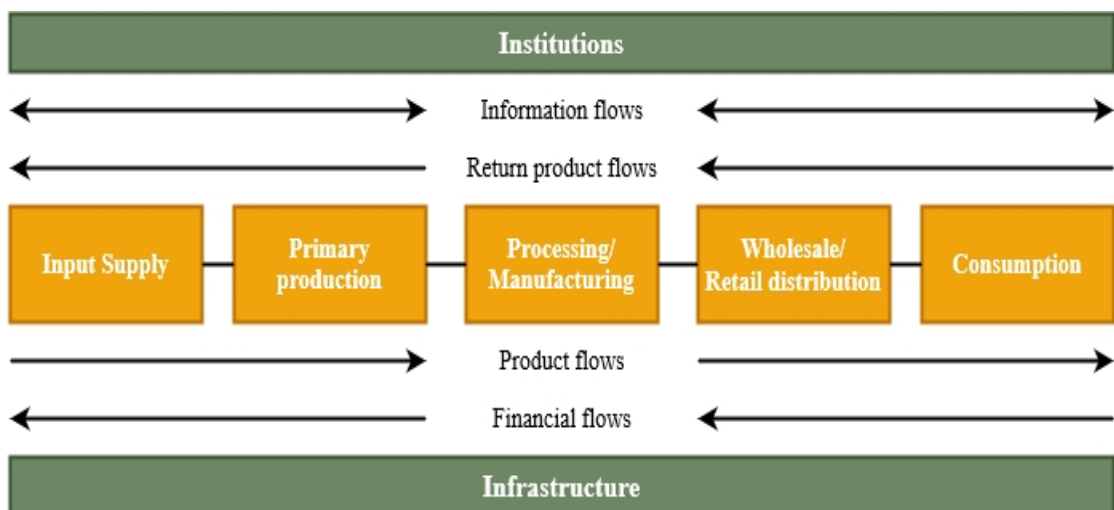


Figure 2. Key elements of a high-quality food supply chain
Modified from King & Venturini (2005)

Another issue due to a weak demand caused by the COVID-19 pandemic in the food cold supply chain is the high rate of return of food cold chain products. Because of the characteristics of food that cannot be recycled, cold food products returned from downstream to upper stream chains will become discarded food (food loss). This food loss will worsen the condition of food shortages and make food cold on store shelves will be drastically reduced during the COVID-19 pandemic. As reported by Tobing (2015), in the normal condition, the food loss rate in some countries reaches 20-60 percent of total cold and fresh food due to lack of storage, transportation, handling activities. As a consequence, the price of food cold and fresh chain products would increase and the number of people who struggle to buy food would also increase.

The issues of food security due to a weakened demand would be significant to help people during the COVID-19 pandemic. Galanakis (2020) believes that the food supply chain must continue to run with a new supply chain strategy in the condition of Pandemic COVID-19 to ensure the availability of food at the downstream level. To reduce barriers and costs incurred along the supply chain of cold chain products, long cold chain supply chains must be simplified and shortened. This supply chain strategy has been applied by several large companies to speed up the delivery process to consumers and reduce the risk of disruption in the supply chain (Aguglia, De Santis, & Salvioni, 2009; Yang, Qi, & Li, 2015). The idea to bring the producers or even the farmers closer to the consumption level would be beneficial to reduce the risk and disruption, minimize the food loss and waste during the COVID-19 pandemic in Indonesia for food cold chain products. It is also beneficial for the consumers to have the food cold chain product in a fresher and cheaper. The new food cold supply chain strategy would work better if facilitated by a well information technology platform to connect the food cold chain's stakeholders. The adoption of 4.0 technology such as information and communication technologies (ICT), online applications, internet of things (IoT), big data and artificial intelligence could be applied to improve the connectivity between producers and consumers.

Food Chain Safety Issues

Food safety is the condition and effort needed to prevent food from possible biological, chemical and other contaminants that can interfere with, harm and endanger human health (Ziska et al., 2016). The increasing number of positive cases of COVID-19 has an impact on all areas, one of which is the safety issues of the food cold supply chain. For food safety issues in Indonesia, it is very important for the cold chain food industry to strengthen personal hygiene measures and provide training on food hygiene principles to eliminate or reduce the risk of food surfaces and food packaging materials contaminated with viruses from food workers. Workers in the packaging processes of food manufacturing and food transfers from manufacturers to distributors or customers are the cold supply chain businesses should be trained periodically. A study by Acikel et al. (2008) indicates that the knowledge level on food and personal hygiene before and after being given training differ significantly, more than 15 percent of 100 respondents. Therefore, periodic training for staff along the food cold supply chain on food hygiene principle is suggested to reduce the spread the COVID-19 virus through the supply chain. The food safety module standard from WHO (2020) could be applied for Indonesian food cold chain businesses.

Other food cold chain safety issue for food cold chain personnel is related with food chain Personal protective equipment (PPE), such as masks and gloves, can be the effective equipment to reduce the spread of viruses and diseases in the food cold chain industry. The movement from one point to another in logistics activities raises a significant risk of the spread of the virus in the food cold chain packaging of the product. The use of PPE could stop the spread of the COVID19 virus from customers to logistics staff and vice versa or through intermediaries from food cold chain products. The effectiveness of the PPE use to reduce the spread of the virus has been studied by Cowling, Zhou, Ip, Leung, & Aiello (2010) who found that face mask could prevent the transmission of the influenza virus. Thus, it is highly recommended for the logistics personnel from the upper and downstream level of the food cold supply chain to use appropriate PPE.

In addition, the cold chain food industry is strongly recommended to introduce physical measures and strict hygiene and sanitation. This recommendation is suitable to be applied in the manufacturer process of cold food chain products that require a lot of employees. The process of producing cold food chain products must comply with strict physical distancing to avoid virus transmission.

Cold Chain Transportation Challenges

During the COVID-19 pandemic, food cold chain transportation sector in Indonesia faces a great challenge to maintain the transfer of cold chain commodities along the supply chain. The transfer of cold chain commodities along the supply chain in the highest standards of hygiene and protecting the drivers/staff from the infection risk by supplying hand sanitizer/alcohol all the time, and sanitation protocols is recommended. The use of reusable containers or package for food cold chain products should be avoided to avoid the transmission of the virus. A study by Sinclair, Fahnestock, Linda, & Perry (2018) shows that reusable container or shopping bags to package a product could be the attribute of the virus transmission. Moreover, Saulo (2012) suggested that reusable packages such as plastic bag or shopping bag must be washed before reusing it.

In the food cold chain product transportation, package is essential to keep the product in cold and fresh. Due to the use of reusable packages in food cold chain transfers would be at risk of transmitting viruses while spraying it with alcohol will endanger the quality of food, the use of disposable packages can be an alternative solution that can be applied during the COVID-19 pandemic. According to World Health Organization (2020), it is highly recommended for drivers who transfer items from one to other points to always use hand sanitizer and disposable containers and packaging before passing delivery to avoid the need of cleaning of any returns. It is a fact that there are many outbreaks of viral infections attributed to the contaminated foods like vegetables, fish product, soft fruit and other food cold chain products due to the food stuffs. The food stuffs such as infected handlers, containers, package or even waters (Rzeżutka & Cook, 2004).

Moreover, protecting clothes for transportation staff when moving cold chain commodities such as gloves and face protectors are required to guarantee the cold chain products are not contaminated. A study by Seymour & Appleton (2001) revealed that food cold chain commodities such as fresh vegetables and processed fruits could be contaminated when handled by infected persons. This is most likely to occur in the process of shipping products from consumers to delivery staff or vice versa. Finally, physical distancing in the cold chain transportation sectors should be implemented by maintaining the distance between the drivers and customers when picking up and delivering the cold chain commodities. Richards (2001) suggested that the strategy for industrial system should be intervened to enhance product safety in transportation processes including to educate transportation workers to minimize the interactions among others in order to avoid the enteric viruses in foods.

Results and Discussions

Globally, the COVID-19 outbreaks have serious implications on socio-economic aspects including in food chain industry. All industry sectors, service and manufacturing, have been shut down to anticipate the transmission of the corona virus during the pandemic. However, most government around the world mandate some essential and important industrial sectors remained open during the pandemic such as food processing industry, public or private health sectors, dairy producers and energy sectors. Therefore, good risk management is needed for supply chain security during the COVID-19 pandemic. According to the State Cyber and Intelligence Agency (2020), the most important strategic stage and related to the company's operational processes and supply chain security risk management to minimize the impact of the COVID-19 pandemic on the business continuity process is the preparation and planning stage. This stage includes:

1. Identify critical business processes or systems for each organization that will continue to carry out operational activities through WFH (work from home).
2. Identification of business processes that are difficult / excluded to be carried out in a

WFH that requires physical access directly to the system.

3. Assign the person in charge of each critical business process or system, and then assign the team and their duties and responsibilities, such as the person responsible for the information security of a company's services.
4. Making rules related to the operational mechanism of the service. This includes employee work hours, defining the role of access, and information security policies.
5. Train workers to carry out formal rules set.
6. Identification of essential functions and suppliers that support the business process or service. This identification is carried out by monitoring the safety of essential functions and ensuring that the continuity of the supply chain of those essential functions is viable.
7. Conduct ongoing assessment of service readiness in dealing with changes in business processes and the impact of environmental changes.
8. Designing work scenarios for remote workers. Work scenario development needs to be done to sort out and anticipate the worst conditions of lockdown.
9. Always monitor all policies, both from the central and regional governments, to the COVID-19 handling efforts, so that companies can make adaptations and anticipatory steps to business processes quickly and accurately.

In the pandemic situation such as this, collaboration of all parties in the food cold supply chain is needed, not only the main actors, but the role of supporting actors is needed and must be done. Changes or actions taken by one member of the supply chain will have an impact on other members of the supply chain. By knowing the relationships between these parties and processes, it can be identified and find the best solution to the current state or condition. Identification of changes that occur during the COVID-19 pandemic allows the discovery of changes in the factors that influence the implementation of the cold supply chain so that it must be considered by the stakeholders involved in it. By knowing the determinants that change, cold supply chain stakeholders could adapt well and expected to be able to make the right decision later.

Appropriate decision making can lead to successful implementation of the cold supply chain even in the middle of the COVID-19 pandemic.

Conclusion

The successful implementation of the COVID-19 pandemic protocols in Indonesian cold supply chain could prevent Indonesia from a food crisis and economic crisis in several sectors during the COVID-19 pandemic. This is because of most the distribution activities, especially in the fields of industry, producer goods, and wholesale trade, were still hampered. In addition, foodstuffs in the cold supply chain have accumulated due to customers who do not buy the food and the difficulty of distributing their foods during the pandemic, so that the decline of producers' income could not be avoided. The supply-demand shock during the pandemic due to large-scale restrictions of the country also impact on the movement of the food products along the chains. Food transportation and food safety issues would be also the challenges rise during the COVID-19 outbreaks.

It is important to describe the current situation faced by stakeholders of the food cold supply chain and provide solutions to the phenomenon of significant changes in the implementation of the cold supply chain, especially in Indonesia during the COVID-19 pandemic, so that appropriate decisions could be taken by the stakeholders involved.

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