

**SUPPLY CHAIN MANAGEMENT ANALYSIS
USING THE BUSINESS PROCESS MODEL AND NOTATION
IN THE MIDST OF COVID-19 PANDEMIC
(A Case Study at MS Company – Indonesia)**

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Abstract

Supply Chain Management (SCM) aims to maximize the value of the products produced to meet customers' needs and demands. This study aims to conduct an assessment of Supply Chain Management at MS Company and suggested BPMN with adjusted business processes. The Business Process Model and Notation (BPMN) approach is useful for describing complex business process modelling in detail but still easy to understand. Thus, it can minimize errors in implementing business processes. We used the study case approach to conduct this research by studying several journals related to SCM. A discussion was then held to improve the four main processes associated with SCM, and the improvement was written by using BPMN. This study explains that BPMN can be used to give detail and minimize errors so that the modified business process modelling is easy to understand and facilitates communication between business process designers and business process executors. Some MS company improvement in its SCM includes production scheduling, goods procurement, production implementation, and warehouse management. It is suggested that further observation and examination of the improved SCM is needed to prove the new SCM's success in the midst of the covid-19 pandemic.

Keywords: *SCM, BPMN, Business Process.*

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INTRODUCTION

The Covid-19 pandemic that is currently happening is the fastest and the steepest in economic growth projections among all global recession since 1990 (Worldbank, 2020). Many countries in the world have experienced an economic slowdown due to the Covid-19 pandemic. This condition happened after the economic growth in QI and II 2020 became minus. Several countries experiencing economic recession include Singapore, South Korea, Germany, Japan, France, Hong Kong, and the United States. In Indonesia, the Central Bureau of Statistics noted a decline in Indonesia's economic growth in Quarter II-2020 became negative -5.32% (Wuryandani, 2020).

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These conditions have affected the process of business in the world and Indonesia. According to Setijadi, the chairman of Supply Chain Indonesia, the supply chain strategy facing the Covid-19 pandemic needs a supply chain mapping both demand and supply. Thus, planning and preparation are required by minimizing the frequency of purchases and increasing orders' quantity (Setijadi, 2020).

According to Tjahjono (2020), the impact of the covid-19 pandemic on Supply Chain Management (SCM), especially on the distributors and warehousing, includes five conditions. First, a supplier could not supply the product. Second, the workforce could not work due to imposed regulations to fight the pandemic (lockdown). Third, distribution and warehousing operations were constrained by physical distancing. Fourth, Inbound and outbound logistics were severely disrupted, delayed by restricted mobility – seaports/ airports closed. Finally, Cash flow was affected due to customers' cash flow (payables) problems. This study aims to address the first four conditions.

Supply Chain Management is a cycle chain management and supervision mechanism that includes supplying raw materials, processing them into finished goods, and sending these products to consumers through a distribution system. SCM also contains other essential activities related to suppliers and distributors (Heizer & Render, 2004). All supply chain practices have capabilities that can positively affect company performance. These practices can be in the form of financial performance, market performance, operational performance. Besides, supply chain practices improve company performance and offer the company a competitive advantage (Silva, Sousa, Moreira, & Amaro, 2020).

Supply Chain Management aims to maximize the value of the products produced to meet customers' needs and demands. Besides, SCM also seeks to reduce costs incurred by companies, such as purchasing costs, production costs, control and storage costs, raw material costs, transportation costs, packaging costs, etc. (Chopra & Meindl, 2007). Supply Chain Management helps companies achieve effectiveness and efficiency in achieving company goals (Miradji, 2014). Process in Supply Chain Management is also used to support the linear business transition to circular business (Hazen, Russo, Confente, & Pellathy, 2020). This finding shows the importance of using Supply Chain Management in a company.

One of the companies implementing Supply Chain Management is MS Company. This company is a leading roofing system manufacturer from Indonesia that has exported its products to more than 40 countries globally. Business processes related to Supply Chain Management (SCM) at MS Company has described in a journal written by Miradji (2014). These business processes are the receipt of raw materials, the production process's execution, and the delivery of ordered goods.

In a journal written by Miradji (2014), business process procedures are not explained in a detailed and sequential manner. The journal only focuses on the shortcomings of business processes at MS Company. The current SCM at MS Company has not accommodated efficient scheduling so that the company's condition has not been able to adapt to the covid-19 pandemic. Based on the journal written by Vistasusiyanti, Kindangen, & Palandeng (2017), the listed business processes should be described coherently, starting from the start of a business process to the end of the business process.

Based on what was written by Miradji (2014), the production department experienced multiple functions. The production department at MS Company also carries out receiving raw

materials, storing raw materials, and storing production results. According to Setiawan and Setiyadi (2017), the one who carries out the function of receiving goods should be the logistics department. Those who carry out the role of storing goods are the warehousing department. The raw materials' receipt should also be separated and become part of the business process for the logistics department's procurement of goods (Giharni, 2012).

Likewise, storage of goods should be part of the warehouse management process carried out by the warehousing department. Another drawback is that in the journal written by Miradji (2014), there is no planning or production scheduling process. According to Vistasusiyanti, Kindangen, and Palandeng (2017), maintaining and managing supply chain management processes need planning or scheduling production.

Business Process Model and Notation (BPMN) is a business process model that describes business processes' flow by providing visual notations to define business processes. BPMN is used because it allows for a notation that is easy to understand and can represent complex processes. BPMN supports business process management in companies for both business and technical users. BPMN serves as a common language to bridge the communication gap between business process design and implementation (Nur, 2017).

This journal aims to assess the business processes in the journal by Miradji (2014) and provide BPMN recommendations with adjusted business processes. It is hoped that this journal can assist companies in running their business more effectively and efficiently.

Supply Chain Management (SCM) is a management system and supervision of the cycle chain, starting from raw products to ending in consumers' hands. Supply Chain Management's primary goal is to balance supply and demand to be more effective and efficient (Martina, 2019). The supply chain includes all the activities (operations) required to convert raw materials into final products. What is meant is from the procurement process through component manufacturing and final assembly to distribution to the final market and includes all necessary material handling and storage activities (Regattieri, Santarelli, & Piana, 2019).

Supply chain management (SCM) helps determine what inventory is required for the value chain and what quantities are needed to meet customer demands. Besides, SCM also helps how stock should be processed (produced) into finished goods and services, and how inventory and product delivery to customers should be scheduled, monitored, and controlled (M. Stair, Ralph, & W. Reynolds, 2010).

A business process is a collection of structured and interconnected activities to solve a particular problem or produce a product or service to achieve an organization/company (Subekti, 2020). Business processes can also be the core of all existing activities within a company or organization (Purnomo, 2020). Some general characteristics that are considered a business process must have are (H. J. Johansson, McHugh, Pendlebury, & Wheeler, 1993): 1). Definitive: A business process must have clear boundaries, inputs, and outputs. 2). Sequence: A business process must consist of activities that are sequential to time and space. 3). Customers: A business process must have process results recipients. 4). Value-added: The transformation that occurs in the process must provide added value to the recipient. 5). Linkage: A process cannot stand alone but must be linked in an organizational structure. 6). Cross function: A general process, although not necessarily, includes several functions.

The business process benefits help the company see a comprehensive (comprehensive) and real-time business picture and provides a report describing the company's actual condition at this time. The business process also gives competitive value to increasingly tough business competition

in a rapidly moving market development. It speeds up evaluating information to quickly and accurately respond to any events and problems (Purnomo, 2020).

Business Process Modeling is an activity that represents a company's business processes so that these business processes can be analyzed, improved, and automated. Business Process Modeling is used primarily to map workflows. Each element that plays a role in the process can understand, research, and make changes to a process that better fits the workflow or process (Sugiyartomo, 2018). The purpose of this modelling is to help business stakeholders in the process to understand and understand each step of the process. Thus, companies can achieve maximum benefits from process modelling (Danny, 2017). Business Process Model and Notation (BPMN) is one of the modelling techniques of Business Process Modeling.

Business process management is planning, directing, and controlling business processes by utilizing organizational resources. Business Process Management is used to achieve organizational goals effectively and efficiently (Sleekr, 2018). Business Process Management is useful for producing optimal overall performance, both within its internal and external scope (Warsidi & Achmar, 2017).

Business Process Model and Notation (BPMN) is a graphical modelling language used in modelling business processes in an organization with the flow of information in messages conveyed between related parties (Rosmala & Falahah, 2007). BPMN's main objective is to provide a standard notation easily understood by all business users (Nur, 2017). BPMN delivers the ability to understand internal business procedures in graphic notation and gives organizations the ability to communicate these procedures in a standardized manner. The graphical notation will facilitate understanding of performance collaboration and business transactions between organizations (BPMN, 2020).

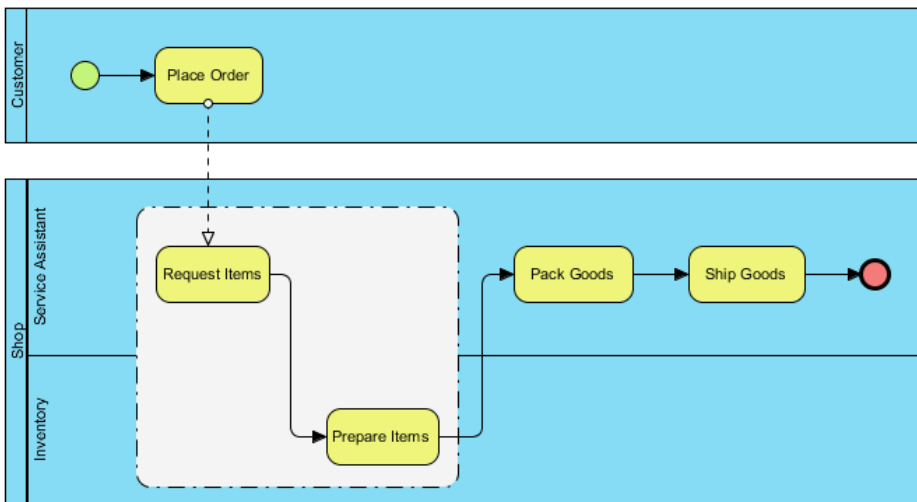


Figure 1. Order to ships goods processes in BPMN (Paradigm, 2020)

BPMN describes these four types of elements for business process diagrams (Lucidchart, 2020): flow objects: events, activities, gateways; linking objects: sequence flow, message flow, association; swimlanes: pool or lane; and artefacts: object data, groups, annotations. Figure 1 shows BPMN's example from the order process to deliver goods is handled by three swimlanes.

RESEARCH METHOD

This research was conducted using a case study approach. Case studies are used to understand something that attracts attention, social processes that occur, concrete events, or experiences of the person who is the background of a case. A case study is expected to capture the complexity of one case. This methodology is increasingly developing in the social sciences, including in practice-oriented fields such as environmental studies, education, and business (R. Johansson, 2007). The purpose of using the case study method is to build a framework for student discussion and debate around some critical professional issues (Yin, 2018).

This research begins by determining a case study. We obtained this case study by reading several journals related to Supply Chain Management, and we looked at the business processes that occurred. After that, we made a selection to determine which company could be appointed as case studies.

Then we review the business processes described in our reference journal. We collect several references from several journals as a reference for comparison against journals that will be improved. Besides, discussion methods were also carried out. The discussion method is a method of solving a problem that is problematic to be discussed and solved together (Djamarah, 2006). We discuss and compare the deficiencies in previous journals and analyze improvements to business processes in the journal. We write down the improvements to the business process in the form of a BPMN diagram

RESULT AND DISCUSSION

There are four (4) business processes discussed: production scheduling, goods procurement, production implementation, and warehouse management. The following is a BPMN formed from a business process that has been defined in previous research along with its improvements from the results of discussions and other literature.

Production Scheduling

Figure 2 begins when the customer will place an order for goods from the sales department. The sales department will inform the incoming orders to the production department and then check and adjust them to other production schedules. Furthermore, the production department will send a request for checking raw goods to the logistics department to determine whether the raw materials in the warehouse meet the needs of the order to be produced. The Logistics Department reviews the raw materials in the warehouse and then delivers the goods' stock availability. Based on the presence or absence of stock, the production department will estimate the time needed to produce production. If raw materials are empty, the estimated time required will be longer because it is necessary to purchase raw materials. After that, the production department will submit the estimated production time to the sales department, and the sales department will inform the customer. The customer will determine whether to place an order at MS Company or not. If the order is made, the customer and the sales department will create a sales contract according to the agreement.

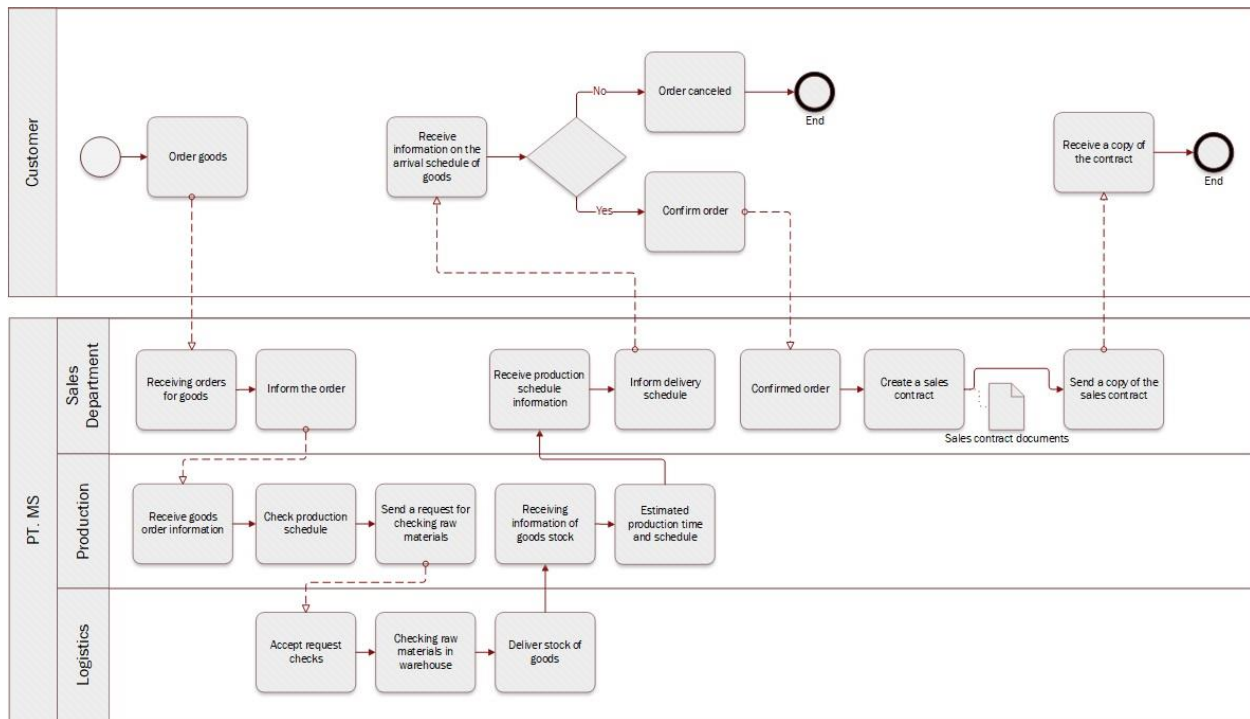


Figure 2. BPMN SCM Scheduling Process MS Company

Goods Procurement

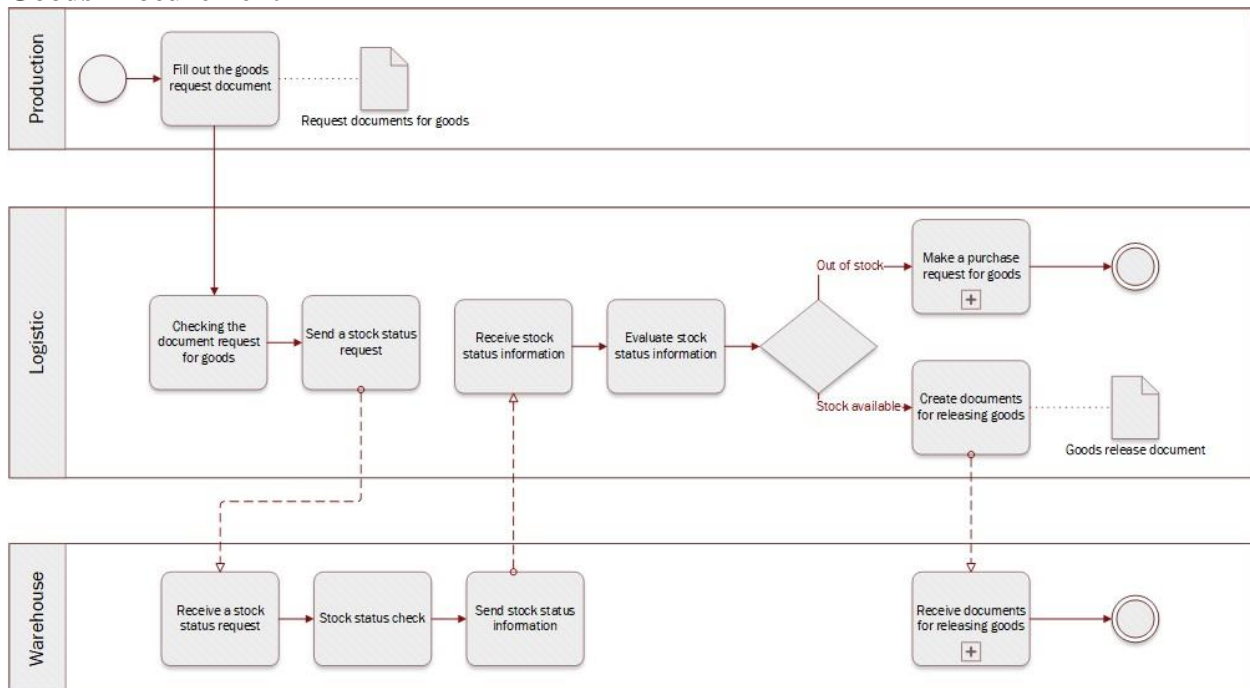


Figure 3. BPMN SCM Goods Procurement Process MS Company

Figure 3 describes the BPMN from the SCM Goods Procurement Process of MS Company. After the customer confirms the order, the production department that has received a copy of the contract from the Sales department will carry out procuring production raw materials. The production department will submit a request for goods to the logistics department by sending a request document. After inspection by the logistics department, a request file will be sent to the warehouse to be rechecked on the goods' stock status.

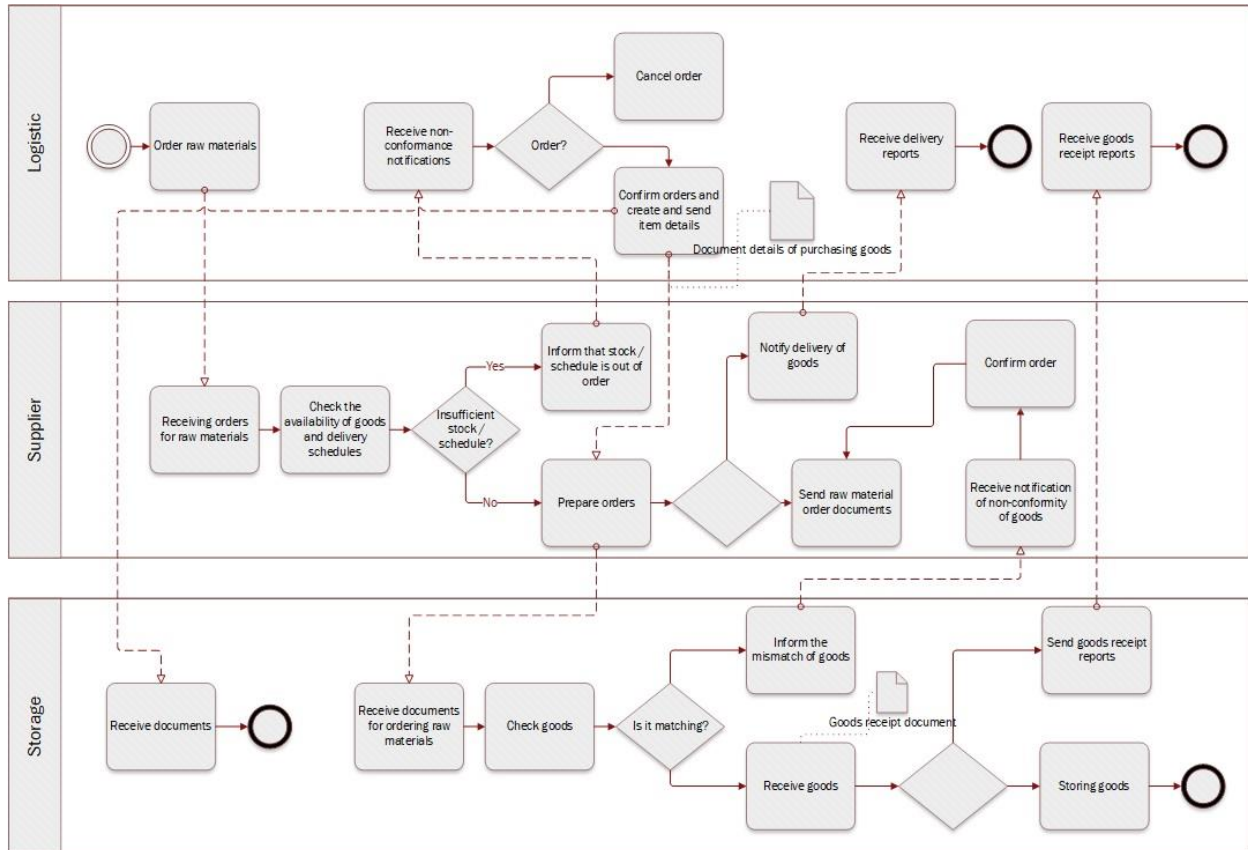


Figure 4. BPMN Purchase of Goods Process MS Company

Figure 4 explains the BPMN purchase of goods process. If the goods are available in the warehouse, the logistics department will issue a document releasing the goods and then send them to the warehouse. After the warehouse department receives the goods release document, the warehouse will prepare the requested items according to the documents and carry out a final check before the goods are sent to the production department. Then the goods will be sent to the production plant and checked again. If the raw material is suitable, it will be received by the production department. However, if the goods are not appropriate, the production department will contact the warehouse for the discrepancies in the items provided. After confirming and checking, the warehouse will send back the raw materials that are not suitable.

If the goods are not available in the warehouse, a request to purchase goods will be made with further processing. Purchases of raw goods are carried out directly by the logistics department to raw material suppliers. The supplier will check whether the goods shipped follow the quantity and whether the raw goods delivery schedule is on demand. If appropriate, the goods will be

prepared. If it does not match, the logistics department will be contacted to decide whether the order should be continued or not. Otherwise, the order will be cancelled. However, if you place an order, the logistics department will confirm the order with the supplier and create a detailed document for purchasing the goods submitted to the warehousing department.

Ready goods can be sent directly by the supplier, and the supplier was informing the logistics department that the goods have been sent. The order arrives at the warehouse where the goods are checked according to the logistics department's goods' detailed document. If there are problematic, not suitable, etc., then the warehouse will make a complaint or notification that it is not appropriate. Confirmation will be made whether the goods are not relevant. If correct, the supplier will resend it. Matched goods will be received with goods receipt documents. The warehouse department will report to the logistics department that the goods have been received. Figure 5 explain the process of releasing goods.

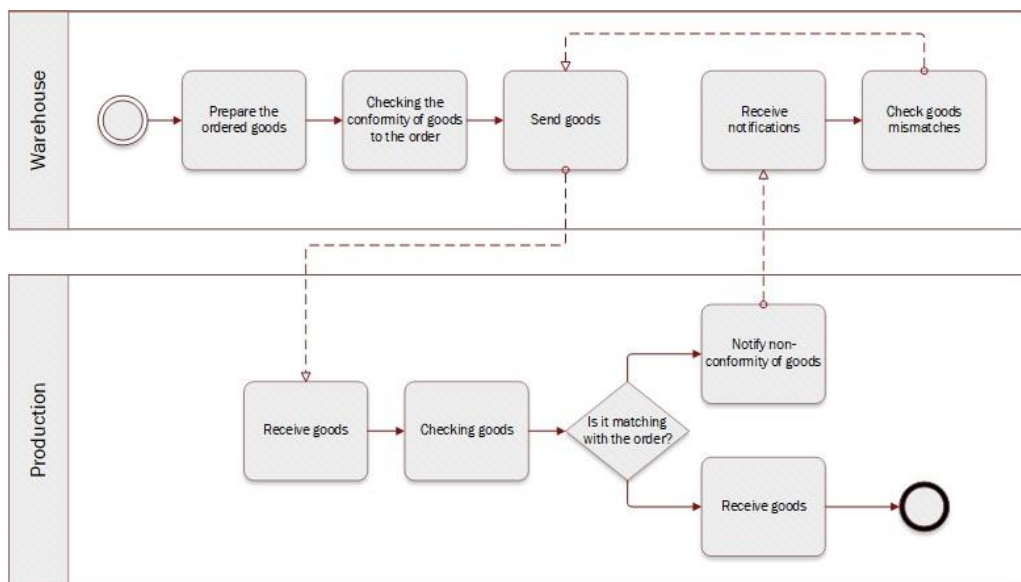


Figure 5. BPMN Process of Releasing Goods MS Company

In Figure 6, before starting production, the sales department will send a copy of the sales contract to the production manager. The manager will make adjustments to the production schedule to be done on time as agreed. The supervisor will then receive the production schedule and double-check if there is an unsuitable schedule. If there is a schedule mismatch error, the supervisor will coordinate with the manager and make re-adjustments. When the plan is correct, the supervisor will notify the production staff to start production according to the predetermined time. QC officers supervise the quality of the goods produced. After the goods are finished in production, the goods will be temporarily stored in the production plant. Supervisors will make an examination result report (LHP in Indonesian abbreviation) documents, which will then be given to the production manager. If the documents need improvement, the manager will notify the supervisor to make revisions to the LHP. When the manager has approved the record, LHP will be kept by the manager as the production section archive. At this point, it indicates the production process has been completed.

Production Execution

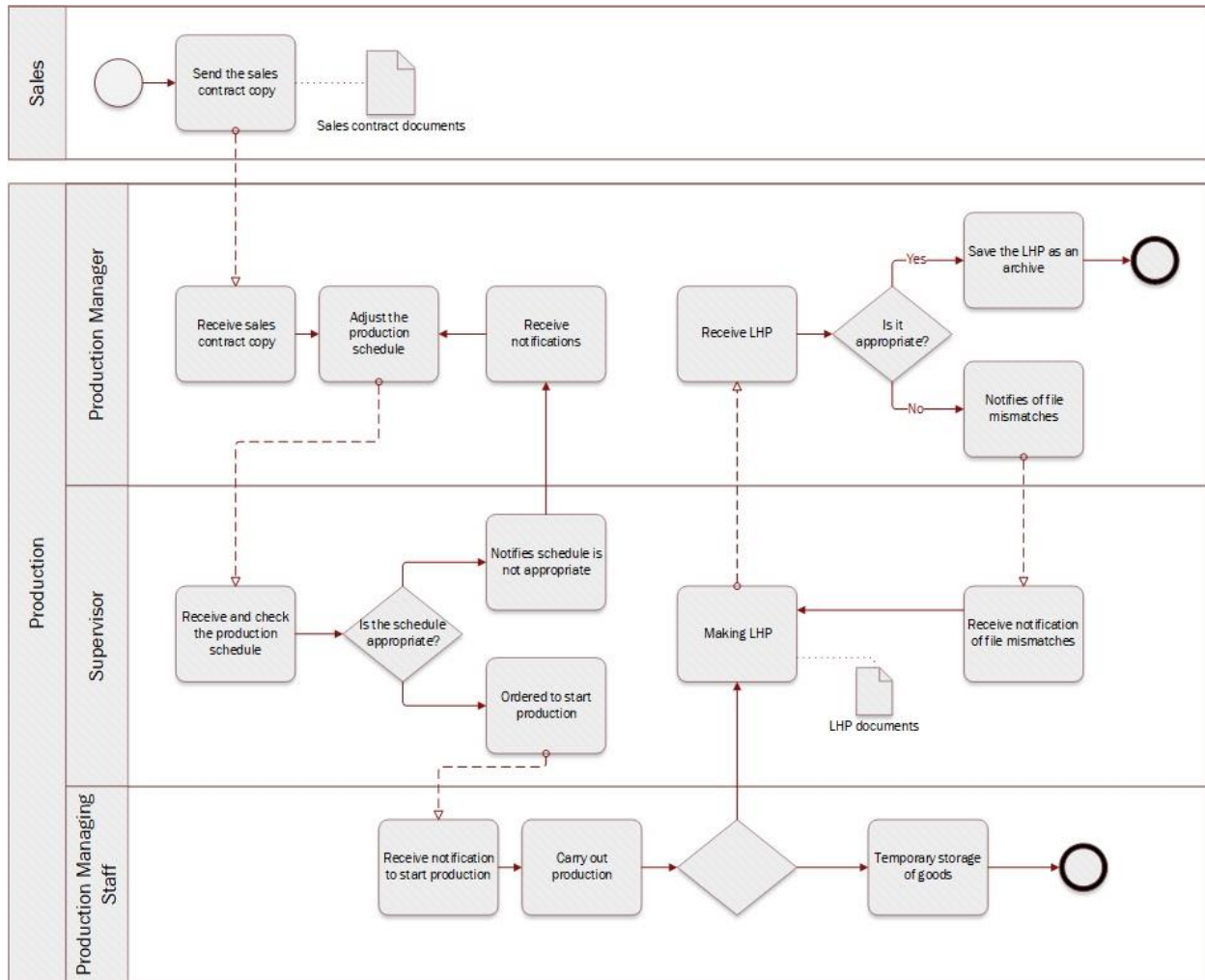


Figure 6. BPMN SCM Implementation of Goods Production MS Company

Figure 7 describes warehouse management after goods are produced. Goods that have been made at the factory will be moved to the warehouse as a storage area. This activity is a process of inbound goods. The finished goods will be stored in the warehouse so that security and supervision are more guaranteed. After the production department produces the goods, a notification will be made to the logistics department to transfer goods to the warehouse. The logistics department will record the transfer of goods to the warehouse and confirm the logistics department's transfer of goods. The production manager will make a Proof of Handover (BST in Indonesian abbreviation) and prepare the goods to be moved. Then the goods will be transferred to the warehouse, and the BST delivered with the goods. Goods received at the warehouse will be checked and then stored in the warehouse before being shipped. Simultaneously, the production department contacts the sales department to move to the warehouse and send through the warehouse.

The sales department will provide information to the delivery department and the warehouse department to deliver the goods. The warehouse department will prepare the goods to be shipped and make a final check so that there are no delivery errors. Goods will be submitted to

the delivery department and checked again by the delivery department. After that, the delivery department will send the goods to the customer, and the shipping process is complete.

Warehouse Management

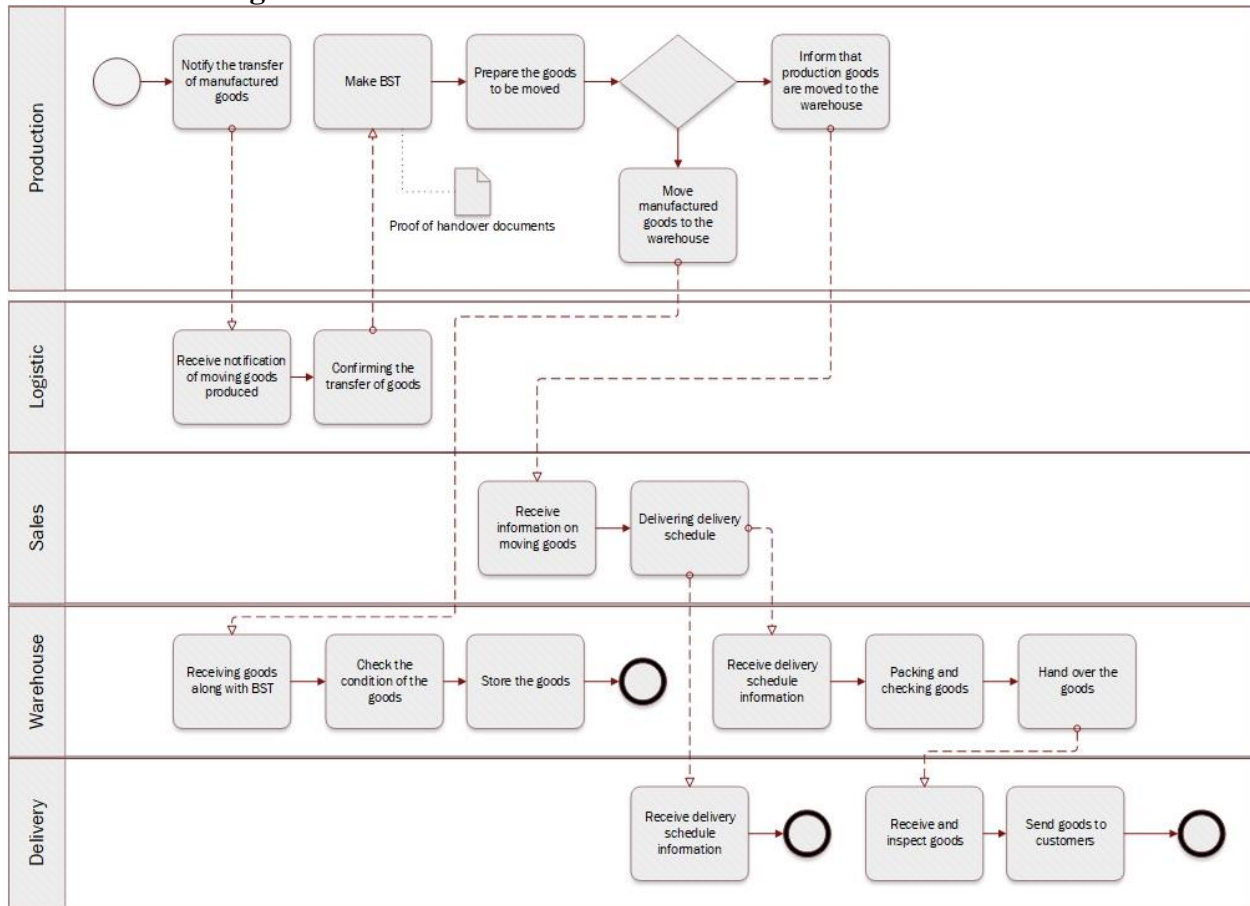


Figure 7. BPMN SCM Warehouse Management MS Company

Discussion

After changes and additions to existing business processes have been made, there are four business processes: Production Scheduling, Procurement, Production of Goods, and Delivery of Goods. Whereas in the previous journal, there were only three listed business processes: Raw Material Receipt, Production Implementation, and Ordered Goods Delivery.

Planning and scheduling is a form of decision making that is always used in many manufacturing and service industries. The decision-making process has an essential role in the procurement and production process (Pinedo, 2009). The production department carries out production scheduling after an order comes in from the customer to the sales department. This process is not described in the previous journal. Scheduling is done by analyzing the estimated production time carried out according to the production and warehousing departments' coordination. Coordination is carried out between the sales department, which provides information to the customer, the production goods department who adjusts the production schedule and

estimates the production time. The logistics department checks the stock of raw materials for production.

The next process is the process of procuring goods. This process is a process to fulfil the needs and supply of goods for business needs. The division that handles it is the Logistics Section. The logistics department at MS Company will be responsible for the process of supplying goods. The production department can submit requests for the procurement of goods at MS Company. To fulfil this request, the Logistics Department interacts with the Production Section that requires goods and the Warehousing Section where the goods are stored and with business partners/suppliers to get raw materials. The previous journal only included an explanation of ordering raw materials from suppliers (Miradji, 2014). The development is then carried out into a more comprehensive procurement of goods, including the fulfilment of raw materials from warehouses and suppliers.

An essential point in the procurement of goods at SCM is purchasing raw materials and supplies of raw materials for production (Daud, 2017). So changes are made to the goods receipt section. The goods are sent to the warehouse to be immediately stored in the warehouse. While the process at MS Company listed in the previous journal, the goods are held at the production plant. According to Miradji (2014), storage in a warehouse is considered safer and has less fraud. So, the goods are more appropriately stored in the warehouse.

The production process is a process that produces new products from existing raw materials. After an order comes in from the customer through the sales department, the production process is carried out, which informs the production department. One production session can last more than one day. Compared to previous journals, not too many changes were made to the production process and only added some conditions that could occur in a process.

Warehouse management includes entering (inbound) and removing (outbound) goods, picking and packing the goods needed by the company. The division that handles this process is the warehousing section. The warehousing department at this PT will be responsible for the warehouse management process. In carrying out its duties, this division interacts with other divisions. Warehouse management is divided into moving finished goods to the warehouse and shipping goods by the warehouse. In the business process in the previous journal, the products produced are stored in the production plant. Simultaneously, the finished goods are better separated so that they are safe and facilitate supervision. Warehouse management involves many divisions so that coordination must run well (Jermsittiparsert, Sutduean, & Sriyakul, 2019). The production department coordinates with the logistics department to record the transfer of goods into the warehouse, the warehouse section to move goods. The sales department, which receives information from the production department that the goods have been moved, will deliver delivery instructions to the warehouse section and the shipping section to carry out the shipment according to the appointed time.

This study describes the company's processes that have been described in Miradji (2014) by using BPMN. BPMN can clearly and show the process flow along with what parts of the company are involved (Rosmala & Falahah, 2007). By modelling business processes using BPMN, users and developers can analyze each business process's activities and system requirements more clearly and quickly (Krisantoso, Ap, Fajar, & Kharisma Makassar, 2015). The proposed BPMN is also enriched with additional discussion results and other literature described in the figures and this discussion.

CONCLUSION

This study discusses steps that can be taken by MS Company to correct deficiencies in the application of Supply Chain Management (SCM). This step can be done by modifying several business processes that have been implemented. These processes are the receipt of raw materials, implementing the production process, sending ordered goods into the procurement process, production scheduling, production implementation, and warehouse management. BPMN can be used to give detail and minimize errors so that the modified business process modelling is easy to understand and facilitates communication between business process designers and business process executors. Hopefully, by conducting the BPMN to improve SCM in MS Company, the company has better strategies to face the impact of the covid-19 pandemic. It is also suggested that further examination of the improved SCM is needed to prove the new SCM's success in the midst of the covid-19 pandemic.

This research's limitation is that the assessment is only based on reference journals and does not directly go to the company concerned because of the pandemic conditions. There are some deficiencies in the information and solutions provided. For further research, it can be done by direct observation of the object in question so that it can get more accurate and give optimal results.

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