

Supply chain disruption in time of crisis: a case of the Indonesian retail sector

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Abstract

Purpose – This study investigated factors in the retail supply chains that were disrupted by the flow of the product distribution process from suppliers to retail stores and finally to consumers during the COVID-19 pandemic.

Design/methodology/approach – This qualitative study involved 12 key informants from two manufacturing industries and three retail industries in Indonesia. Meanwhile, the analysis of empirical conditions employed qualitative content analysis to discover facts of the inbound and outbound supplies in retail supply chains.

Findings – This study revealed high demands for certain products and a shift in consumer purchase trends during the pandemic screwed merchandising planning in retail stores. These conditions have brought continuous impacts on the production processes of manufacturing industries that also faced constrained raw material supplies. Container shortage in the global supply chain has increasingly aggravated the crisis of retail supply chains. 10;

Practical implications – Retailers and all related parties are ready to anticipate the changing of the supply chain by preparing strategies to overcome the crisis.

Originality/value – A contribution is made to the global retail supply chain in times of crisis and can serve as a framework for further research in each region.

Keywords Global supply chain, Retail supply chain, Inbound supply, Outbound supply, Disruption, Crisis
Paper type Research paper

Introduction

The retail business, one of the oldest forms of business, has accompanied the history of human civilization. Transactions in selling products through retail stores support manufacturers in marketing their products to the public. Vice versa, the existence of retail stores helps people to get the products needed. It is inseparable from the role of retail stores that are being directly and closest to the end consumer. Considering the importance of retail stores in a trading process, their existence is very important to keep maintained. Unfortunately, the retail business is very vulnerable and full of risks. The theft of physical items, digital fraud, uncontrolled inventory management, poor administration and reputation loss are the crucial problems in a retail operation that are possible to make the business collapse. The inaccuracy of product assortment with consumers' characteristics is also another risk that retailers need to be aware of. Although consumer behavior is very dynamic

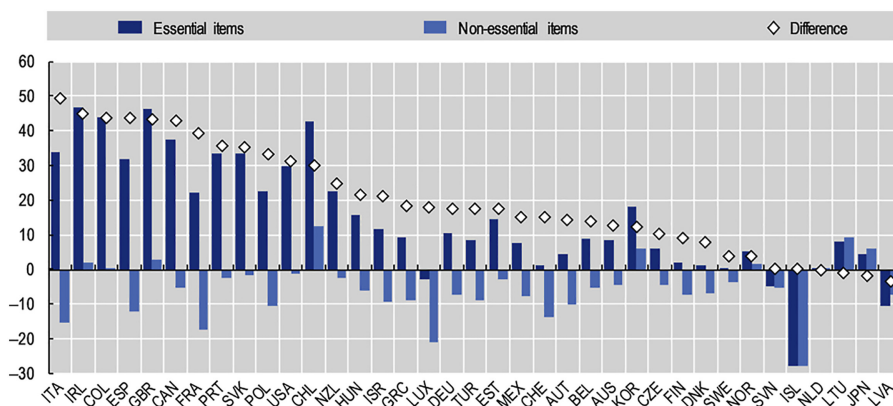


and unpredictable, the products must not only be available in sufficient quantities but also must be appropriate.

Related to product availability, the retail business depends on product supplies from the manufacturing industry through distributors who distribute the products from a central warehouse to the shops and consumers. Sparks (2010) believes that a product distribution flow as an integrated supply chain system determines retail business sustainability. Retail supply chains deal with the accuracy of the number of delivered products and the speed and smoothness of product distribution from one point to another (Ayers and Odegaard, 2008;) Randall *et al.*, 2011). Constraints occurring in one point will interfere with activities in the next point; such a condition can lead to a shortage in retail stores. Moreover, the product scarcity in retail stores will interfere with the balance between supply and demand (Ardal, 2017; Bell *et al.*, 2013; Parker, 2011). The impacts of this condition include consumer panic buying, illogical increases in selling price, the presence of various counterfeit products with low quality, longer waiting time and other negative impacts (Eva *et al.*, 2020; Hall *et al.*, 2021; Prentice *et al.*, 2020; Wijaya, 2020).

The COVID-19 pandemic that appeared at the end of 2019 has created a crisis for the retail business (Roggeveen and Sethuraman, 2020), furthermore, after WHO declared the COVID-19 as the global pandemic on March 11th, 2020. For some retailers, the crisis is caused by the drastic decrease in sales level although the product is available at their stores. Mehta *et al.* (2020) discover that such a condition more commonly occurs in retailers selling non-daily needs or complementary products that are not consumers' purchases priority during the pandemic, as found by Pantano *et al.* (2020). These problems are presented in Figure 1. The Organization for Economic Cooperation and Development records that the essential items have grown by nearly 50%; conversely, non-essential items have been reduced by almost 30% compared to before the pandemic in several countries (OECD, 2020).

The out-of-home activities restriction leads to consumers' drastically declining visits to physical retail stores (Brandtner *et al.*, 2021; Deloitte, 2020; Mehta *et al.*, 2020; Roggeveen and Sethuraman, 2020). Retail stores selling fast-moving consumer goods generally still have high consumer demands, but their obstacle is insufficient product availability. Pantano *et al.* (2020) predict that both physical retail stores and online stores have experienced obstructed product supplies from suppliers through their distributors. Ideally, the product availability in retail stores is beneficial to avoid social conflicts and maintain the stability of society's basic needs due to panic buying (Sparks, 2010). Disruption of retail supply chains during the crisis



Source(s): OECD, 2020

Figure 1. Change in demand for essential versus non-essential retail goods, April 2019–April 2020

is necessarily studied to reveal factors of disruption and formulate the most effective strategy as a solution.

By considering the importance of smooth distribution systems of retail supply chains, this study conducted an empirical investigation on the conditions during the crisis due to the COVID-19 pandemic. The primary data of this qualitative research were collected through interviews and observations. Valuable information was collected from retailers, including manufacturing industry practitioners who supplied their products to retail stores. Moreover, the information was collected from theories and secondary data. This study analyzed two flows of retail supply chains: a flow from suppliers to retail stores (inbound supply) and a flow from retail stores to consumers (outbound supply).

The unexpected drastic changes that occurred during the pandemic are novel experiences for everyone living in the modern industrial era. It is critical to comprehend these changes so that all parties, particularly manufacturers and retailers, can prepare for the worst-case scenario. This empirical study of cases involving Indonesian retailers and manufacturers might be a useful reference for anyone working in supply chain management. In short, the findings of this study are novelties since they compare factual conditions to existing theories.

Literature review

The characteristics of the retail business

As the oldest business form on Earth, retail business has proliferated along with the advancement of technology, consumer demands and market changes (Timotius and Octavius, 2021). According to Dunne *et al.* (2020), the retail business is a type of business that sells products to consumers directly. In the modern retail business management, the roles of retail stores are not only to provide products purchased by consumers but also become entertainment for consumers, provide information of new products, increase social status, improve knowledge and offer a medium for manufacturers to introduce their products to the public (Levy *et al.*, 2019; Roggeveen and Sethuraman, 2020). At the same time, Harahap *et al.* (2021) discover a phenomenon that the retail business is moving more dynamically when online stores have grown rapidly during the pandemic. Such a condition is proved that COVID-19 has accelerated the penetration of e-commerce in American retail markets (Figure 2). Before the pandemic, the composition of online sales in 2009 was approximately 5.6%; the number rose by 16% for the last ten years. Fortunately, the US Department of Commerce records that the online sales grew by 10–11% within eight weeks during the pandemic. This phenomenon illustrates the incredible growth of transactions on the online

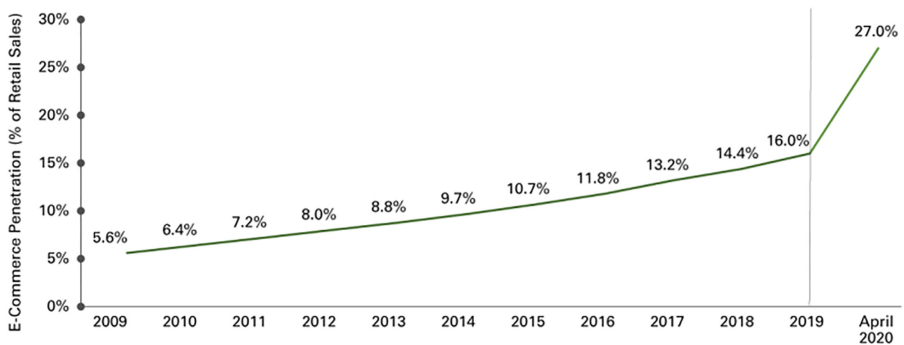


Figure 2.
E-Commerce
penetration 2009–2020
in the United States of
America

Source(s): Bank of America, U.S. Department of Commerce

stores in the US and nearly other countries during the pandemic (Alflayyeh *et al.*, 2020; Khusainova, 2020).

The continuity of retail business highly depends on the selling margin obtained. This condition signifies that retailers must reduce their operating costs as much as possible without reducing the quality of their services. Dunne *et al.* (2020) emphasize that retailers must focus on the mechanism of buy-sell transactions at their retail stores with the understanding of the consumer behavior for preparing products assortment properly, formulating an effective retail marketing strategy, managing a product availability optimally, displaying products through an attractive visual merchandising, creating the store atmosphere uniquely and empowering their resources efficiently.

A controlled inventory turnover is a successful key in a retail business (Levy *et al.*, 2019; Sparks, 2010). To achieve this, Árdal (2017) and Parker (2011) suggest that retailers must always ensure six crucial points. First, the products are sold before the payment date (inventory turnover is higher than term-of-payment). Second, the products have been sold before expiration (product life cycle is earlier than the expiry date). Third, seasonal products run out when the season ends. Fourth, the retailers do not make loss sales. Fifth, the value of shrinkage products is deficient. Sixth, the products are not under-stock or overstock. The historical sales data cannot be casually employed as a reference when retail stores repurchase products from suppliers in a dynamic market. Levy *et al.* (2019) encourage retailers to constantly analyze and identify possibilities of occurring changes in product trends and consumer behaviors in the retail market. Products sold will not necessarily experience the same success in the next period, particularly fashion, seasonal and even more, fads merchandising. On the contrary, a less salable product in the past can suddenly receive an unexpected surge in sales because it becomes a trend or viral. In short, retailers must avoid slow-moving items and, especially, dead-moving items because these items will reduce the obtained profits. However, at the same time, the retailers must avoid shortages for moving items; otherwise, they can lose opportunities to gain advantages.

Supply chain management in the retail business

Supply chain management in the trading business is the flow of product or service movement from one location to another, including a storage process of raw material, work-in-process and finished goods. These processes are done to fulfill an end-to-end order consumed by users. Since Keith Oliver introduced this concept in 1982, we have been aware that a process is interdependent and links with many external parties (Randall *et al.*, 2011). The production process of manufacturing industries will be useless if it is not supported by the adequacy, accuracy and inventory of raw materials (Garay-Rondero *et al.*, 2020). Likewise, manufacturing industries' products will not be helpful if they are not distributed smoothly through distribution channels. Sparks (2010) believes that consumers will not receive a product without a smooth supply chain management flowing from upstream to downstream. Therefore, many parties are involved in the supply chain process (Rana *et al.*, 2015). A transporter party, who becomes the main actor to the material flow in supply chain management, requires reliable and accurate data associated with the supply, stock and demand (Garay-Rondero *et al.*, 2020). These data integrate the numbers and types of products that were requested, already exist, should be sent and are being distributed.

Supply chain management is not only for the manufacturing industry but also for other business industries, including the retail business (Ayers and Odegaard, 2008; Chiles and Dau, 2005; Rana *et al.*, 2015; Sparks, 2010). The retail supply chains can be divided into inbound supply and outbound supply, as illustrated in Figure 3. The product movement from raw material suppliers to manufacturers, distribution centers and a retail store is called inbound supply (Kleverlaan, 2008). By considering product assortment planning and merchandising strategies, a retailer places orders from suppliers for products that are predicted to be saleable

to consumers. If disruptive factors do not exist, the ordered products will be available on time and conform to the ordered numbers and types. However, Chiles and Dau (2005) and Randall *et al.* (2011) believe that if out-of-predicted factors that disrupt the retail supply chains exist, the retailers will suffer losses, such as overstock, purchase cancellation, the switch of selling a chance to competitors, declining store images, etc.

The outbound supply of retail supply chains generally occurs in retail stores implementing a product delivery system to customers. Harahap *et al.* (2021) found the growth of online retail stores made the outbound supply have more significant meaning than previously when consumers come directly to physical retail stores and carry in the product bought themselves. During the pandemic, consumers spend more time at home; and thus, the online purchase has rapidly increased (Harahap *et al.*, 2021). This condition undoubtedly made the outbound supply become the key to determining the product distribution flow to let consumers accept the product bought. Consumers do not mind paying additional fees for the shipping, packaging and insurance costs as long as they can receive the products safely, rapidly and precisely (Khusainova, 2020). Besides, some marketplaces promote free delivery charges for online transactions (Harahap *et al.*, 2021).

Unlike the inbound supply, the outbound supply of the retail supply chains is simpler and shorter because it only connects retail shops and consumers through courier services. However, this condition does not mean that the outbound supply does not have a complex problem. Kleverlaan (2008) and Pettersson (2008) postulate that the outbound supply focuses more on the product safety during delivery, the product delivery speed and accuracy in the product sent. In this condition, the role of an information system integrated with data is the key to smooth retail supply chain management. When a retail store receives online orders from consumers and the payment is verified, it must immediately follow up. Unfortunately, the data of product inventory is frequently inaccurate and in real-time. Consequently, the retail store is forced to decline the transaction, which will disappoint consumers and the store loses trust from them. Harahap *et al.* (2021) assert that complaints frequently emerging in online transactions are the consumers' unfulfilled expectations when receiving a product bought. They receive different products as expected because the product description on the website is not exhaustive and detailed, the product pictures are different from the original products, or consumers pick wrong sizes, colors, models, or brands. Although those factors are not entirely the retailers' faults, the consumers will still rate the retail store poorly. Another important factor determining the success of the outbound supply is employing a courier service to send the product from retail stores to consumers. The courier is the final determinant of the smooth retail supply chains. Although the courier factor is beyond the control of online business retailers, they still expect fast and accurate delivery.

Supply chain in time of crisis

During the pandemic, various studies had revealed the impact of the crisis in life sectors. However, those studies focus more on the economic impact, not specifically examining supply chains in manufacturing and retail on an ongoing basis. Whereas both are interrelated because of a material flow from suppliers to manufacturers then manufacturer to retail stores. The manufacturer-retailer's relational trust and commitment are driven by a relationship

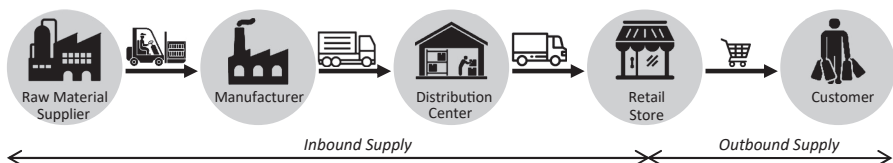


Figure 3.
Retail supply chain

value that is important in determining company performance (Prasetya *et al.*, 2021). Besides, due to limitations and urgency, not many empirical studies have been conducted directly to the related parties, so the findings are still general and partial. According to Esper (2021), the real supply chain crisis occurs when materials could not move smoothly from end to end. It means the crisis is not only for certain products or sectors.

Meyer *et al.* (2021) report that a supply shortage has occurred due to supply chain disruptions during the crisis. They propose a sustainable supply chain network, however, it still may change because their research only analyzes the popularity of context by text mining in newspapers. Likewise, Pujawan and Bah (2022) found five important issues discussed in supply chain management during a crisis, namely: safety, digitization, localization, efficiency and vaccination by applying for a systematic literature review. Not much different, Queiroz *et al.* (2020) with a similar approach, formulates adaptation, digitization, preparedness, recovery, ripple effects and sustainability from popular issues in supply chain crises.

The supply chain crisis is also summarized by Swanson and Santamaria (2021) from some literature, the supply chain at the beginning of a pandemic tends to be more related to healthcare products and the food supply chain then. Specifically, Okitasari *et al.* (2021) propose to shorten the supply chain, particularly for food agriculture, from their literature study. Although not many supply chain crises had examined directly on related objects factually, several studies are focusing specifically on the impact of supply chain crises in certain countries. Table 1 summarizes those studies to explore the gap from existing studies.

According to the findings and recommendations of eleven recent studies concerning supply chain crises in numerous countries (Table 1), the COVID-19 pandemic clearly shows a global crisis and has negatively impacted the economy in many countries, including the uncertainty of material supply flow. The fragility of the supply chain must be anticipated by the organizations' readiness to change, reconfigure their resources, apply an integrated system and be self-sufficient. The crisis, on the other hand, generates some opportunities for improvement.

Research methods

There are abundant potential conditions possibly disrupting the retail supply chains. Therefore, a study investigating these potentials is necessarily conducted. The investigation results can be implemented as inputs for retailers to control the retail supply chains, especially during the crisis. Sequentially, this study was conducted from the upstream to the downstream to obtain a comprehensive analysis of the interference in the retail supply chain during the crisis. The informants were selected through a purposive sampling method to receive the relevant information to this study.

This empirical research was conducted qualitatively by interviewing informants from two national manufacturing industries that supplied instant food (Manufacturer A) and healthcare products (Manufacturer B) to retail stores in Indonesia. These industries were selected because their products experienced a surge in demand and were highly needed during the pandemic. This condition signifies that smooth retail supply chains are highly necessary to distribute the products to retail stores. Imported raw materials dominantly used in the production process increasingly enriched the obtained information because they were associated with the condition of global supply chains. The primary data of this research were collected from the key informants who served as the PPIC (Production Planning and Inventory Control) manager, the production manager and the national sales manager in two manufacturing industries. Meanwhile, the key informants from three national retailers (Retailer A, Retailer B and Retailer C) were the merchandising manager and the store manager who manage offline and online sales. They were involved in this study because they

Author(s)	Country	Findings	Recommendation
Al-Mansour and Al-Ajmi (2020)	Kuwait	The pandemic has resulted in a dramatic recession in the global economy leading to uncertainties that have negatively affected businesses	To survive and remain sustainable during the pandemic, all businesses need to revisit their strategies from three perspectives: (1) supporting human resources financial commitments, (2) forming cross-functional teams and connecting with their supply chains and (3) investing in corporate social responsibility and doubling down efforts concerning partnerships
Black and Glaser-Segura (2020)	USA	The Covid-19 pandemic affected supply chains from a variety of disruptions, particularly supply chains that are not prepared or unadaptable supply chain organizations. The ability to manage and control risk is a key aspect of effective supply chain management	The strategic mitigation model covers five dimensions: leadership, preparedness, digitization, resilience and pivoting. They are designed to help future organizations be more adaptive to large-scale disruptions
Japan External Trade Organization (2020)	Japan	Almost all Japanese companies prioritize employee safety over the sustainability of operations. Only 40% of their concerns are related to the supply chain crisis. Business activities are carried out by social distancing and modified procurement and management methods	Work-at-home schemes, production process review, digital technology application in sales activities, automation practices and labor-saving in production lines, diversification of suppliers or multiple sourcing and inventory levels readjustment are necessary to be considered in the manufacturing industry
Kumar (2021)	India and South Korea	India has been striving to emerge as a supply chain hub for key industries by ending China's control. Likewise, South Korea has also been diversified its supply chain beyond China under the New Southern Policy	The high-level political exchange on the supply chain is recommended in reshaping the supply chain dynamics in East Asia in the post-COVID-19 era
Ministry of Trade and Industry Singapore (2020)	Singapore	There are new opportunities in the national business while most sectors are adversely affected by the COVID-19 outbreak. They come in demand for online sales and services	Businesses need to ensure that safety management practices are implemented at the workplace and their workers continue to work from home as much as possible

Table 1.
Summary of studies in supply chain crisis

(continued)

Author(s)	Country	Findings	Recommendation
Nagy and Nguyen (2021)	China	Stakeholders are preparing diversification strategies to minimize risks due to supply chain crises. In addition, asymmetric interdependence and countermeasures from other countries (such as the US, Japan, Australia and India) are needed to reduce vulnerabilities	The global crisis in a supply chain needs coercive diplomacy by increasing the capacity and capability of alternative supply chain hubs with the structural limit to the degree of diversification in the short to mid-term
Ongkowijoyo <i>et al.</i> (2020)	Indonesia	Risk management, resource reconfiguration and supply chain flexibility are needed for supply chain management dealing with the crisis	Risk management in adaptive supply chain management has an important contribution in building firm resilience, however, managers should carefully use it by preparing different scenarios to develop contingency strategies
Paul <i>et al.</i> (2021)	Bangladesh	The COVID-19 pandemic has revealed the fragility of global supply chains arising from raw material scarcity, production and transportation disruptions and social distancing	Firms need to carefully anticipate difficulties during recovery and formulate appropriate strategies to ensure the continuity of their businesses and supply chains. Stakeholders are advised to develop strategic policies related to the development of competitive resources and dynamic capabilities, shift to localized sources and focus on the basic survival of operational firms
PricewaterhouseCoopers (2020)	Nigeria	Production activities have been interrupted due to the pandemic, also impacting labor scarcity and a lack of production supplies, as well as the inability of businesses to access raw materials and distribute finished items. The global restrictions hampered the distribution of inputs, intermediates and finished products. Consequently, retail outlets experienced frequent stock out and difficulty in stock replenishment due to a high rate of panic buying from Nigerians	The government officially enforced lockdown guidelines that exempt industrial operations and supply chains. A couple of retailers transitioned from providing physical shopping to online shopping services and formed strategic alliances with delivery and logistics providers to facilitate the delivery of their products to the customers

*(continued)***Table 1.**

Author(s)	Country	Findings	Recommendation
Shen and Sun (2021)	China	The pandemic caused tremendous demand and severe logistical disruptions in China but this could be overcome well through an integrated supply chain structure with a modified intelligent platform comprehensively. The entire market scenario in China is controlled effectively through the joint efforts of multi firms, the government and the entire Chinese society	Practical use of operational indicators is needed to analyze supply chain resilience. Firms are suggested to pay attention to operational flexibility and collaborate beyond supply chains to deal with large-scale supply chain disruptions
Todo <i>et al.</i> (2021)	ASEAN Countries and India	The tendency to form a group with similar agents, known as homophily, contributes to the robustness of supply chain links. Another factor that contributes to supply chain resilience is the geographic diversity of customers and suppliers	Companies are encouraged to maintain the robustness and resilience of their supply chains because it leads to higher business performance

Table 1.

had information about product distributions from suppliers to retail stores, as well as from retail stores to consumers. In total, this study interviewed 12 key informants with open-ended questions to explore the factors disrupting retail supply chains during the crisis (Table 2).

The interview results were synthesized to discover interpretations and gain beneficial findings. The empirical conditions were interpreted by developing qualitative content analysis techniques, which Harold D. Lasswell initially introduced in the early 1940s. The information from the key informants was then compared to gain messages of who, what, whom, how and what effects. Furthermore, each interpretation was triangulated with the observation results, basic theory and other available data. This study determined the retail supply chains as the research focus, while the inbound supply and the outbound supply are its sub-focuses. Figure 4 describes the flow implemented in this research to obtain the empirical findings.

Results and discussion

Disrupted retail supply chains

The COVID-19 pandemic firstly occurred at the beginning of 2020 and has brought remarkable impacts globally. All countries in the world have received the effects of the pandemic. Human habits and activities change and are forced to adjust to health protocols (Brandtner *et al.*, 2021; Deloitte, 2020; Mehta *et al.*, 2020; Roggeveen and Sethuraman, 2020). The new normal life changes consumer behavior and product demands, especially daily need products and supplementary products to maintain health and prevent risks of contracting the virus (Brandtner *et al.*, 2021; Deloitte, 2020; Eva *et al.*, 2020). These conditions result in panic buying, especially for food and health products as found by Eva *et al.* (2020), Hall *et al.* (2021), Prentice *et al.* (2020) and Wijaya (2020). Informant 5 stated the fact that panic buying had drastically doubled instant food sales in the early days of the pandemic. This statement

Informant	Role	Industry	Open-ended question
1	PPIC Manager	Manufacturer A	How is the condition of raw material supplies for the production process during the pandemic?
2	PPIC Manager	Manufacturer B	
3	Production Manager	Manufacturer A	How is the condition of the production process during the pandemic?
4	Production Manager	Manufacturer B	
5	National Sales Manager	Manufacturer A	How is the condition of the distribution process from the manufacturer to retail stores during the pandemic?
6	National Sales Manager	Manufacturer B	
7	Merchandising Manager	Retailer A	How is the condition of the replenishment process in retail stores during the pandemic?
8	Merchandising Manager	Retailer B	
9	Merchandising Manager	Retailer C	
10	Store Manager	Retailer A	How is the condition of merchandising in retail stores during the pandemic?
11	Store Manager	Retailer B	
12	Store Manager	Retailer C	

Table 2. Key informants profile and interview guidance

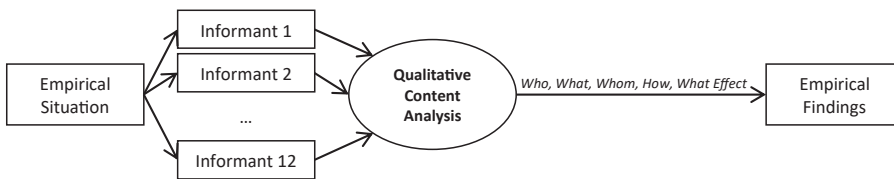


Figure 4. Research process

agrees with [Su et al. \(2021\)](#) discovering that consumers hunted instant food products because the government implemented rules of work-from-home, school-from-home and restrictions on people’s mobility. Moreover, consumers anticipated the difficulty of getting food during staying at home. Informant 6 described a similar phenomenon in which consumers buy up the available health products in retail stores shortly. Demands for health products, such as vitamins, masks and hand sanitizer, suddenly increased many times and illogically. The manufacturing industries that supply the products to retail stores never predicted this condition before. Informant 10, 11 and 12 recognized that the retailers were not ready for the product inventory when consumer demands surged during the pandemic.

The supply crisis during the pandemic occurred at the retailer level and the industry as suppliers. Informant 3 and 4 explained that manufacturing industries difficulty altered their production schedule and increased the production capacity in a short time. According to informant 1, the industry did not have sufficient raw materials for the production process. Meanwhile, informant 2 must change the production plan which had been prepared following the demand forecasting and previous sales data. This condition does not meet the material requirement planning for the bill of material of each product. Informant 2 argued that the procurement of raw materials was suddenly difficult to do, especially for certain raw materials. They have specific features and need to be imported so could not be replaced by other raw materials. Since the crisis occurs globally, raw materials become scarce globally. Whereas all manufacturing industries require additional supplies of similar raw materials. Consequently, competition to gain raw materials among the industries is inevitable. This condition is not prevalent.

The crisis in the retail supply chain due to the pandemic occurs in a long series and is mutually related. The consumer needs that change dramatically lead to enormously

increasing demands for certain products (Brandtner *et al.*, 2021; Deloitte, 2020; Mehta *et al.*, 2020). Product inventory in the retail markets becomes scarce because the retail stores do not anticipate high demands. As retail merchandisers, informants 7, 8 and 9 were overwhelmed to reorder products from the suppliers and manage the product distribution to retail stores during the pandemic. They had to patiently wait for the supply because many other retailers also required the manufacturing industry's products. Meanwhile, informant 2, 5, 8 and 9 described that the retailers' sudden demands could not be easily fulfilled because the manufacturing industry could not increase their production capacity due to limited raw materials. Many industries worldwide required raw materials simultaneously, and thus, the raw material became scarce and prices rose sharply (Informant 2). The retail supply chains became abnormal due to the disruptions in the series of product transfers, as summarized in Figure 5.

Crisis in outbound supply

The pandemic conditions have made consumer demands surge uncontrollably and patterned randomly. Retailers perceived that only specific products had very high consumer demands; regardless of the amounts of available products, they would be quickly sold out. However, after a while, their sales rate decreased significantly (Informant 10 and 12). Informant 8 and 9 argued that a sales trend in one region would not necessarily occur in another region. Retailers complained about the difficulty of calculating optimal inventory at any outlet accurately (Informant 7). The product assortment and selling retail price could no longer be well managed as the principles of modern retail management. The distribution speeds to replenish and display products at retail stores become a mainstay to prevent piling up products because the consumer demand patterns change frequently and suddenly. This condition was indicated by the stock-sales ratio as an indicator of the inventory level in retail stores that compares the stock value to the sales value (Table 3). In times of pandemic, product replenishment was out of balance with the sudden increase in demand, which is why many retailers only have about one-third of their ideal inventory. The out-of-stock was often happened for certain products in stores during the pandemic compared to previous periods.

The effectiveness of merchandising in retail stores is determined by the right product, places, price, time and quantity (Dunne *et al.*, 2020). It indicates that retail stores must have the

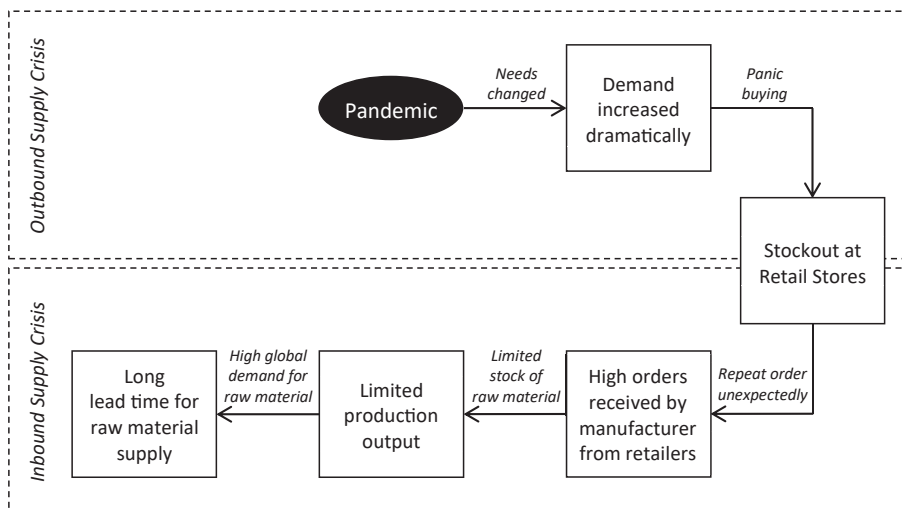


Figure 5.
Crisis in retail supply chain

Period			Stock-sales ratio		
			Retailer A	Retailer B	Retailer C
2019	Jan	Before pandemic	30.1	28.5	39.4
	Feb		29.9	27.6	38.4
	Mar		30.2	26.3	41.3
	Apr		30.0	25.8	40.5
	May		31.3	29.1	40.2
	Jun		33.2	28.0	42.9
	Jul		30.5	23.9	45.0
	Aug		30.1	26.4	43.4
	Sep		29.8	29.7	42.5
	Oct		31.1	27.6	41.1
	Nov		30.8	25.1	40.6
	Dec		32.2	26.0	42.7
2020	Jan	During pandemic	32.3	25.3	43.1
	Feb		31.5	26.5	44.0
	Mar		26.8	24.5	35.5
	Apr		25.5	19.4	33.9
	May		19.8	14.6	28.8
	Jun		18.5	13.9	25.6
	Jul		21.1	11.8	22.4
	Aug		16.7	12.0	23.6
	Sep		14.5	13.5	24.3
	Oct		12.9	10.3	24.2
	Nov		13.6	11.3	18.4
	Dec		11.8	12.1	19.8

Table 3.
Inventory level in retail
stores, 2019–2020

right products of which the quality, brand and features agree with the characteristics of consumers of the store. Moreover, the retail stores must adjust selling prices with consumers' buying power and provide sufficient products, not excessive or deficient when the consumers need them. Unfortunately, unpredictable market dynamics make product inventory and its assortment at the retail store messed up. Informant 11 and 12 mentioned that the products demanded by consumers were frequently sold out and delivered to the retail stores very late. Strangely, the products were massively offered in virtual markets with a very high price, either original or counterfeit products and either good or poor quality. Although the price was highly unreasonable, consumers still willingly bought the products because they worried it would be harder to find. Informant 10 reported that irresponsible parties utilized such a wild condition to take advantage.

During the crisis, many retailers decided to change their business models. [Harahap et al. \(2021\)](#) found some retailers had transformed from physical stores to virtual stores; some suddenly changed their core product following the market demands, offered free delivery, promoted the products with a new strategy and many others. These strategies are reasonably performed to make the retailers survive during the pandemic. However, these strategies will result in consumer detriment when they are done just to gain profits. It is indicated that some parties speculated to buy a particular product and sell it at a high price in the market through online transactions in virtual markets. According to informant 9, 10 and 11, retailers took their moral responsibilities by limiting consumers' purchases of a particular product to prevent speculators from being involved in this situation. Retailers prioritized sales to direct end-users, not to resellers who bought a particular product and sold it to consumers at a high price without post-sale services.

Retail stores with sufficient product inventory and intended to expand their online sales networks faced increasingly diverse problems. Informant 11 experienced several complaints

from consumers because their ordered products required days to receive. A surge in delivering products purchased online forced retailers to reformulate their partnership strategies with the delivery service providers. Moreover, the tracking delivery feature becomes the moral responsibility of the retailers to meet the consumers' expectations, including the provision of customer service and omnichannel communication. Informant 12 received complaints triggered by consumers' order rejection because the ordered product was already sold out. The rapid inventory movement of a physical retail store that was not recorded in real-time and did not integrate inter-branches became the cause of the complaints. Informant 12 was forced to separate the number of products sold in physical retail stores from that in online retail stores to avoid time differences between the online transaction confirmation and physical retail transactions. Although these steps do not agree with implementing the O2O (Online-to-Offline) concept, the retailers were forced to do so as a solution to anticipate "ghost orders" and order cancellations that harmed them. Kim (2021) believed that it is not simple to manage physical and online retail stores simultaneously during a crisis, especially when retailers are not supported by the technology of integrated distribution systems.

Crisis in inbound supply

The restriction of mobility caused the product supply delay from manufacturer to retail stores, besides the presence of obstacles in the production process in the manufacturing industry (Informant 1 and Informant 2). Informant 5 and 6 further explained that although the distribution cost increased, the delivery fleet was not available and the delivery process could not operate normally during the pandemic. Whereas, the government regulation to lock the movement in one area does not apply to logistics shipping that relates to human basic needs. Informant 3 and 4 confirmed that there had been large-scale changes in the production plans since the beginning of the pandemic. The PPIC changed the production schedule to meet orders from the retailers. Informant 3 admitted the changes occurred frequently and suddenly and had to be done despite being inefficient. However, performing the changes is not easy because the production department compulsorily holds health protocols by resetting the working hours of machine operators to prevent the occurrence of new clusters and virus spread on the production floor. As informants mentioned, the major changes in the manufacturing process result in significant delivery delays. More than half of orders of manufacturer A were delayed by more than 12 weeks or could not be delivered at all during the pandemic, as seen in Figure 6. There are several reasons for the delay in delivery, as summarized in Figure 7. They were dominated by incompleting raw materials and a limited delivery fleet during the pandemic. This condition differs from that which existed before the pandemic in which manufacturer A was unable to fulfill orders on time due to overload.

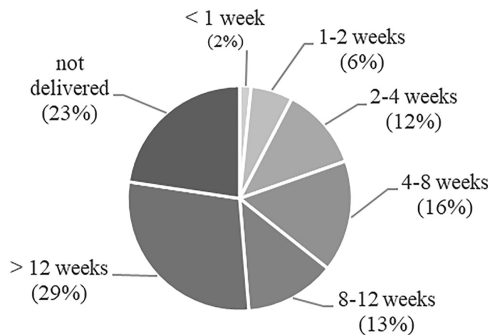


Figure 6.
Order fulfillment delay
of manufacturer A,
March 2020–
December 2021

Retail stores have experienced the product inventory crisis while manufacturing industries have experienced an inventory crisis of raw materials. Informant 1 and 2 faced similar obstacles when planning production because of the unavailability of the raw materials needed. They perceived that repurchasing raw materials from suppliers could not be processed immediately because the global needs also significantly increased. As a result, the availability of raw materials became harder to predict. Whereas the production process could be executed fully when all the raw materials were available following the bill of material. The production was no longer run depending on demand forecasting but sporadically depending on the availability of raw materials. This condition hampered informant 5 and 6 to provide accurate information about when the retailers' orders can be delivered to stores. Informant 6 added that even if the raw material suppliers could fulfill the manufacturer's order, the number of delivered materials was fewer than the ordered. Consequently, Manufacturer B could not fulfill the demands from the retailers even though their production was lower compared to the normal situation, as shown by Figure 8. In short, the manufacturing industries had limitations to meet retailers' orders due to limited raw materials owned and reducing production output although their production capacity is still available.

The condition of global supply chains has also become another exciting fact to investigate. Many manufacturing industries in the world at the same time require raw materials.

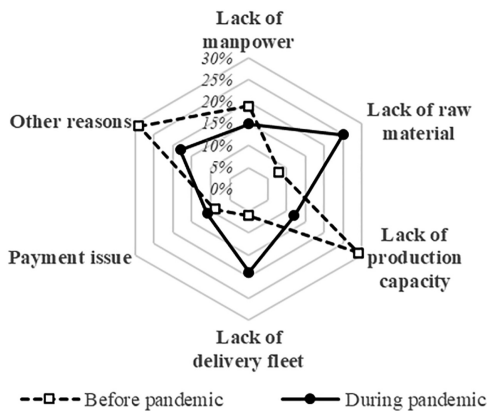


Figure 7. Order fulfillment problems of manufacturer A due to pandemic

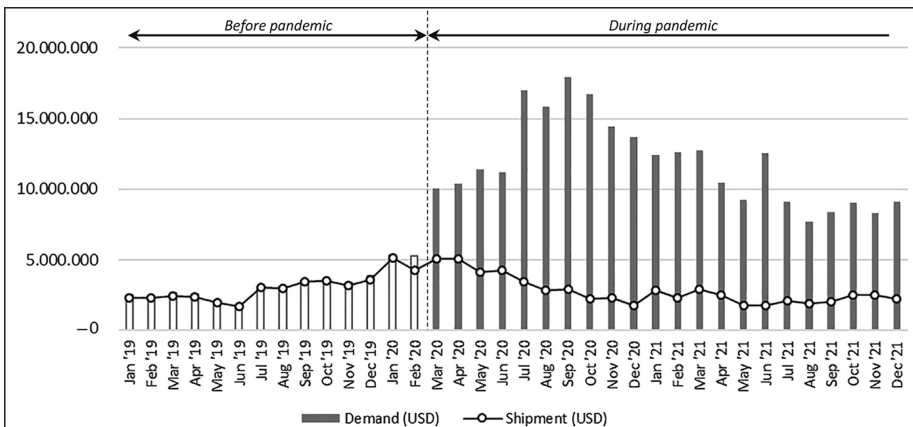


Figure 8. Order fulfillment of manufacturer B, 2019–2021

For example, the healthcare industry requires imported raw materials with certain specifications. Substituting imported raw materials with other local raw materials is almost impossible because the substitution requires a test and specific criteria. Informant 2, who manages production planning in manufacturer B, experienced the emptiness of imported raw materials because only a few containers in many shipping ports could be rented to transport the raw material orders from suppliers. Almost in 2020, the availability of containers in the world, both 20-foot and 40-foot containers, was in deficit (Figure 9). This condition was the impact of high demands for global shipping. Before the pandemic, Edirisinghe *et al.* (2016), as well as Gençer and Demir (2019), predicted that uneven container traffics in export and import shipments have occurred due to the unbalanced world trade. Ongkowitzo *et al.* (2020) believed that such a condition has hampered the global supply chain. An efficient and effective empty container management is necessary for a smooth supply chain (Song and Carter, 2009). Karmelić *et al.* (2012) argue that repositioning containers requires harmonization between the accumulations of empty container availability at any requested point and the waiting time of the next container arrival.

COVID-19 originated in Wuhan, China, made many empty containers that could not get into shipping ports in China because the delivery process from this country was stopped during the implementation of the lockdown policy. If no container is readily dispatched from China, the global distribution will be distracted. In contrast, 40.4% of the world's largest export port is located in China (Figure 10) and has an export value of nearly USD 300 billion.

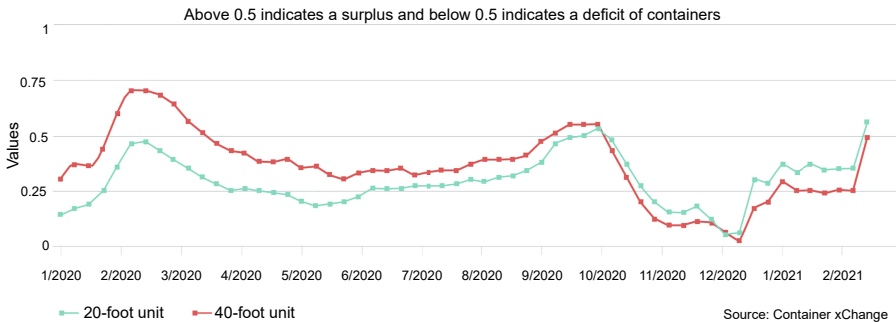


Figure 9.
Container index,
January 2020–
February 2021

Source(s): Flexport, 2021

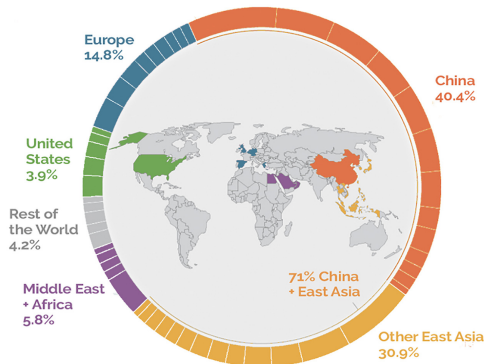
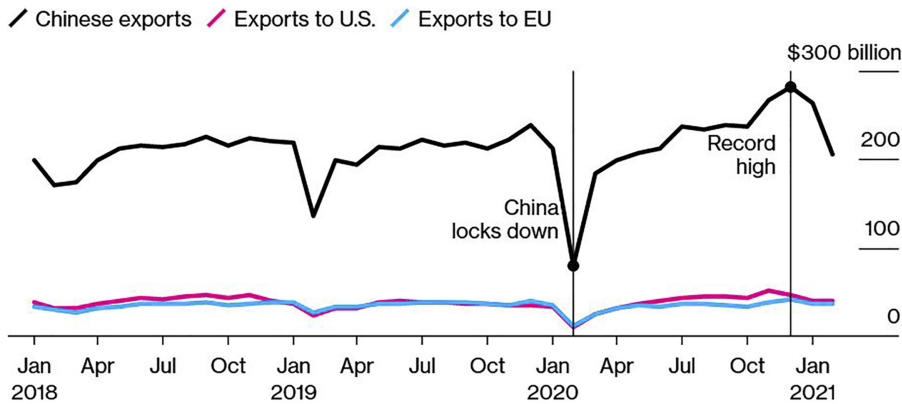


Figure 10.
Top 50 container ports

However, the value has decreased by one-third during the lockdown (Figure 11). The opposite condition occurs in other countries that import more than export. Many empty containers were parked in destination ports due to the policy of the temporary inflow dismissal.

The global container scarcity has increased shipping costs. The United Nations Conference on Trade and Development noted that container freight rates from the shipping port in Shanghai have risen almost double during the pandemic (Figure 12). This statement was confirmed by informant 2, who was forced to pay more expensive container rent costs than usual. Still, they had to queue to wait for the container availability to send their ordered raw materials. Therefore, it is no wonder if the lead time of raw material acceptance in manufacturing could not be determined and became longer than usual.

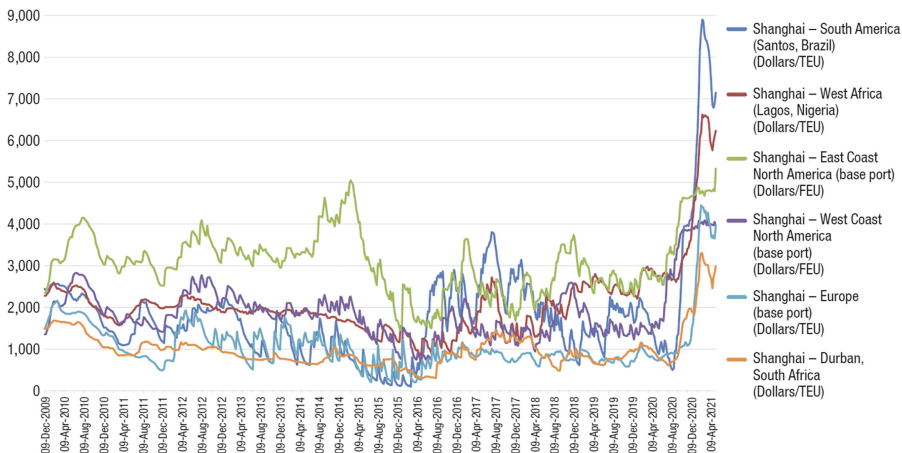
Informant 2 reported that suppliers responded to the high demands for raw materials from the manufacturing carefully. The suppliers anticipated the number of “ghost orders” from the



Source: China's General Administration of Customs, Bloomberg calculations
China only released combined Jan.-Feb. data for exports to U.S. and EU. We have apportioned those exports equally to each month.

Source(s): Bloomberg, 2021

Figure 11.
Chinese exports value,
January 2018–
January 2021



Source(s): UNCTAD, 2021

Figure 12.
Shanghai
containerized freight
index, weekly spot
rates, 18 December
2009–9 April 2021

speculating manufacturing to avoid fluctuating exchange currency rates; thus, the suppliers bought all raw materials for their production. However, when the order was ready to be sent, the manufacturers canceled or postponed the delivery and reasoned that warehouse storage capacity was limited or the production plan changed. For the manufacturers, the reasons are quite logical because when the raw materials are received, they could not be produced as some other related raw materials are not available. Consequently, the storage costs will swell. However, for the raw material suppliers, the delay or cancellation will result in a “bottle neck” that impedes the supply chain operation (Saeed, 2012). At the beginning of the pandemic, the raw material suppliers suffered from many losses because manufacturers canceled many orders as their production stopped. Therefore, the suppliers asked for a guarantee or even a full payment in advance when receiving the manufacturing’s orders. Although this practice disrupts financing cash flow, the manufacturers were forced to accept the suppliers’ requests. In the long term, the suppliers will more likely prioritize orders from the loyal manufacturers; thus, it offers an advantage for manufacturers that have strong capital.

Strategies to overcome the crisis

The retailers have experienced a crisis uneasily faced during the pandemic. The suppliers’ smooth product supply does not accompany a surge in demands for the product. This condition can help their cash flow, which has collapsed due to the declining purchasing power, the degenerating rates of consumer visits and the rising operating cost of retail stores. Table 4 summarizes the analysis results of the information of informants, either the retailers or manufacturers, who identified the impacts of each factual condition. The empirical findings revealed multiple factors hampering the retail supply chains during the pandemic. Thus, the strategies necessarily implemented by the retailers and manufacturers to reduce the disruptions can be formulated.

There were many disruptions in the retail supply chains during the crisis. At least two empirical findings of the outbound supply and three empirical findings of the inbound supply triggered the crisis. The consumers’ product demands that increased significantly in a short time without being predicted previously became the initial of the retail supply chain crisis. This condition confirms the belief of Ayers and Odegaard (2008) who state that the supply chain of new retails can be optimally implemented if the forecasting demand runs normally, has patterns and is predictable. Although the operational activities of retails will be mostly conducted digitally in the future (McKinsey and Company, 2020), the shift from offline to online retail transactions will not bring positive impacts if retailers do not prepare an integrated system and establish good cooperation with third parties. The supply from manufacturers to retailers was also hampered by various causes due to a disrupted production flow in manufacturing industries. Global container shortage and the manufacturers’ cancellation/postponement of confirmed orders had also contributed to the disruption of the retail supply chain.

Conclusions

The empirical findings of this research concluded that the pandemic has led to the retail supply chain crisis with interrelated disruptive factors. The fluctuating, random and unpredictable consumer product demands are not suitable to implement the demand forecasting system based on sales historical data in the retail industry, as well as material requirement planning in the manufacturing industry. Product inventory management can only be conducted qualitatively based on intuition and observation of market trends. Meanwhile, the quantitative one can only be accurate if no other factors occur and are affected (*ceteris paribus*). However, it must be followed up with a strategic business decision quickly.

Empirical findings	Disruption	Strategies
<p>Outbound Supply</p> <p>Consumers' demands for certain products increased significantly in a short time without an earlier prediction</p>	<ul style="list-style-type: none"> - The product scarcity occurred in retail stores due to consumers' panic buying at the beginning of the pandemic - Retail merchandisers were not ready to face the emerging phenomenon due to the pandemic. Consequently, they have difficulty preparing the product inventory optimally - Quantitative forecasting demands can no longer be implemented accurately because it is not ceteris paribus - The suppliers could not immediately fulfill the reorder from a retailer because of many similar orders from other retailers - Retailers could no longer optimally manage product distribution following the assortment planning principles to their stores because consumer purchases were very volatile and random - According to the market economy law, the rising selling price in the market is illogical - The emergence of counterfeit or low-quality products in the marketplace is caused by consumers' high demand and the shy retailers who take advantage of the situation for their benefit 	<ul style="list-style-type: none"> - The inventory control must be done qualitatively by observing daily sales trends - The product selling prices must be set swiftly and carefully by considering the decreasing sales trends and on-hand inventory to avoid aging products - The retail store managers must replenish products on the display shelves dynamically and proactively. Moreover, the display must be done gradually and regularly. They are suggested not to display all inventories at once - Retailers must avoid speculators' purchases detected as a realtor - Speed distribution becomes vital to face the crisis when the delivery cycle must immediately adapt to the needs, including the decision to hire a special delivery fleet, although delivery loads become ineffective
<p>Consumers are more interested in purchasing online product sales when their mobility is limited during the pandemic</p>	<ul style="list-style-type: none"> - The opportunities to sell products to consumers on the online marketplace or own e-store have resulted in various customer complaints about the order confirmation, payment verification, delivery speed, order conformity and quality of products received by consumers 	<ul style="list-style-type: none"> - Retailers utilize the market's high demand by offering slow and dead-moving products - Retailers collaborate with financial institutions and courier services as the third party whose integrated and real-time system - Retailers allocate the product inventory for sale that is integrated into physical and online stores - Retailers design the O2O (Online-to-Offline) system to maximize online retail transactions

(continued)

Table 4. Retail supply chain strategies

Table 4.

Empirical findings	Disruption	Strategies
Inbound Supply	<ul style="list-style-type: none"> - The manufacturers had difficulty changing the production schedule because they had limited raw materials. In comparison, certain specific raw materials are hard to replace - The manufacturers could not maximize their production capacity due to the implementation of health protocols on the production floor - The manufacturers could no longer control the precise material requirement planning because the lead time of raw materials grew longer and the suppliers could not ensure the fulfillment of all orders - Inventory costs have increased because the Bill of Materials is not yet completed. Therefore, the available raw materials cannot be produced - The global need for raw materials from many manufacturing industries suddenly increased. Thus, the raw material suppliers difficulty met the needs - A tendency emerged in which manufacturers speculated when ordering raw materials (the ghost order). Consequently, the need for raw materials seems to increase very high globally 	<ul style="list-style-type: none"> - Retailers can consider the availability of buffer stocks in a satellite warehouse, especially for staple merchandise or products with a long life-cycle (the 20-80 Pareto principles might only be applied during normal conditions) - Retailers must proactively and immediately seek substitute products from other manufacturers if the suppliers cannot fulfill the products that the retailers usually sell - The private label practice can be implemented in non-brand-sensitive products. Therefore, the retailers can request the production allocation from manufacturing industries - The manufacturers should prioritize their product distributions to the retailers with a wide network and have an independent distribution system. However, product availability must not be dominated by a few retailers - For the long term, retailers can encourage suppliers to be integrated with the B2B (Business-to-Business) supply chain system
The container shortage due to the world's unbalanced trade traffic occurred when some countries implemented lockdown	<ul style="list-style-type: none"> - The lead time becomes longer because suppliers must queue to get containers for the delivery - Raw material costs increased because of the increasing rental cost of the container - The production process schedule in manufacturing was disrupted because the arrival and number of raw materials were unpredictable. Unfortunately, it possibly risked the retailers' cancellation 	<ul style="list-style-type: none"> - Although this condition is not manageable, the practices of join-buying and cross-docking through the forwarder agents can be implemented for certain raw materials. At least, the needs of containers can be met to ship raw materials from suppliers to manufacturers
Manufacturers' canceled/postponed orders	<ul style="list-style-type: none"> - The sudden changes in trend products at the beginning of the pandemic made many manufacturers cancel or postpone the orders. Consequently, the condition disrupted the delivery planning of the raw material suppliers - The raw material suppliers prioritized loyal and trusted manufacturers to avoid cancellation/postponement of orders and adverse them - Raw material suppliers asked for a guarantee payment in advance. Such a condition threatens the manufacturers' cash flow of financing 	<ul style="list-style-type: none"> - Manufacturing industries must build long-term mutually beneficial relationships with raw material suppliers - The manufacturers' contract of purchasing raw materials to the suppliers can be considered if the manufacturers master rigid markets accompanied by strong financial capital support

Another factor frequently ignored in supply chain management is maintaining the supplier-retailer relationship. In an urgent situation and a limited condition, prioritizing the trusted partner becomes the key to overcoming the retail supply chain crisis. The confidence to run a business in the long term requires a commitment to fulfill the delivery, quality of products and payment time. The commitment applies to the inbound and outbound supplies.

The recent global pandemic that has just occurred in modern society's life is very intrusive. However, the occurring crisis due to the pandemic must be addressed wisely to obtain the ideal and strategic solutions to maintain business continuity. The changes will undoubtedly occur, especially in the retail supply chains. Therefore, the business model must be agile in anticipating unpredictable dynamic changes. Some anticipations that can be performed include getting around the visual merchandising on the display rack, implementing "satellite warehouses", modifying product distribution mechanisms to retail stores, manufacturing private label products, utilizing sales on online stores, integrating the system with the third party in a real-time and others possible strategies.

This qualitative research investigated the empirical conditions by interviewing informants in the two manufacturing industries and three retailers in Indonesia. These are the limitations in this research, including the progress of the pandemic which is still difficult to predict and is highly subject to change that allows the logistic problems to become increasingly complex. However, different conditions may exist in other industries and retailers although it seems unlikely because the crisis has a widespread impact at the same time everywhere. The findings of this research potentially occur in other countries, not only in Indonesia, because they also experience the same pandemic and global crisis. Nevertheless, other factors that disrupt the retail supply chains possibly occur and have not been discussed in this study. Comparing the conditions in different countries is strongly recommended for further research. This seeks to obtain a precise conclusion as anticipatory actions in the retail business sector concerning logistics issues. It also usefully develops supply chain management better.

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