National Economics University

School of Advanced Education Program

Information System Final Exam Report

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Ha Noi, May 19, 2025

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1 Introduction.

1.1 Description of the furniture company

Our furniture company specializes in designing, manufacturing and retailing high-quality, stylish, and functional furniture for homes and offices. With a focus on craftsmanship production, sustainability, and customer satisfaction, we offer a wide range of products that blend modern design with lasting comfort.

1.2 Objectives of the furniture company

We establish specific objectives to guide our strategies and business operations in order to achieve optimal performance in the market:

- Provide durable and aesthetically pleasing furniture that meets the diverse needs of the customers.

- Ensure excellent customer service and post-sale support.

- Promote sustainability by using eco-friendly materials and processes.

- Expand market presence locally and establish a representative branding for furniture in the domestic market.

- Continuous innovation in design and production to stay ahead of industry trends.

1.3 Module overview in Odoo

- **Manufacturing Module**

Purpose: The Manufacturing module in Odoo is designed to support businesses in planning, scheduling, and managing their production processes. It ensures that production operations are executed efficiently, with real-time tracking of resources and outputs.

Key Functions: Creating production order, generating work orders, confirming the completion of a manufacturing order and moving finished products into inventory, reporting

- **Inventory Module**

Purpose: The Inventory module handles all operations related to product storage, stock movement, and quantity management. It supports multiple warehouses, traceability, and integration with other modules like Sales, Purchase, and Manufacturing.

Key Functions: Checking availability, creating replenishment, creating and updating products, managing stocks

- **Quality Module**

Purpose: The Quality module enables businesses to implement and monitor quality control processes throughout the supply chain. It ensures compliance with product standards through inspections and quality checks.

Key Functions: Creating quality checks, validating check, recording reasons or messages when a product fails a quality inspection

2 Description of stakeholders.

Stakeholders	Responsibility	Function
Production Planning Staff	The Production Planning Staff is responsible for defining product details, establishing the bill of materials (BOM), setting up manufacturing routes, and managing both work and replenishment orders.	They perform essential setup tasks such as adding new products and components, configuring manufacturing processes, and ensuring automatic replenishment rules are correctly defined and triggered.
Production Staff	The Production Staff is responsible for executing the production activities, operating machinery during manufacturing, and recording actual production data throughout the process.	Their function includes starting and continuing work orders, assigning and confirming tasks, and reporting production progress and completion in alignment with BOM instructions and real durations.
Facility Engineer	The Facility Engineer is responsible for maintaining the operational readiness of production equipment and responding promptly to machinery breakdowns during production processes.	Their function is to conduct inspections, carry out equipment maintenance, and perform emergency repairs when machines fail, helping to minimize downtime and maintain workflow continuity.
Quality Team	The Quality Team is responsible for designing quality control checkpoints, executing inspection procedures, and addressing any product failures identified during testing.	They set up test criteria, evaluate product quality through inspections, determine if products meet required standards, and record failure messages for any items that do not pass quality control.

Table 2.1: Stakeholders description

3 BPMN Main Process Description.

Success Path: Our BPMN illustrates the main manufacturing process within a single pool consisting of four lanes: **Production Planning Staff, Production Staff, Facility Engineer,** and **Quality Team**

When the system detects demand based on replenishment rules, it automatically generates a replenishment order. The system then checks for component availability. If components are insufficient, it triggers procurement requests handled by the **Purchasing** and **Warehouse** teams (from a separate process). If components are sufficient, a manufacturing order is created 1-by-1 — each assigned a unique serial number —and the Production Staff carries out the production.

The Execute Production Process begins with scheduling a production date, followed by assigning an employee to the task. Once assigned, the employee starts or continues the work order, which references the Bill of Materials (BOM). After the work is completed, the work order is confirmed, and then the employee is assessed based on their performance. The assessment considers both the real duration of the task and the expected duration derived from the BOM. The process concludes when production is marked as completed.
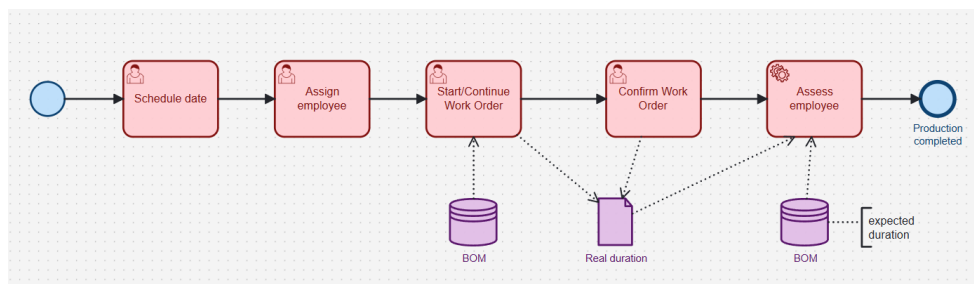

Figure 3.1: Production Process.

For more information, visit Main Process

Once production is completed, the **Quality Team** performs a quality check, using quality control points and serial number to inspect the product. Products that meet standards are marked as "Passed"; those that do not are recorded as scrapped.

Afterward, the process evaluates whether all required quantities have been produced. If not, the Production Planning Staff will generate back orders to fulfill the remaining quantities. The items produced successfully are reviewed and summarized. Any non-qualified products are classified as scrap and will be removed from the batch. The number of pass or fail products is then summarized. If all products pass, the manufacturing process concludes successfully.
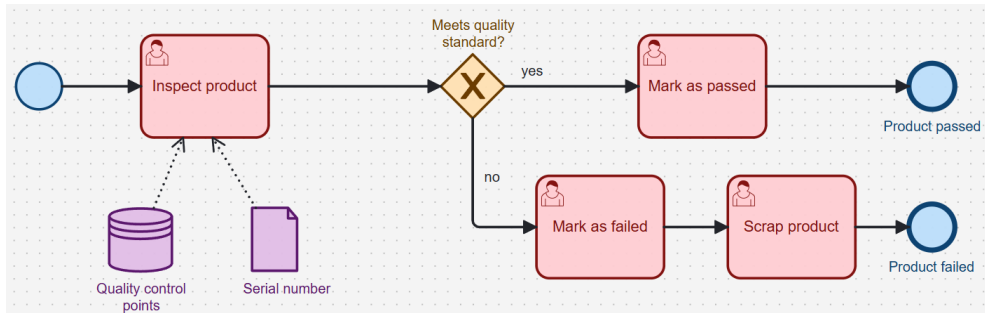
Figure 3.2: Quality check subprocess.

Exception 1: Should an escalation event occur (e.g., machine breakdown during production), all active work orders are paused, and the Production Planning Staff must issue a maintenance order for repair.
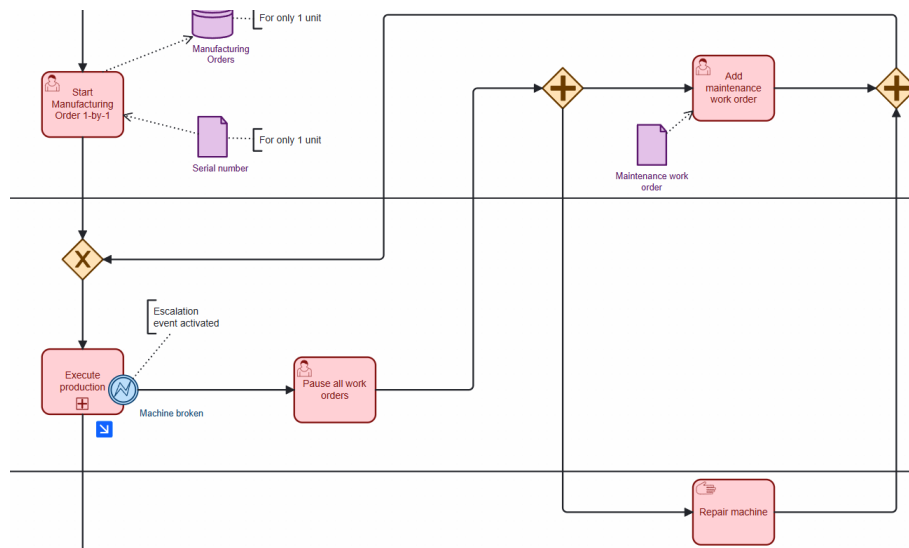

Figure 3.3: Exception 1.

Exception 2: If any product fails, the scrapped quantities are reported from the end of the previous process via an end signal event. A start signal event then receives this quantity information and initiates a new manufacturing process.

Data Objects:

- BOM (from Bill of Materials subprocess): Bill of Materials are input for Manufacturing Orders creation, in which the system uses BOM for checking component availability. It is also used for starting/continuing work order task and assessing employer task in production process.

- Quality control points (from Quality Control Point process): Used for inspecting products in assessing product quality
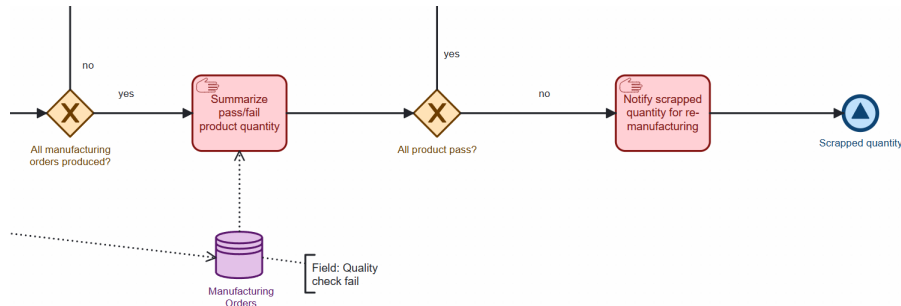
8

Figure 3.4: Exception 2.

For more information, visit *Main Process*

- Serial Number: Is attached to new products being produced, using for classifying independent products

- Manufacturing Orders: Are created when replenishing requests for new products being made. Manufacturing orders are input for adding maintenance work order task, summarizing failed/passed product quantity, it is also output for stage of confirming completion of manufacturing orders, in which the status is marked as "Done"

4 Subprocess Description.

4.1 Quality control points

The Quality control point process outlines the setup of quality control procedures by the Quality Team. The process begins with creating quality control points, then adding the related product from the product and component catalog database. Next, the team sets the control frequency per product, followed by defining the test type as pass/fail. The location where failures may occur is then specified. Afterward, inspection instructions are added, and finally, failure messages are defined. All these details are saved under quality control points to guide future inspections.
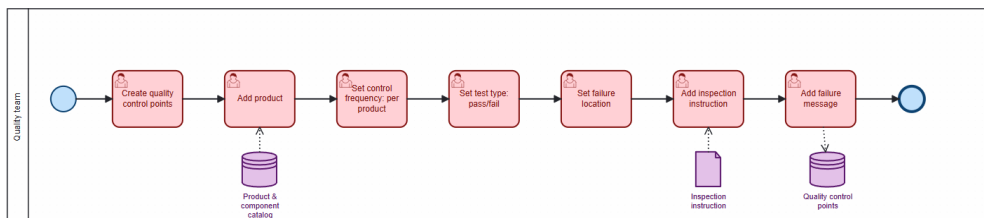

Figure 4.1: Quality control points subprocess

For more information, visit *Quality control points.*

Output data objects: Quality control points

4.2 Bill of Materials

The BOM process illustrates how the Production & Planning Staff sets up a new manufactured product and prepares its Bill of Materials (BOM). It begins with adding the new product to the system and enabling serial number tracking. The product is then classified as "manufactured", and required components are added. If a component is entirely new, it is first registered in the component catalog database. Once all components are confirmed, work orders are created based on manufacturing rules and assigned work centers. Finally, the BOM is saved, making the product ready for manufacturing.
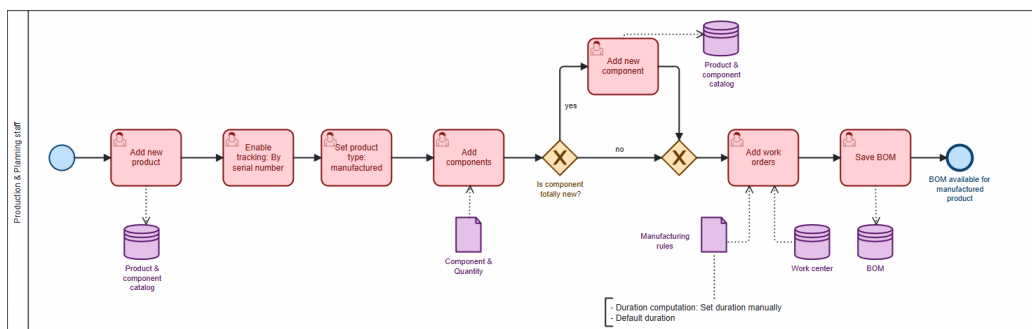

Figure 4.2: Bill of Materials subprocess

For more information, visit Bill of Materials

Output data objects: Bill of Materials

4.3 Minimum stock check

The Minimum stock check process illustrates how the Production Planning Staff configures an automatic replenishment rule for a manufactured product. The process begins with creating a replenishment rule, followed by selecting the product from the product and component catalog. Minimum and maximum inventory quantities are then defined to establish stock thresholds. Next, the appropriate manufacturing route is assigned. Finally, the trigger is set to "Automatic," enabling the system to automatically generate manufacturing orders when stock levels fall below the minimum threshold. The process concludes with the replenishment rule successfully configured.

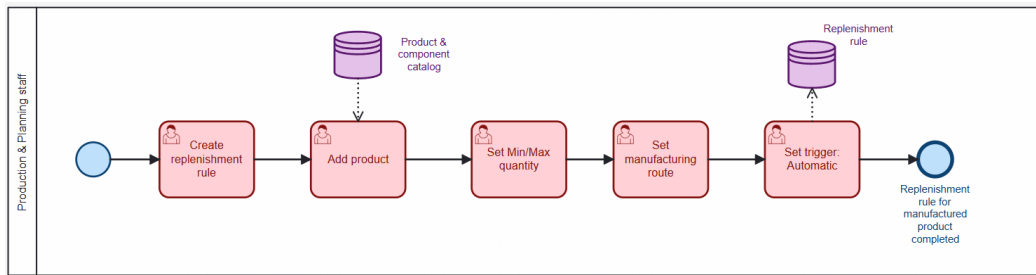Figure 4.3: Minimum stock check subprocess

For more information, visit Minimum stock check.

Output data objects: Replenishment rule

5 Application on Odoo.

5.1 Create new product

After accessing the Inventory module, users can create a new product by filling in all necessary information such as product name, type, sales price, cost, and inventory tracking method.

Figure 5.1: New product created

Once the product is successfully created, it will appear in the list of existing products.
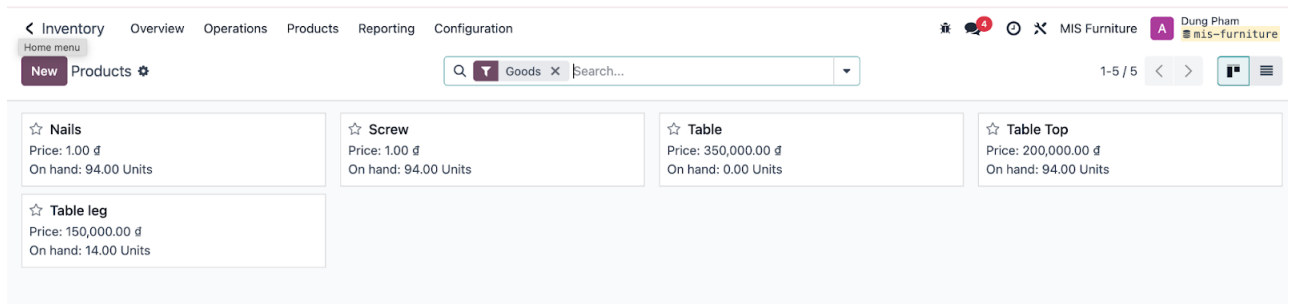
Figure 5.2: Products Inventory

Table 5.1 describes the step-by-step process for creating a new product in the Odoo system.

Description	Create new product	
Perform by	Production Planning Staff	
Basic flow	**Step**	**Activity**
	1	Click on Inventory module
	2	Click on Operations in toolbar
	3	Select 'New'
	4.1	Create product name, select 'Sales' or 'Purchase' Flags (**description below)
	4.2	Set 'product type', 'track inventory', 'route', 'sales price', 'cost', select or create new 'category' (**description below)
	5	Click 'Save'

Table 5.1: Steps to create a new product

Table 5.2 outlines the structure of the "Product & Component" data object used in the Odoo system. This standard format helps store and manage product-related information such as product code, type, inventory tracking method, bill of materials (BoM), and pricing.

No.	Data field	Describe	Obligatory?	Valid conditions	Example
1	Product/ Component ID	Unique identifier for the product	Yes	Unique	PRD001
2	Product/ Component name	Full name of the product	Yes	Text, max 255 characters	Table
3	Product Type	Type of product	Yes	Goods / Service / Combo	Goods
4	Product Category	Category of the product	Yes	Product/ Component	Product
5	Quantity on hand	Quantity of the product	Yes	Positive number	1.00
6	Bill of Material	Finished product with BoM	Yes	Product category = Product	Table
7	BOM components	Components used in BoM	Yes	Product category = Component	Table leg
8	Track Inventory	Inventory tracking method	Yes	By unique serial number / By quantity / By lot	By unique serial number
9	Valuation by Lot/Serial Number	Tracking the cost and value of individual items based on their unique lot or serial number	No	TRUE / FALSE	TRUE
10	Sales Price	Selling price	Yes	Positive number	3,500,000
11	Cost Price	Purchase or production cost	No	Positive number	2,100,000

Table 5.2: Product & Component Table

ID	Name	Product Type	Product Category	Quantity On Hand	Bill of Materials	BoM Components	Tracking	Valuation by Lot/Serial number	Sales Price	Cost
__export__.product_template_6_b655570c	Nails	Goods	Component	94.0		Nails	By Quantity		1.0	10.0
__export__.product_template_7_da0e62b3	Screw	Goods	Component	94.0		Screw	By Quantity		1.0	10.0
__export__.product_template_8_f89006c3	Table	Goods	Product	0.0	Table		By Unique Serial Number	TRUE	350000.0	250020.0
__export__.product_template_4_69abc5b7	Table Top	Goods	Component	94.0		Table Top	By Quantity		200000.0	150000.0
__export__.product_template_3_5e98e659	Table leg	Goods	Component	14.0		Table leg	By Quantity		150000.0	100000.0

Figure 5.3: Products (extracted from Odoo)

5.2 Create Bill of Materials

The first step in preparing for manufacturing is to define the product's Bill of Materials (BoM). Figure 5.4 shows how a new BoM is created for a selected product.

Figure 5.4: Create Bill of Materials

In addition to defining the components, it is necessary to specify the operations required for manufacturing. The interface below allows users to add operation steps to the BoM.
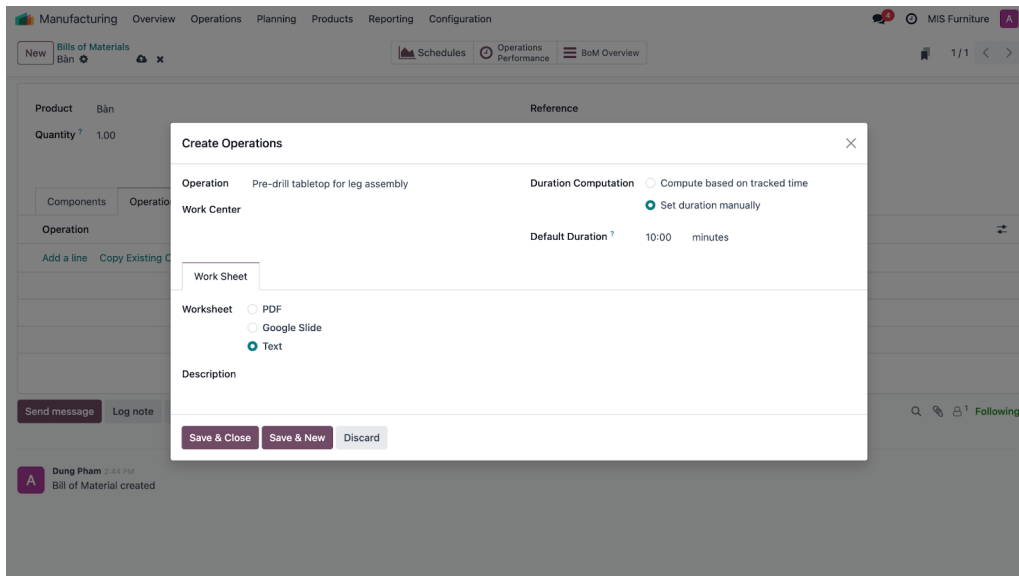
Figure 5.5: Create Operations for Work Orders

Table 5.3 outlines the step-by-step process for creating a Bill of Materials in Odoo. It clarifies the tasks performed by production planning staff to configure manufacturing details.

Description	Create Bill of Materials	
Perform by	Production Planning Staff	
Basic flow	**Step**	**Activity**
	1	Click on Manufacturing app
	2	Click on 'Products' module, then select 'Bill of Materials'
	3	Select 'New'
	4	Select product name, specifies the required quantity per BoM, select BoM type (**description below)
	5	In 'Component', select "Add a line" to input components to manufacture a product, specify the required 'quantity' for each component (**description below)
	6	Select 'Operations', then select 'Add a line', then enter the information into the system as prompted by the window. (**description below)
	7	Click 'Save'

Table 5.3: Create Bill of Materials

Table 5.4 describes the data structure of the Bill of Materials object in the Odoo system.

No.	Data field	Describe	Obligatory?	Valid conditions	Example
	BILL OF MATERIAL TABLE				
1	BoM ID	Unique identifier for the Bill of Materials	Yes	Unique	BOM001
2	Product ID	Finished product linked to this BoM	Yes	Must exist in Product Table	PRD001
3	Quantity to Produce	Minimum quantity of products which can be produced per BoM	Yes	Positive integer	1
4	BoM lines/Quantity	Quantity of components used to manufacture a product	Yes	Positive integer	4
5	BoM Type	Type of BoM	Yes	Manufacture this product / Kit	Manufacture this product

Table 5.4: Bill of Materials table

Bill of Material

Reference	Product	BoM Type	Quantity	BoM Lines	BoM Lines/Quantity
	Table	Manufacture this product	1.0	Table Top	1.0
				Table leg	4.0
				Screw	4.0
				Nails	4.0

Figure 5.6: Bill of Materials (extracted from Odoo)

Table 5.5 explains the structure of a work order object, including key attributes such as operations, work center, responsible employee, and status.

WORK ORDER TABLE					
No.	Data field	Describe	Obligatory?	Valid conditions	Example
1	Work Order ID	Unique identifier for the work order	Yes	Unique	WO003
2	Work Center	Work center / workshop location	No	Existing work center	Assembly Workshop
3	BoM ID	Linked BoM for the operation	Yes	Must exist in BoM Table	BOM001
4	Operation Name	Name of the operation step	Yes	Text	Assemble Table
5	Product ID	Product linked to this BoM	Yes	Must exist in Product Table	PRD001
6	Expected Duration	Estimated time to complete the operation	Yes	Positive number	45 minutes
7	Responsible Employee	Assigned employee for the operation	No	Must exist in Employee Table	NV001
8	Status	Status of the work order	Yes	Ready/Finished/ Cancelled	Ready

Table 5.5: Work Order Table

Figure 5.7: Work Order

5.3   Create Replenishment

To ensure sufficient stock levels, replenishment rules can be set up in the Inventory module. The following screen shows the interface for defining such rules.

Figure 5.8: Create Replenishment

Table 5.6 summarizes the basic steps to create a replenishment rule in Odoo, including setting product thresholds and trigger types.

Description	Create replenishment to auto send "Requests for quotations" to suppliers or create new manufacturing orders.	
Perform by	Production Planning Staff	
Basic flow	**Step**	**Activity**
	1	Click on Inventory module
	2	Click on 'Replenishment' in the 'Operations' dropdown menu
	3	Select 'New'
	4.1	Select 'product name', 'location', 'route', 'vendor', 'trigger' (**description below)
	4.2	Set minimum and maximum quantity of a product (**description below)

Table 5.6: Create Replenishment

Table 5.7 describes the structure of the minimum inventory rule object. It specifies how restocking is triggered and managed for each product.

MINIMUM INVENTORY RULE TABLE					
No.	Data field	Description	Obligatory?	Valid conditions	Example
5	Vendor	Vendor if the route is Buy	No	Exist in Vendor list	tdht company
6	Trigger	How the replenishment is triggered	Yes	Manual / Automatic	Automatic
7	Minimum Quantity	Minimum stock quantity to trigger replenishment	Yes	Positive integer	5
8	Maximum Quantity	Maximum allowed stock quantity	No	Positive integer	100

Table 5.7: Minimum inventory rule table

Minimum Inventory Rule

Rules used	Product	Location	Route	Vendor	Trigger	Min Quantity	Max Quantity	To Order
WH: Stock (Buy)	Table leg	WH/Stock	Buy	tdht	Auto	4.0	20.0	0.0
WH: Stock (Buy)	Table Top	WH/Stock	Buy	tdht	Auto	10.0	30.0	0.0
WH: Stock (Buy)	Screw	WH/Stock	Buy	tdht	Auto	20.0	100.0	0.0
WH: Stock (Buy)	Nails	WH/Stock	Buy	tdht	Auto	20.0	100.0	0.0
WH: Stock (Production)	Table	WH/Stock	Manufacture		Auto	1.0	3.0	3.0

Figure 5.9: Minimum Inventory Rule (extracted from Odoo)

5.4 Create quality control points

Before any manufacturing order is confirmed and executed, quality control points must be defined to ensure production meets required standards. The screen of figure 5.10 shows how these control points are created in the system.

Figure 5.10: Create quality control points

Figure 5.11: Message if failure

Table 5.8 summarizes the steps performed by the Quality team to define control checkpoints and inspection criteria in Odoo.

Description	Create quality control points
Perform by	Quality team
Basic flow	**Step Activity**
	1 Select 'Quality' module, select Control points' in 'Quality Control' dropdown menu
	2 Select 'New'
	3 Enter the required/non-required information into the system (**description below)
	3 Provide 'Instructions', 'Message If Failure' (**description below)
	4 Click 'Save'

Table 5.8: Create quality control points steps

Table 5.9 outlines the data structure of the Quality Control Point object. It includes fields such as inspection type, frequency, related product or operation, and responsible team.

No.	Data field	Describe	Obligatory ?	Valid conditions	Example
1	QC Point ID	Unique identifier for the Quality Control Point	Yes	Unique	MO001
2	Title	Name or short description of the control point	Yes	Text	Check final products
3	Product ID	Linked product for the quality check	Yes	Positive integer	50
4	Product Category	Category of the product	No	Text	01-05-2005
5	Operation	Manufacturing operation related to this quality check	No	Must exist in Employee Table	Assemble
6	Control Per	Unit for control (Product/Operation)	Yes	Must exist in Work Order Table	Product
7	Control Frequency	Frequency of control checks	Yes	Pending / In Progress / Done	All
8	Type	Type of inspection	Yes	pass/fail/ measurement	pass/fail
9	Team	Team who is responsible to check product's quality	Yes	Must exist in Quality Team	Main Quality Team
10	Inspection Instruction (Step/Instruction)	Instructions for how to conduct the inspection	No	Text	
11	Message If Fail	Message displayed if the inspection fails	No	Text	

Table 5.9: Quality control points

Manufacturing Order									
Reference	Product	Start	Component Status	Quantity To Produce	Lot/Serial Number	Work Orders	working employees	State	Quality Check Fail
WH/MO/00011	Table	2025-04-28 08:00:00		1.0	T004	WH/MO/00003-003 - Pre-drill tabletop for leg assembly.	Dung Pham	Done	TRUE
						WH/MO/00003-003 - Assemble legs to tabletop using screws or bolts			
WH/MO/00012	Table	2025-05-02 18:00:00	Available	3.0		WH/MO/00012 - Pre-drill tabletop for leg assembly.	Dung Pham	Confirmed	
						WH/MO/00012 - Assemble legs to tabletop using screws or bolts			

Figure 5.12: Quality control point after executed (extracted from Odoo)

5.5 Confirm and execute manufacturing order

Once the Bill of Materials (BoM) has been defined, replenishment rules are set, and quality control points are configured, the system can generate manufacturing orders based on product demand. The interface below displays the initial details of a manufacturing order.

Figure 5.13: Manufacturing Order

Figure 5.14: Create Manufacturing Order

Figure 5.15: Confirm Manufacturing Order

Table 5.10 outlines the full data structure of a manufacturing order in Odoo.

Description	Confirm and execute manufacturing orders		
Pre condition	The replenishment is configured in the Inventory module and components are available		
Trigger	Select 'To order' from the 'Replenishment' option in the 'Operation' dropdown menu in the Inventory module to make manufacturing order		
Perform by	Production Planning Staff, Production Staff		
Basic flow	**Step**	**Perform by**	**Activity**
	1.1	Production Planning Staff	Select 'Start', specify the required 'quantity' of product to produce, label serial number for each product unit (**description below)
	1.2	Production Planning Staff	Modify 'Scheduled Date', select person in charge in 'Responsible' dropdown menu (**description below)
	2	Production Staff	Execute each 'Work Orders'
	3	Production Staff	Confirm work order, assess employee performance (**description below)
	4	Production Staff	Select 'Produce' after Quality Team checks the product
Exception flow	Machine is broken during manufacturing process		
	2.1	Production Staff	Click 'Pause' to pause all work orders
	2.2	Production Staff	Add a line which is called 'Maintenance' work order
	2.3	Production Staff	Continue step 1.2, 2 and 3

Table 5.10: Confirm and execute manufacturing orders steps

No.	Data field	Describe	Obligatory?	Valid conditions	Example
1	MO ID	Unique identifier for the Manufacturing Order	Yes	Unique	MO001
2	Product ID	Linked product	Yes	Must exist in Product Table	PRD001
3	Quantity to Produce	Number of units to produce	Yes	Positive integer	50
4	Scheduled Date	Planned start date of production	Yes	Date	01-05-2005
5	Responsible Employee	Person assigned to manage production	Yes	Must exist in Employee Table	NV002
6	Serial Number	Serial number assigned to each produced unit	Yes	Must be unique	SN001-A
7	Work Order ID	Work order associated with the manufacturing operation	Yes	Must exist in Work Order Table	WO005
8	Work Order Status	Current status of the work order	Auto	Pending / In Progress / Done	Done
9	State	Current status of the manufacturing order	Auto	Done/Cancelled/ Confirmed	Done
10	Quality Check Fail	Description of failure if maintenance is needed	No	False/True	False

Table 5.11: Data library for manufacturing order

Figure 5.16: Manufacturing Order after executed (extracted from Odoo)

6 Conclusion

6.1 BPMN Summary

The overall manufacturing process is structured around a main process that handles the core production activities for table assembly, while multiple subprocesses are used to support preparatory tasks such as product creation, bill of materials setup, replenishment configuration, and quality control definition.

The main process begins with an automated replenishment trigger based on predefined inventory rules and continues through the execution of manufacturing orders. Exception handling is clearly modeled, covering both machine breakdown scenarios and cases where products fail to meet quality standards. The BPMN model also defines task responsibilities for each stakeholder involved, including the Production Planning Staff, Production Staff, Quality Team, and Facility Engineer. This role-based clarity helps ensure that each participant understands their function and contribution within the end-to-end manufacturing workflow.

6.2 System Evaluation

Odoo offers a comprehensive and modular enterprise resource planning system that supports automation, real-time data processing, and seamless integration across business functions. Its structured workflows facilitate efficient management of key operations such as inventory, manufacturing, and quality control. By enabling data-driven decision-making and reducing manual intervention, Odoo enhances operational transparency, traceability, and productivity. Furthermore, its user-friendly interface and customizable modules make it adaptable to diverse organizational needs.

Odoo was selected for modeling the manufacturing process due to its open-source nature, flexibility in customization, and robust support for discrete and process manufacturing workflows. The platform's built-in features for bill of materials, work orders, replenishment rules, and quality control align closely with real-world industrial practices, making it an ideal choice for demonstrating digital transformation in production environments.

6.3 Importance of BPMN

In the context of our manufacturing process design, BPMN plays a vital role in structuring and communicating complex operational workflows. By using BPMN diagrams, each step in the process—from product creation, bill of materials configuration, replenishment, manufacturing execution, to quality control—is clearly visualized with assigned roles and responsibilities. This helps both technical and non-technical stakeholders understand who performs what, when, and under which conditions.

BPMN significantly enhances process clarity by explicitly modeling decision points, parallel activities, and exception flows. For example, in our model, BPMN captures scenarios where machines malfunction during production or when products fail quality inspection. These exceptions are formally documented through intermediate events and conditional flows, enabling predefined responses such as pausing work orders, initiating maintenance tasks, or triggering rework procedures.

In conclusion, BPMN enables a modular view of manufacturing by breaking down complex workflows into smaller, well-defined subprocesses. This structure supports easier implementation within ERP systems such as Odoo while improving the process's ability to scale, track progress, and evolve over time. It provides a clear operational blueprint that aligns business logic with system behavior.