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Supply Chain and Digital Transformation of the Tire Manufacturing Company during the COVID-19 Pandemic: A Case Study of PT. X

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Abstract

Since COVID-19 has been on the rise since 2020, many facets of our lives have changed and been touched, including the radically upended economic situations. To combat COVID-19, governments and health officials everywhere have enacted laws requiring the use of protective gear like gloves, masks, and hand sanitizers. Compared to earlier pandemics like the Spanish Flu in 1918 and Ebola in 2014, the effects on the entire world are more severe now. The automotive manufacturing industry, including its derivative business such as tire manufacturing, as one of the business activities, is also dealing with difficulties, as is seen from the drop in production and sales volume. During lockdowns, they were forced to scale back or stop their retail sales and production, which cost them money. By implementing supply chain and digital transformation for business continuity, this research intends to assess the problems and make recommendations for solutions that will allow these firms to thrive in the face of uncertainty. The transition is anticipated to alter how companies deal with customers and bring everyone involved's health procedures into line.

Keywords: COVID-19, Tire Manufacturing, Supply chain, Digital transformation, Uncertainty, Business continuity.

1. Introduction

As we recognized, businesses have been severely impacted by the COVID-19 outbreak. Most companies are experiencing a decline in their sales volume, which has consequently affected their revenues. In the tire manufacturing industry sector, the chain reaction is affecting all related companies, starting from the car's original equipment manufacturers (OEMs) to their supporting companies for parts, such as tires, and so on. They were all facing a decline in terms of sales as the impact of the uncertainties during COVID-19.

Following these challenges, PT.X need to act in order to avoid further decline and keep their sustainable business, even in hard situations. Therefore, we will take a look at their business model canvas as the basis of this study and how we

could improve further for the next onward. As outlined by the internal source data from PT.X (2020), their business model canvas includes the following components:

1. Value Proposition: The company offers high-quality tires, related products, and services, along with advanced technology and innovative solutions to meet the changing needs of its customers.
2. Resources: The company possesses global manufacturing facilities, research and development capabilities, distribution networks, and advanced technology.
3. Channels: The company employs a variety of channels to reach its customers, including direct sales, partnerships with OEMs, and collaborations with retailers targeting replacement markets.
4. Costs: The company incurs costs related to manufacturing, research and development, marketing and advertising, distribution, and overheads.
5. Revenues: The company generates revenues through its global manufacturing facilities, research and development facilities, distribution networks, and advanced technology.

Based on the components, this study will review the threats faced by the company, analyze the uncertainties and their impact on the companies, and explore potential ideas to improve the situation and sustain businesses, particularly in challenging economic conditions like the COVID-19 pandemic, which can occur unexpectedly.

The Research Questions for this study are as follows:

1. What effects did the COVID-19 epidemic have on PT. X's supply chain?
2. In response to the COVID-19 epidemic, what digital transformation efforts did PT. X put into place?
3. How successfully did these digital transformation initiatives reduce the pandemic's effects on PT. X's supply chain?
4. What can PT. X's experience teach other tire manufacturing businesses?

Following to above, The Research Objectives are as below:

1. To comprehend how the COVID-19 epidemic has affected PT. X's supply chain.
2. To list the measures PT. X took to transform the company's digital infrastructure in response to the pandemic.
3. To assess how well these digital transformation measures are working to reduce the pandemic's impact on PT. X's supply chain.
4. To determine the lessons that PT. X's experience can teach other tire manufacturing companies.

Since the study is focused on tire manufacturing, we expect that the findings will have relevance and applicability to other businesses operating in the same business sector, offering similar benefits for their business sustainability as well.

2. Analysis Of Uncertainties

In this chapter, we will conduct an analysis of the uncertainties that may have a negative impact on the business and explore solutions to mitigate these impacts and ensure the sustainability of operations, especially during COVID-19 when

we knew many things had changed and become unpredictable. We will first identify the uncertainties and determine the types of uncertainties that the company needs to be prepared to face to prevent future issues.

Based on the discussion and interview with representatives of PT.X, the uncertainties in the Tire Manufacturing Business based on the situations are as follows:

1. **Economic Uncertainty:** Indonesia is not an exception to the significant effects of the COVID-19 epidemic on the world economy. In 2020, the GDP of the nation shrank by 2.2%, while the unemployment rate increased to 6.9%. As a result of businesses and consumers making expenditure cuts, the demand for Bridgestone's products has decreased.
2. **Supply Chain Disruptions:** The disruptions to global supply chains caused by the COVID-19 epidemic have made it challenging for PT.X to secure the raw materials and components it needs to produce its products. Production delays and higher expenses are the results.
3. **Government Regulations:** In reaction to the COVID-19 outbreak, the Indonesian government has put in place a number of laws, including travel restrictions and social segregation measures. PT.X has a harder time running its company and reaching its customers as a result of these rules, including facing start-stop production, lockdowns, etc.
4. **Customer Behavior Change:** It has also been brought on by the COVID-19 epidemic. For instance, fewer people are driving, which has reduced the demand for tires. The likelihood that individuals will shop online has also increased, making it more challenging for PT.X to sell its products through conventional channels.

From the aforementioned list, it is evident that economic conditions and the regulatory environment have become the most uncertain factors influencing the current situation as challenges during the COVID-19 pandemic.

3. Analysis of Impact from the Uncertainties

An essential aspect of managing uncertainty is to identify as many sources and factors of uncertainty as possible (M., A., Wazed, et al., 2009). Given the rapid changes experienced during the pandemic in industrial markets, it is important to develop an awareness of how industrial companies have changed and what the future norm might look like (Matthew, R., et al., 2022). To take successful action, it is important to analyze all the relevant uncertainties, including their impact on our businesses. Since we have identified economic conditions and the regulatory environment as our uncertain factors, we will now analyze each business model component mentioned in the previous section to understand their connection. The details are as follows:

1. **Value Proposition:** Overall, the value proposition remains unaffected by these two uncertainties. The company continues to offer their high-quality products to customers, even during the pandemic, as affirmed by PT.X.
2. **Resources:** The distribution networks are facing difficulties in sourcing supplies from vendors or suppliers, as well as delivering products to customers in various destinations such as OEMs, replacement markets, and exports. This is primarily due to the implementation of regulatory measures, including social distancing, work-from-home schemes, and lockdowns in certain countries. These factors have resulted in imbalances in container availability at ports and delays in vessel schedules.

3. Channels: Prior to Covid-19, the company primarily operated through direct selling channels, allowing for easy interactions with customers and product deliveries to distributors, TOMO (Toko Model), and direct customers. However, with the implementation of social distancing and other regulations to safeguard public health, the traditional approach is no longer feasible. Many stores have had to close during lockdowns, customers are reluctant to visit TOMO outlets due to concerns about the spread of Covid-19, and various other barriers have hindered our operations. Resolving these challenges is crucial.
4. Costs: As the sales volume declines, it inevitably has an impact on overall costs.
5. Revenues: Building upon the previous point, the increase in total costs will lead to a reduction in revenues, directly impacting the company's financial condition. A worsening financial report could ultimately lead to bankruptcy.

To ensure the company's survival, it is imperative to minimize or eliminate the impact of uncertainties, particularly those affecting resources and channels, after conducting a thorough review of the business model.

4. Design of the Changes

The next step involves designing the necessary changes following the previous analysis of the impact of uncertainties on PT.X, which will further explore the solution from digitalization, reshoring, and collaboration. In order to mitigate the pandemic's impact, we need to increase the resiliency and effectiveness of PT. X's supply chains, they have been obliged to implement new technologies and procedures. This included digitalization, reshoring, and collaboration.

Following above, more detailed explanations are as follows:

- Digitalization: To increase visibility and control over their supply chains, tire manufacturers need to engage in digital technologies like big data analytics and artificial intelligence. They have been able to detect and reduce risks as a result, improve inventory levels and demand forecasting, and more.
- Reshoring: It has been used by several companies to lessen their dependency on international supply networks. They have been able to decrease their exposure to interruptions and increase the efficiency and dependability of their supply networks as a result.
- Collaboration: To increase the resiliency and effectiveness of their supply chains, many companies have been working with their suppliers and consumers. They have been able to exchange information, arrange activities, and create backup plans in order to mitigate the risks.

On the other hand, it is also important to resume critical processes or functions following any disruptive event to ensure business continuity (BC). Business impact analysis (BIA) is a crucial part of a business continuity management system (BCMS), which evaluates a company's core services and products, vital operations, and relevant BC indexes (Seyed Ali Torabi, et al., 2014). Therefore, we will establish connections between each critical factor, its impact, and the design for improvement. The details are as follows:

Table 1. Changes for Business Continuity of PT.X

Most affected Business Model Factors	Original Condition	Uncertainties Impact	Design of The Changes
Resources	Importing the most critical raw materials. Experiencing a lack of container supply and significant delays in exporting.	Falling into a critical situation/shortage of raw material supply. Lack of supply for containers and facing long delay for Export.	Optimize resource localization (Pujawan, et al., 2022). Adopt a flexible container usage strategy and review contracts.
Channels	Direct selling to customers through Distributor / TOMO.	Difficulty in selling products during lockdowns, social distancing, etc., resulting in reduced opportunities for direct selling.	Optimize digital transformation and supply chain processes, including e-commerce and social media, to expand the market and comply with health protocols.

Based on the above, a review of the supply chain and digital transformation becomes our suggestions to improve the situation and minimize the impact of uncertainties caused by COVID-19 which will be shared with PT.X management to improve the situation.

Following that, the resume of the plans and their references are as follows:

Table 2. Resume of the plans and references for PT.X

Area	Big Items
Supply Management	<ul style="list-style-type: none"> - Numerous, adaptable, and different suppliers (van Hoek, 2020) - Local or nearby sourcing (van Hoek, 2020) - Sources of local replacements (Xu et al., 2020) - Localizing the supply chain and supplier base (Sarkis et al., 2020; Zhu et al., 2020; Cai and Luo, 2020)
Supply Buffering	<ul style="list-style-type: none"> - Supply buffering (van Hoek, 2020; Belhadi, et al., 2021) - Lean adaptability (Ivanov, 2021)
Flexibility in the supply chain	<ul style="list-style-type: none"> - Supply chain flexibility (McMaster, et al., 2020; Končar et al., 2020) - Redundancy in capacity (Xu et al., 2020)
Information, acquisition, processing, and visibility	<ul style="list-style-type: none"> - Supply chain transparency (Messina et al., 2020) - Boost awareness of information (van Hoek, 2020) - Active communication between all parties in the supply chain (van Hoek, 2020) - Capabilities for processing information (Yang et al., 2021)
Digital Transformation	<ul style="list-style-type: none"> - Digitization of the supply chain (Belhadi et al., 2021; Kumar et al., 2020; Sarkis et al., 2020; Cai and Luo, 2020; Karmaker et al., 2021; Nandi et al., 2021) - Electronic twin (Ivanov and Dolgui, 2020)

5. Project Execution Plan

In this section, we will share the plan for executing the changes that we have reviewed in the previous section. It is crucial to execute the plan effectively in order to derive any benefits from it. Therefore, as discussed with PT.X management then they will allocate resources to implement this plan, as detailed below:

- Establish the Project Management Office (PMO) and define its structure.
- Determine the priority of each item and create a more detailed schedule for each phase, clarifying roles, responsibilities, methods, and duration as project targets. Set milestones to track progress.
- Allocate funds (expenses and capital investment) across fiscal years based on project requirements.
- Decide on the reporting line and frequency to monitor project progress.
- Incorporate annual reviews into the company's annual plan and policies to ensure the continuity of the project until its completion.

6. Conclusion

Disruptions and uncertainties are inevitable in the business world. As we have witnessed, these challenges can arise unexpectedly, especially during the pandemic. Therefore, the agility and resilience of our company are key to maintaining sustainable business operations in the future.

This study has demonstrated that analyzing the business model in conjunction with uncertainties provides a valuable approach to finding ideas and solutions for improving our company and transforming challenges into opportunities. It is also important to protect ourselves from the risk of obsolescence.

These approaches have allowed PT. X to successfully manage the COVID-19 pandemic's effects on its supply chain. The business has been able to keep up production levels, satisfy client demand, and prevent major disruptions. PT.X case study serves as a good illustration of how tire producers can use new technology and techniques to increase the robustness and effectiveness of their supply chains. Tire producers will need to keep investing in these technologies and procedures to be competitive as long as the global supply chain faces difficulties.

As a result of the improvement, a significant sales uptrend is shown in the below chart:

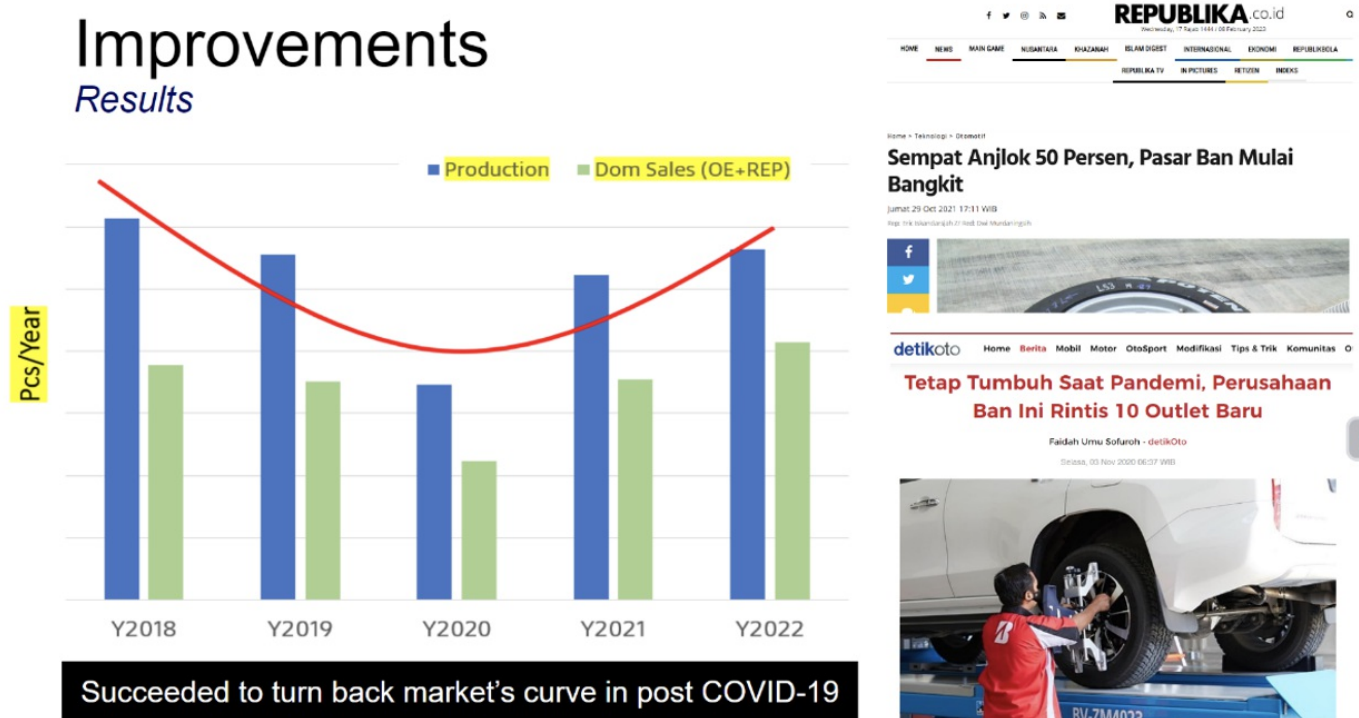


Figure 1. Result of improvement. Source Internal Data PT.X (2022).

Furthermore, we acknowledge that there are still untapped opportunities that could be explored further but were beyond the scope of this article due to time and resource limitations. Future collaborations or research endeavors may bring additional value to our endeavors.

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