

Assignment 1

Dock-to-Stock Process Modelling

Prepared and submitted by		
Hanh Nguyen		

TABLE OF CONTENTS

GROUP DECLARATION	1
1. EXECUTIVE SUMMARY	4
2. INTRODUCTION	5
3. PROCESS PROFILE	5
4. BUSINESS PROCESS MODEL	6
4.1 <i>Business Model Assumptions</i>	6
4.2 <i>Vertical Scope</i>	10
4.3 <i>Subprocess Justifications</i>	11
4.4 <i>BPMN Models</i>	13
4.4.1 <i>Screenshot of BPMN Model for Step 1-3</i>	13
4.4.2 <i>Screenshot of BPMN Model for Step 4-6</i>	13
4.4.3 <i>Screenshot of BPMN Model for Step 7-13</i>	14
5. OPPORTUNITIES FOR IMPROVEMENT	14
5.1 <i>Batch-oriented approach with unreasonable batch sizes</i>	14
5.2 <i>Full pallet requirement for process continuation</i>	14
5.3 <i>Ineffective use of human resource at the receiving area</i>	15
5.4 <i>No package tracking system and visibility</i>	15
5.5 <i>Refrigerator-required packages not identified</i>	15
6. CONCLUSION	15
7. REFERENCES	16

1. EXECUTIVE SUMMARY

(NMH), a leading academic medical center situated in _____, is deeply committed to enhancing the quality of patient care and service _____. Recognizing the critical role of supply chain efficiency in meeting the demands for exceptional healthcare experiences, NMH prioritizes the timely, accurate, and cost-effective procurement and distribution of medical supplies, guided by the principles of just-in-time inventory management. However, NMH faces significant challenges in its supply chain operations, particularly with the long lead time for package delivery from the receiving area of the dock to the final destination in the hands of the internal customer who purchased the medical supplies. Currently, the hospital's dock-to-stock process lead time is three days on average, leading to issues such as delayed delivery of essential medical products, excessive inventory stockpiles, and safety hazards for receiving area staff and more.

To address these challenges and streamline operations, a thorough analysis of the process identification and process discovery phases of the BPM lifecycle was conducted based on the provided case study. Alongside this report, a comprehensive business process model was developed, representing the existing state of the dock-to-stock process (as-is process model). This report includes a process profile providing detailed insights into the process, including its name, type, ownership, outcomes, and other essential details. Additionally, fundamental assumptions were identified to facilitate a deeper understanding of the model. The analysis also examined NMH's value chain, with a specific focus on the dock-to-stock process. Critical sub processes within the value chain were identified, each supported by rationale for their inclusion. Finally, the report concludes with ideas for process improvements aimed at aligning NMH's operations with its long-term business goals. These ideas will guide the organization in optimizing its dock-to-stock processes and achieving greater efficiency and effectiveness in internal healthcare goods delivery.

2. INTRODUCTION

As NMH continues to struggle with challenges such as long lead times and uncertain delivery dates, which hinder the internal material flow, particularly from the receiving area to par locations. These deficiencies have resulted in issues such as late or incomplete deliveries, item misplacement, overstocking, and inaccuracies in inventory records, leading to significant costs for NMH. Therefore, it is crucial to review the current dock-to-stock process, identify limitations, and implement improvements.

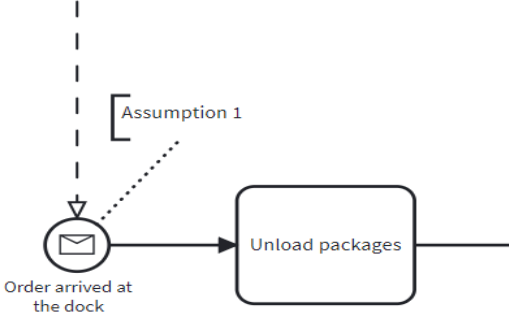
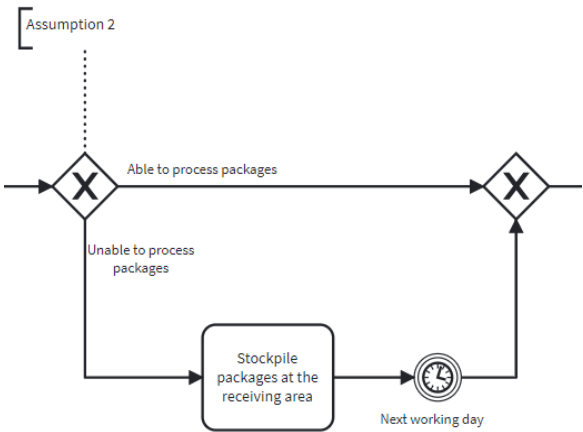
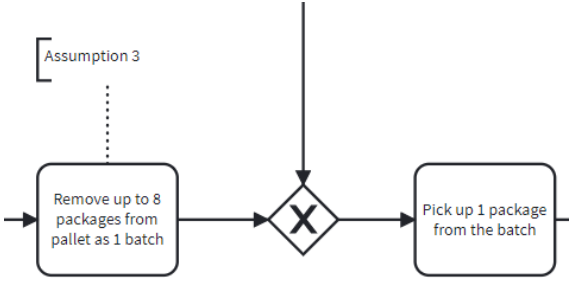
3. PROCESS PROFILE

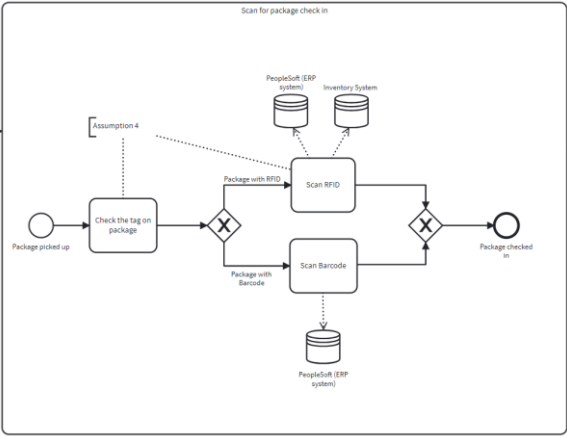
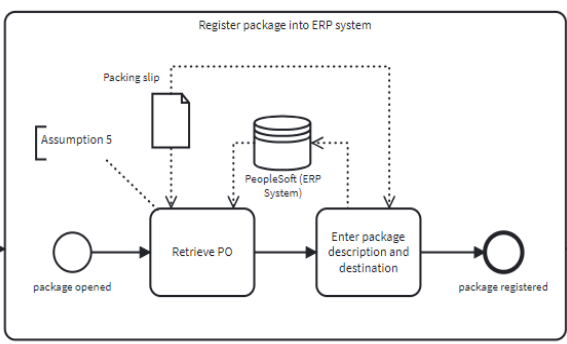
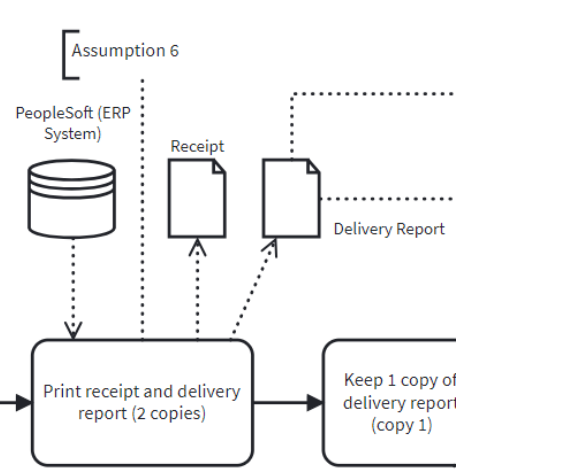
Process Name	Internal material delivery
Process Type	Dock-to-stock
Process Owner	Supply Chain Performance Manager
Customer of the process	Internal hospital's clinicians and staff
Expectation of the customer	Timely receive all their ordered packages in one delivery, with accuracy, and without any losses.
Trigger(s) of the process	Orders arrived at the dock
Outcome(s) of the process	<p><i>(positive)</i> On-time and complete order delivery to par locations, with accurate items and quantities.</p> <p><i>(negative)</i> Infrequent, late, or/and partial deliveries.</p> <p><i>(negative)</i> Misplaced packages.</p> <p><i>(negative)</i> Failure to deliver due to insufficient space at both par locations and temporary storage.</p>
Resources involved	Couriers, dock team, receiving area's working staff, internal customers
Business objects	Delivery report, receipt, packing slip, ERP system, inventory system
Process performance measures	<ul style="list-style-type: none"> • Average lead time from dock to par locations • Average lead time for package sorting at the receiving room • Average wait time of package at the receiving area before processing • Percentage of late deliveries • Percentage of lost deliveries • Percentage of repeat orders

4. BUSINESS PROCESS MODEL

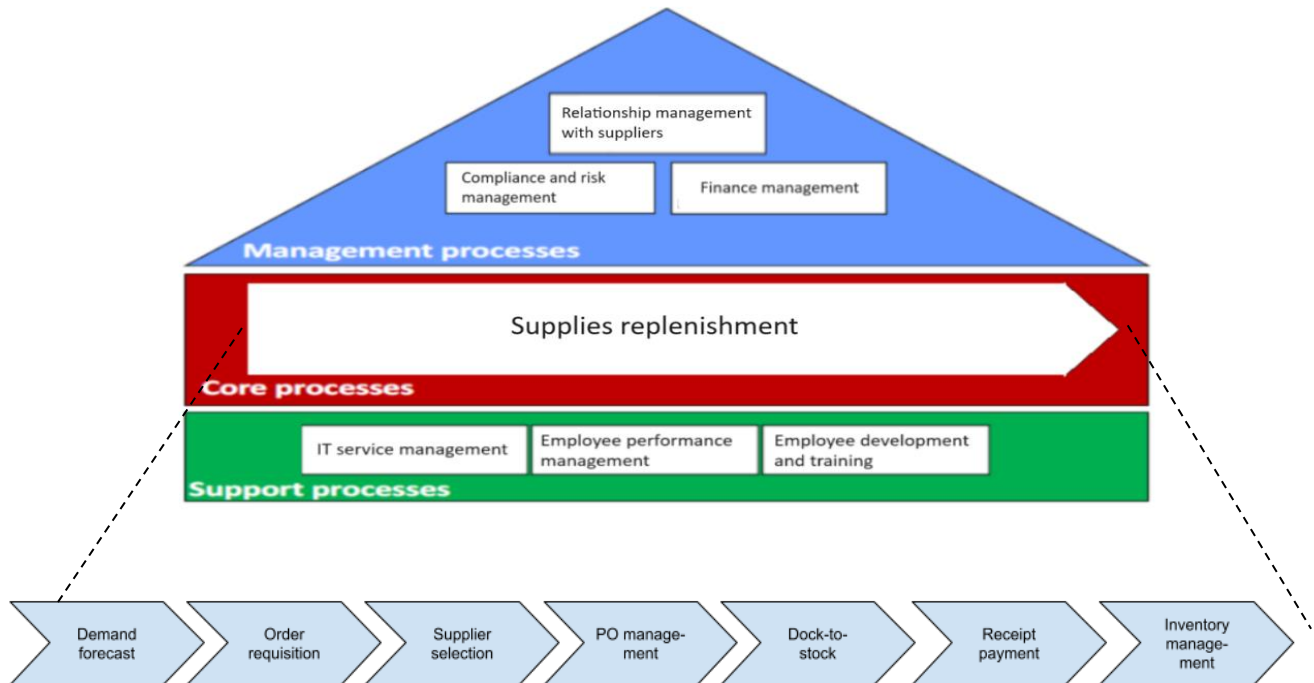
4.1 Business Model Assumptions

The following session outlines the assumptions made during the modelling of the business model for the internal package delivery process (dock-to-stock). 12 assumptions are presented in total.

No.	Process	Justification
1		Our process starts with the event 'Order arrived at the dock' because it models the delivery of the entire purchase order made by the customer. We have assumed that each delivery corresponds to one receipt, representing one purchase order, each receipt may contain one or more packages.
2		In this step, we have assumed that if the dock team works overtime due to deliveries outside the designated time windows, it is considered as being 'able to process packages.' In such cases, they will proceed to the next step, which involves loading packages onto pallets. Otherwise, if the staff does not work overtime to handle the packages, they will wait until the next working day to proceed loading the packages onto the pallets.
3		In this step, we have assumed that the team will always process 8 packages as one batch at a time. If there are fewer than 8 packages left on the pallet, they will process whatever remains. Therefore, the activity is written 'up to 8 packages.' While the team handles 8 packages collectively as one batch, it is important to note that we assume the team still processes each package individually within the batch.

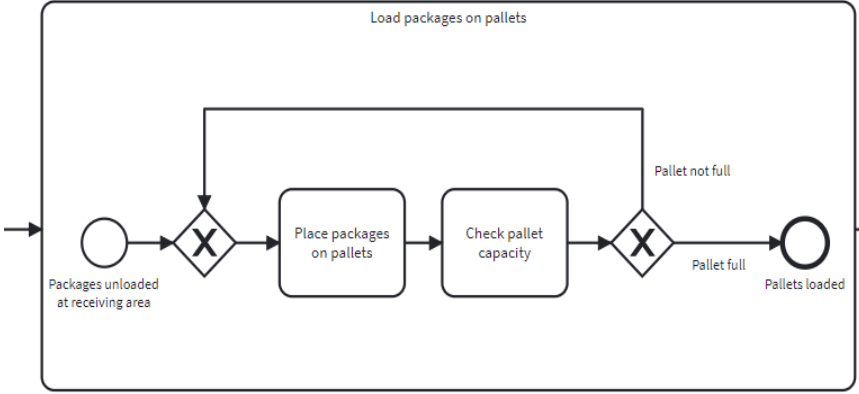
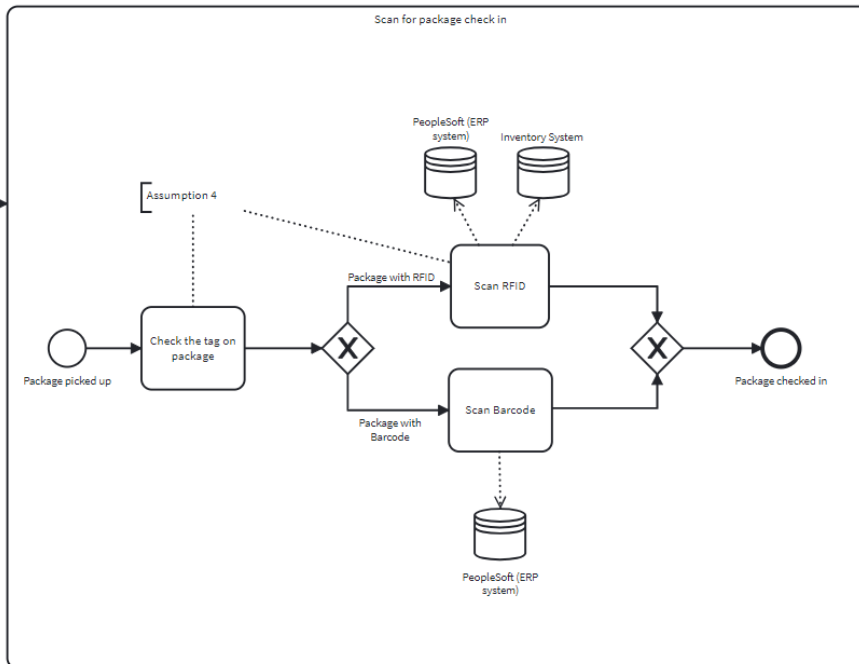
4	 <p>Scan for package check in</p> <p>Assumption 4</p> <p>Package picked up</p> <p>Check the tag on package</p> <p>Package with RFID</p> <p>Scan RFID</p> <p>Package with Barcode</p> <p>Scan Barcode</p> <p>Package checked in</p> <p>PeopleSoft (ERP system)</p> <p>Inventory System</p>	<p>In this step, we have assumed that the receiving area staff can differentiate between various types of tags on packages by visually identifying them, and these tags are located outside the packages.</p> <p>According to the case study, only packages labeled with RFID are logged into the inventory system. As the ERP system is synchronized with the inventory system, we have assumed that data would automatically transfer to the ERP system after being logged into the inventory system. Therefore, both the ERP and inventory systems are considered as data stores for packages with RFID tags.</p> <p>For packages labeled with barcodes, we assume that they are only checked into the ERP system; therefore, the ERP system is the only data store for these packages.</p>
5	 <p>Register package into ERP system</p> <p>Assumption 5</p> <p>package opened</p> <p>Packing slip</p> <p>Retrieve PO</p> <p>Enter package description and destination</p> <p>package registered</p> <p>PeopleSoft (ERP System)</p>	<p>In this subprocess of registering package details into the ERP system, we have assumed that the purchase order (PO) number used to retrieve the PO from the system is found on the packing slip. Additionally, registering the package involves entering the package description and destination associated with the retrieved PO, and this information is assumed to be taken from the packing slip as well.</p>
6	 <p>Assumption 6</p> <p>PeopleSoft (ERP System)</p> <p>Receipt</p> <p>Delivery Report</p> <p>Print receipt and delivery report (2 copies)</p> <p>Keep 1 copy of delivery report (copy 1)</p>	<p>In this step, we have assumed that the receipt and delivery reports are generated and printed through the ERP system, with the ERP system serving as the input data store object and the receipt and delivery reports as the output data objects.</p>

4.2 Vertical Scope



Level 2	
1.	Demand Forecast
2.	Order requisition
3.	Supplier
4.	PO management
5.	Dock-to-stock
6.	Receipt payment
7.	Inventory management
Level 3	
1.	Load package on pallets
2.	Scan for package check-in
3.	Sort package at receiving room
3.1	Register package into ERP system

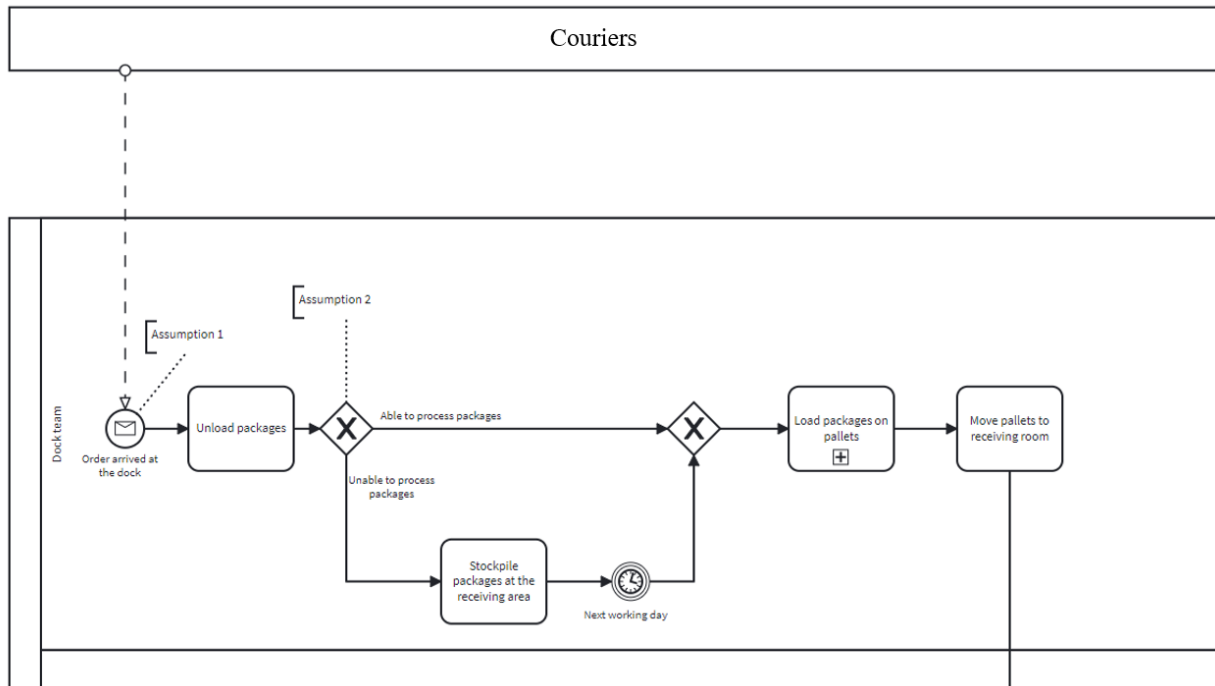
4.3 Subprocess Justifications

No.	Subprocess	Justification
1	<p>Load package on pallets</p>  <pre> graph LR Start(()) --> D1{X} D1 -- "Pallet not full" --> A[Place packages on pallets] A --> B[Check pallet capacity] B --> D1 D1 -- "Pallet full" --> D2{X} D2 --> End(()) </pre>	<p>The process of loading packages onto pallets involves looping and related activities such as “Place packages on pallets” and “Check pallet capacity”. Therefore, making it into a subprocess helps with the understanding of the model (Dumas et al., 2018).</p>
2	<p>Scan for package check-in</p>  <pre> graph LR Start(()) --> A[Check the tag on package] A --> D1{X} D1 -- "Package with RFID" --> B[Scan RFID] D1 -- "Package with Barcode" --> C[Scan Barcode] B --> D2{X} C --> D2 D2 --> End(()) PS1[(PeopleSoft ERP system)] -.-> B IS[(Inventory System)] -.-> B PS2[(PeopleSoft ERP system)] -.-> C </pre>	<p>The check-in package activity occurs at two points of time in this process:</p> <ol style="list-style-type: none"> 1. When the package is received at the receiving room (step 4) 2. When the package is received at the par location (step 9) <p>Therefore, the aim of this subprocess is to reuse the steps in this activity multiple times (Dumas et al., 2018).</p>

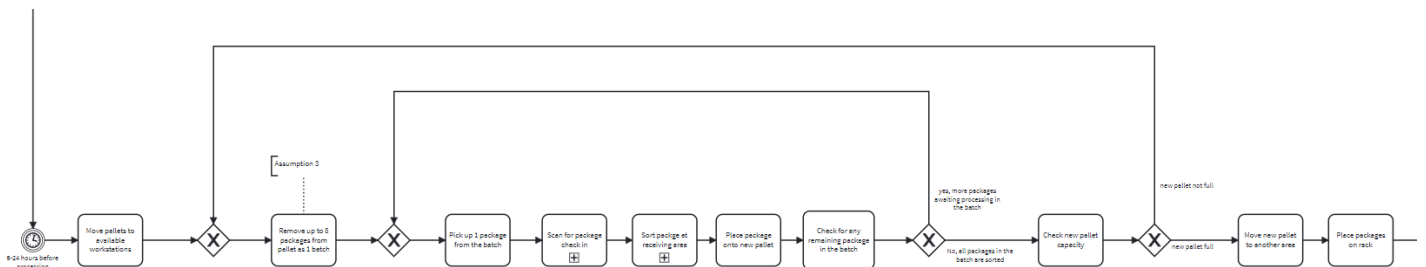
4.4 BPMN Models

This session presents screenshots of the BPMN model depicting the dock-to-stock process. Due to its size, the model has been broken down based on process steps. Additionally, a complete BPMN model has been submitted for clearer and more readable representation.

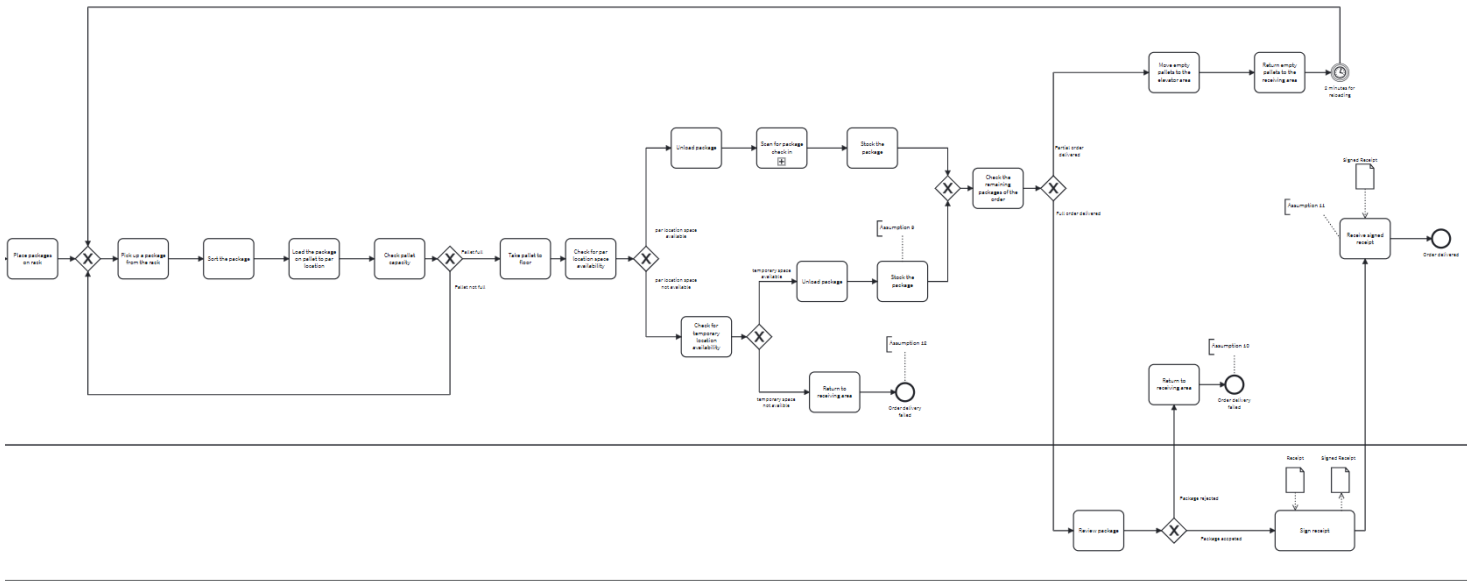
4.4.1 Screenshot of BPMN Model for Step 1-3



4.4.2 Screenshot of BPMN Model for Step 4-6



4.4.3 Screenshot of BPMN Model for Step 7-13



5. OPPORTUNITIES FOR IMPROVEMENT

5.1 Batch-oriented approach with unreasonable batch sizes

The predominant use of a batch-oriented approach across most process steps has significant, interlinked impacts on the entire process, making it the primary area for improvement. Specifically, this method results in substantial time wastage and ineffective batch size. For instance, processing each batch can take up to 25 minutes (as observed in step 6). Furthermore, this leads to prolonged waiting times at step 3, ranging from 8 to 24 hours, potentially resulting in packages remaining overnight at the receiving area. These delays contribute to stagnant stock and considerable process delays overall. Consequently, the extended lead time makes internal customers to overstock par locations due to delayed deliveries. As a result, stock must be stored at temporary locations, leading to untracked supplies and ineffective inventory management.

5.2 Full pallet requirement for process continuation

The requirement for pallets to be fully loaded before moving them contributes to unnecessary delays in the process, hindering efficiency and extending the average delivery lead time. For instance, if an incoming order fails to fill an entire pallet, it must wait to be combined with another order. Consequently, there is a possibility that the subsequent order would be too large to fit onto the same pallet and may need to be split into smaller deliveries, resulting in additional workload to manage them under a single purchase order. Furthermore, the ad hoc loading of packages onto pallets and delivering them without following a pre-scheduled timeline can disrupt the process and resource allocations. This may result in delayed deliveries for internal customers or insufficient personnel available to receive the items.

5.3 Ineffective use of human resource at the receiving area

The lack of clearly defined roles for receiving area staff contributes to an increase in their workload and the performance of unnecessary tasks. For example, staff may spend excessive time searching for missing or misplaced items, disrupting the continuity of the overall process. Additionally, redundant activities such as printing multiple delivery forms and manually recording information create a risk of human errors in the ERP system. Furthermore, the lack of metrics to measure the performance of the receiving area worsens the issue, as it hinders the identification of exact bottlenecks for improvements. Therefore, addressing this matter is crucial for enhancing the efficiency of the process.

5.4 No package tracking system and visibility

The uncertainty regarding delivery dates arises from the absence of a systematic approach to track packages, confirm their arrival at specific destinations, and maintain visibility throughout the delivery process. This lack of clarity is compounded by the absence of well-defined delivery routes, standardized procedures for drop-offs, and effective visual management methods. Without these crucial elements, the coordination and efficiency of delivery operations suffer, leading to delays, errors, and customer concerns about potential shortages. Consequently, customers tend to over-order, which worsens inventory management and increases costs for the business. Addressing these interconnected challenges is essential for establishing visibility and enhancing the efficiency of delivery operations.

5.5 Refrigerator-required packages not identified

The lack of a labelling system and defined handling steps for packages requiring refrigeration is worsened by long processing lead times. Consequently, packages often spoil as they are not promptly identified at the beginning of the process. This results in adverse outcomes such as customers needing to spend extra time ordering replacement packages, leading to inconvenience and duplicated effort. Additionally, the business faces a significant financial burden, as the costs associated with replacing spoiled packages soar.

6. CONCLUSION

In conclusion, following the analysis of the process identification and process discovery phases of the BPM lifecycle, including modelling the as-is process of the current dock-to-stock process, several areas for improvement have been suggested for NMH to enhance its dock-to-stock process. Through further analysis steps such as process analysis and process redesign, NMH can continue to refine its business processes in alignment with its business objectives and goals. This ongoing effort to optimize operations will ultimately contribute to improved efficiency, reduced costs, and enhanced service delivery for NMH and its stakeholders.