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Jurnal Ilmiah Teknik Industri (2024) Vol. 12 No. 3, 211 – 222

ENHANCING SPARE PARTS SALES BY IMPROVED CUSTOMER SERVICE LEVELS MEASURED BY OTIF (ON-TIME IN-FULL) THROUGH NEW SUPPORT POINTS AND SUPPLY CHAIN DISTRIBUTION DESIGN: A CASE STUDY AT PT XYZ MEDAN BRANCH

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ABSTRAK

Ditemukan bahwa tidak ada titik dukungan di wilayah Martabe PT XYZ, yang menyebabkan masalah pada tingkat layanan pelanggan yang diukur dengan OTIF (On-Time In-Full). Situasi ini dapat menunda pengiriman karena jarak yang jauh (367 km atau 12 jam dengan transportasi darat) antara Medan dan Martabe. Rendahnya tingkat OTIF sesuai dengan terbatasnya ketersediaan suku cadang di PT XYZ. Kemampuan perusahaan untuk memenuhi permintaan dengan stoknya adalah ketersediaan suku cadang. Akibatnya, pelanggan membeli dari pesaing dengan suku cadang yang siap di tempat. Studi ini telah merancang titik dukungan baru berdasarkan perkiraan permintaan yang akurat dan penilaian kelayakan proyek berdasarkan Internal Rate of Return (IRR). Hasilnya, titik dukungan baru menjamin ketersediaan suku cadang untuk membuat barang In-Full dan mengurangi waktu tunggu pengiriman untuk membuat barang On-Time. Setelah membangun titik dukungan baru di wilayah Martabe, penjualan meningkat sebesar 74% dan berkontribusi pada pertumbuhan penjualan sebesar 44% di wilayah Medan.

***Kata kunci**: Penjualan, Tingkat Layanan Pelanggan, On-Time In-Full (OTIF) Rates, Ketersediaan Suku Cadang, Waktu Pengiriman, Titik Dukungan Baru.*

ABSTRACT

It was found that there are no support points at PT XYZ's Martabe Site, which led to a problem with customer service levels measured by OTIF (On-Time In-Full). This situation may delay delivery due to the long distance (367 km or 12 hours by land transportation) between Medan and Martabe. Low OTIF rates correspond with the limited availability of parts at PT XYZ. A company's ability to supply demand with its stock is the availability of parts. Consequently, customers purchase from competitors with parts that are ready on-site. This study has designed new support points based on accurate demand forecasting and a project feasibility assessment based on an Internal Rate of Return (IRR). As a result, new support points guaranteed the availability of parts to make the item In-Full and decrease lead time delivery to make the item On-Time. After building a new support point at the Martabe site, sales increased by 74% and contributed to a 44% growth in sales in the Medan area.

***Keywords**: Sales, Customer Service Level, On-Time In-Full (OTIF) Rates, Availability Parts, Lead Time Delivery, New Support Points.*

INTRODUCTION

It is a multinational company with a vision to serve its stakeholders as a world-class, solution-driven company in heavy equipment, mining, and energy. Through its six business pillars, the company plays a critical role in a wide range of sectors and industries in the country, including Construction Machinery, Mining Contracting, Coal Mining, Gold Mining, Construction Industry, and Energy. PT XYZ has a distribution network comprising 19 branch offices, 22 supporting offices, and 11 representative offices, including a branch office in Medan. PT XYZ covers the region from Aceh to Martabe.

Despite struggling to achieve high spare parts sales, PT XYZ Medan Branch still has a problem: its service level, as measured by OTIF rates, is 85%, which falls short of its target of 90%. A gap of 5% exists for the OTIF rates that have not been achieved at PT XYZ. Lower OTIF rates align with the low availability of parts at PT XYZ. Its inventory must be available so that demand can be met. The availability of PT XYZ is 77%, which falls short of the target of 90%. There is a gap of 13% for availability.

Enhancing Spare Parts Sales by Improved Customer Service Levels Measured by OTIF (On-Time In-Full) Through New Support Points and Supply Chain Distribution Design: A Case Study at PT XYZ Medan Branch
Edwin Sandjaja, Togar W.S. Panjaitan, Henry Nasution

A successful business revolves around the pursuit of customer satisfaction. Two critical aspects significantly influence service quality and on-time fulfillment of promises. OTIF relies heavily on reliable delivery and timely turnaround, directly impacting customer satisfaction and loyalty. Modak [1] and Dündar & Ztürk [2] stated that reliable delivery and timely completion increase customer satisfaction and loyalty. Several studies also have learned how to get a good supply chain to enhance customer service [3,4]. Studies by Tadayonrad and Ndiaye [5] and Li et al. [6] explained that managing multi-storage inventory by forecasting demand increases parts availability.

Furthermore, according to other studies, OTIF achievements reduce customer downtime, increase customer satisfaction, and even potential sales growth and cost savings [7,8]. As a result, it is crucial to implement practices that promote reliability, responsiveness, and assurance [9]. Investments in sophisticated inventory management systems, optimized logistics networks, and organizational collaboration cultures can contribute to organizational success [10,11,12].

This study will aim to (1) increase spare parts sales at PT XYZ Medan Branch by evaluating the relationship between spare parts sales and customer service levels as measured by the On-Time in Full (OTIF) indicator and (2) increase OTIF rates by improving inventory control management and developing a new support point. This study developed three research questions:

1. What are some potential solutions for improving sales by increasing OTIF rates at PT XYZ Medan Branch?
2. How can OTIF rates at PT XYZ Medan Branch be improved?
3. How does improving parts availability impact PT XYZ Medan Branch OTIF rates?

Additionally, the study hypothesizes that providing a new support point will improve spare parts distribution in the spare parts supply chain at PT XYZ Medan Branch. This will increase spare parts availability, reduce lead times, and improve OTIF.

RESEARCH METHODOLOGY

This study uses a robust analytical framework to examine the complex relationship between OTIF, spare parts sales, and the impact of new support points.

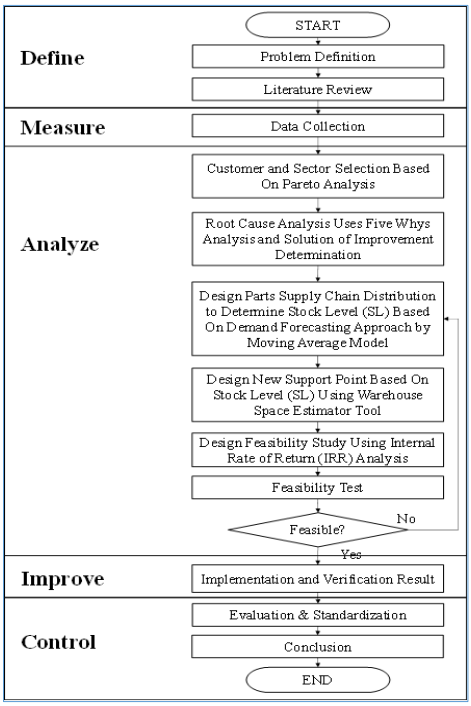

Figure 1. Research Workflow

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Using quantitative and qualitative methods, this study should provide a comprehensive picture of how new support points impact OTIF performance and spare parts sales. The Six Sigma DMAIC (Define, Measure, Analyze, Improve, and Control) method serves as a roadmap for problem-solving and process improvement. Six Sigma is a proven method for optimizing business processes [13].Thus, the DMAIC method is used to draw in-depth conclusions and provide meaningful recommendations for PT XYZ based on the triangulation of data from various sources (Figure 1).

RESULTS

Data Collection

Data will be collected and analyzed to evaluate the customer service levels of PT XYZ Medan Branch. The impact of OTIF rates on company sales will follow. Finally, opportunities will be explored to increase company sales through OTIF rate increases.

1. Customer Database and Historical Sales

Four sectors make up PT XYZ's customers. The company has 196 customers, divided into three sectors: gold mining (MNG), agriculture (AGR), construction (CON), and industrial (IDT). The total number of customers in the mining sector is just 2%. Still, they contribute about 44% to sales, or equal to IDR 17.4 Trillion, with 12 customers in the industrial sector, 62 in the agribusiness sector, and 119 in the construction sector (Table 1).

Table 1. Percentage of Customer Sector and Sales Contribution

Sector	Total Customer	% Customer Contribution	Sales	% Sales Contribution
MNG	3	2%	17,4	44%
IDT	12	6%	0,5	1%
AGR	62	32%	11,8	30%
CON	119	61%	9,9	25%
Total	**196**	**100%**	**39,5**	**100%**

PT XYZ has three customers from the gold mining sector at the Martabe site. Two are in the top sales contributors, PT Table 2 shows PT UA and PT MMS.

Table 2. Percentage of Customer and Sales Contribution

No	Customer	Sector	Sales	% Sales Contribution
1	UA	MNG	10,79	27%
2	MMS	MNG	6,50	16%
3	TS	AGR	1,50	4%
4	MNA	AGR	1,00	3%
5	MMS	AGR	1,00	3%
6	BSS	CON	0,92	2%
7	PLB	AGR	0,87	2%
8	GIP	CON	0,76	2%
9	TN	AGR	0,71	2%
10	PN 1	AGR	0,64	2%
11	Others		14,81	37%
Total			**39,50**	**100%**

2. On-Time In Full (OTIF Rates)

On-Time In Full (OTIF) rates are KPIs between PT XYZ and customers to evaluate PT XYZ's performance towards the customer's purchase order (PO). OTIF rates are calculated as two aspects: (1) In-Full is about the fulfillment of spare parts, and (2) On-Time is about the lead time delivery of spare parts based on customer request delivery date (CRDD). The CRDD at PT XYZ is three days. If the parts are ready (In-Full) and the lead time for delivery is not over three days, they are OTIF. A formula for calculating OTIF rates can be found in equation (1).

$$\text{OTIF Rates} = (\text{Total Item OTIF})/(\text{Total Item}) \times 100\% \quad (1)$$

PT XYZ's OTIF rates were collected for 12 months, comparing actual results to the target (Figure 2). The orange line represents the consistent target OTIF rate at 90% across all months, while the blue line shows the actual monthly performance. The OTIF fluctuates between 82.0% and 89.0%, consistently falling below the target. Notable low points occur in months 3 and 8, where the performance drops to 82.0% and 83.0%, respectively. Although there is a slight improvement in month 11, reaching 89.0%, the overall trend indicates a struggle to meet the target, with no months achieving or surpassing the 90% benchmark.

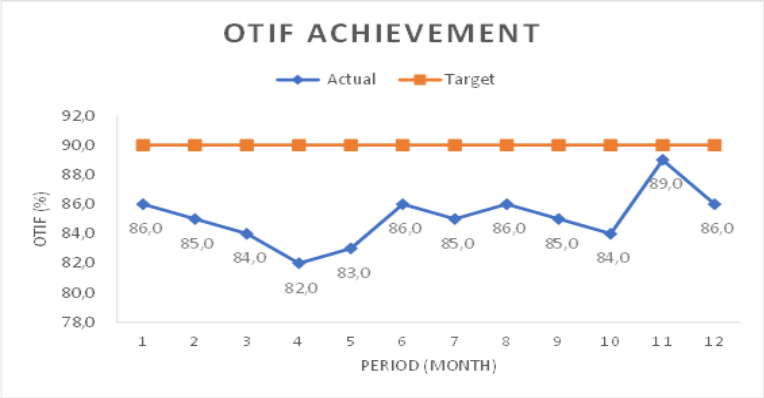

Figure 2. OTIF Rates Achievement at The Martabe Site

PT XYZ's OTIF rates are 85%, as shown in Table 3. This leaves a gap of 15% from the target of 90%. 11% of items are not On-Time and not In-Full; 4% are not On-Time but In-Full.

Table 3. OTIF Rates Achievement at The Martabe Site

OTIF Item	On-Time Item	In-Full Item	Total Item	Percentage
No	No	No	838	11%
		Yes	322	4%
Yes	Yes	Yes	6325	85%
Total			**7485**	**100%**

3. Availability Parts

A part can be available at the warehouse when the demand arises. This study collected availability for 12 months at PT XYZ, comparing actual performance with the target (Figure 3). The orange line indicates a consistent target availability of 95% across all months, while the blue line represents monthly availability. Throughout the year, availability fluctuates, ranging from a low of 70.0% in month 6 to a high of 85.0% in month 11. Although there is some improvement towards the end of the year, with a peak in month 11 and a close follow-up in month 12 at 83.0%, the availability consistently falls short of the 95% target, highlighting ongoing challenges in meeting the desired availability level.

Figure 3. Availability Parts Achievement at The Martabe Site

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Furthermore, PT XYZ's historical demand is essential to this research to determine customer demand. It will calculate a demand forecast and select items for a list item backup (LIB) to maintain stock. In this study, the historical demand was collected over 12 months.

4. Customer Survey by Questionnaire

In addition to the customer survey, a questionnaire was distributed to 12 of the Martabe site's customers to obtain their perspectives. Table 4 summarizes the summarized responses to three questions regarding parts availability, cost vs. delivery time, and delivery speed preferences.

Table 4. Questionnaire and Answer

No	Question	Option 1	Option 2	Option 3	Option 4	Total
1	Availability of Parts	Genuine (12)	Local Shop (0)	-	-	12
2	Parts Availability Cost vs. Delivery Time	Ready but More Expensive (12)	Cheaper but Need Time for Delivery (0)	-	-	12
3	Delivery Speed	Very Slow (5)	Slow (7)	Fast (0)	Super Fast (0)	12

For the first question on "Availability of Parts," all respondents (12) preferred genuine parts, while none opted for the local shop option. In the second question, all respondents (12) preferred ready but more expensive parts, with no preference for the cheaper option requiring a delivery delay. Lastly, in the "Delivery Speed" category, five respondents indicated a preference for "Very Slow," 7 for "Slow," while none selected "Fast" or "Super Fast". Thus, it highlights a strong preference for genuine parts, immediate availability despite higher costs, and a notable inclination towards slower delivery speeds.

5. Business Process at PT XYZ

Figure 4 shows the process flow between a customer and PT XYZ for order management. The customer initiates an order request, which PT XYZ receives and verifies. If the order can be fulfilled, PT XYZ proceeds with processing; otherwise, the customer is informed of any issues. This flow emphasizes the key interactions and decisions needed to ensure efficient order fulfillment and customer satisfaction.

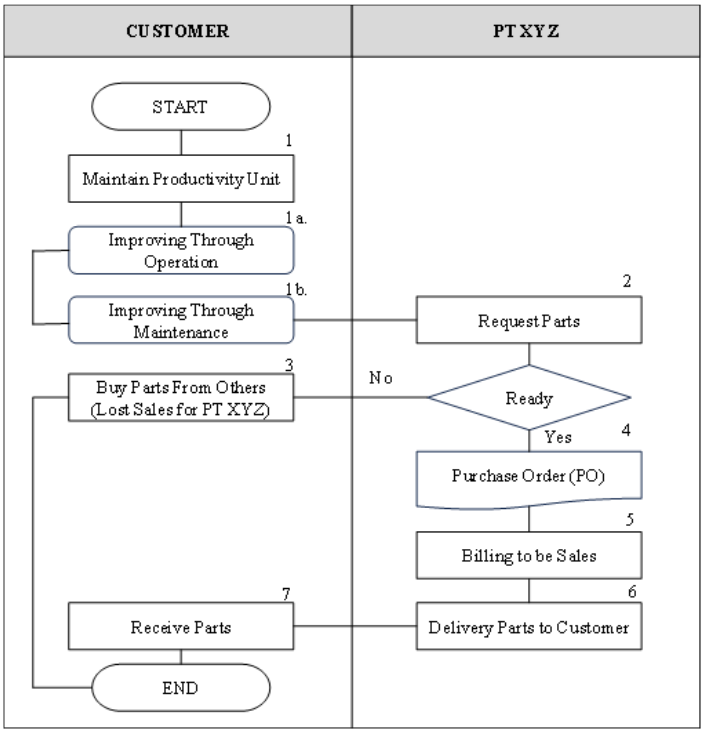

Figure 4. Business Process at PT XYZ

Data Analysis

1. Customer Database and Historical Sales

Pareto analysis is used to select customers and sectors based on 80%- 20% rules that will boost PT XYZ's sales significantly. Based on Pareto analysis, the researcher found that ten large customers (5%) contributed 63% of the sales at PT XYZ, as shown in Figure 5.

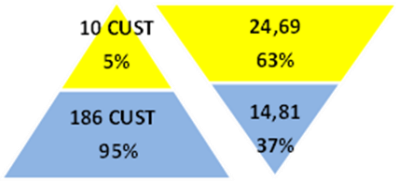

Figure 5. Pareto Analysis of Customer and Sector-to-Sales Contribution

Based on Table 2, the top two sales contributors are customers in the gold mining sector. PT XYZ has three gold mining customers, contributing 44% of sales. To boost sales at PT XYZ, this research will examine the mining sector located at the Martabe Site.

2. Root Cause Analysis Uses Five Whys Analysis and Solution of Improvement Determination

Based on data collection, this research uses five whys analysis to identify the root causes of the problem of not achieving sales at PT XYZ. Data from the survey are analyzed by the researcher, who recognizes the purchasing factors of Martabe customers through the survey answers. As a result, customers at the Martabe site prioritize genuine products when parts are available, while price is a secondary consideration. At the Martabe site, the key buying factor for customers is the availability of parts and fast lead times for delivery, which can reduce breakdown time and increase productivity.

Furthermore, this questionnaire provides insight into customer complaints about PT XYZ. The problem is that the speed of parts supply from PT XYZ is still slow. Low customer service levels measured by OTIF exacerbate the complaint, as shown in Table 4. In OTIF, 15% of the parts were not delivered on time, a problem that was not solved. Parts not arriving on time are caused by (1) a shortage of parts and (2) a delivery delay from Medan to Martabe Site. This problem is analyzed using the five whys method, as shown in Figure 6.

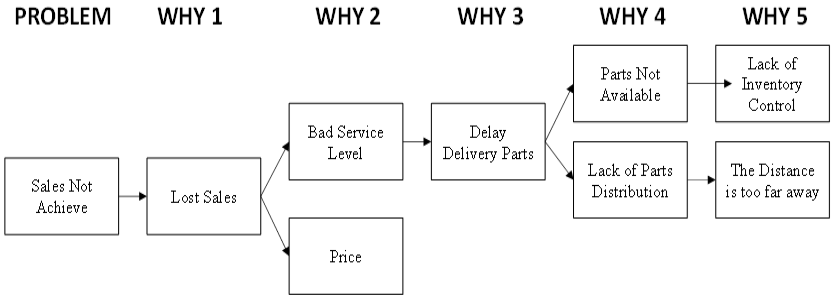

Figure 6. Pareto Analysis of Customer and Sector-to-Sales Contribution

Finally, based on the analysis, the study found a strong relationship between sales and OTIF. This study also identified several potential improvements or actions to boost sales through increasing OTIF rates. Therefore, this information could answer the first research question.

Moreover, based on the five whys analysis, this study identified the root causes of low rates of OTIF as (1) Lack of inventory control and (2) Too far away. Therefore, this information could address this second research question. Based on this root cause, this study generates the solution to build a new support point to build an improved parts supply chain and inventory control and boost sales to increase customer service levels as measured by OTIF rates.

3. Design Parts Supply Chain Distribution to Determine Stock Level (SL) Based on a Demand Forecasting Approach by Moving Average Model

As shown in Table 4, this study calculates forecast demand based on historical demand for washers. The forecast demand is as follows:

$$F_d = \frac{(D_1 + D_2 + \ldots\ldots\ldots\ldots + D_{12})}{12} \quad (2)$$

$$F_d = \frac{(112 + 175 + 196 + 217 + 175 + 147 + 385 + 199 + 140 + 179 + 350 + 193)}{12}$$

$$F_d = 206\ pcs$$

After calculating forecast demand, this study calculates stock level min and stock level max.

$$SL_{min} = FD(SS + LT) = 205(0{,}5 + 0{,}5) = 206$$

$$SL_{max} = FD(SS + LT + CO) = 205(0{,}5 + 0{,}5 + 0{,}4) = 288$$

Based on this calculation, the minimum stock level for the Washer is 206 pieces, and the maximum is 288 pieces. Following the acquisition of stock levels, this study devised a list item backup (LIB) based on Rank Month Movement (RMM). Based on a 12-month historical demand, Rank Month Movement (RMM) is a movement of demand parts for each month. There are three categories in this study: (1) Fast-moving is ranked A-D, (2) Slow-moving is ranked E-H, and (3) Non-moving is ranked I, as shown in Table 5.

Table 5. Rank Month Movement (RMM)

MM	RMM	Remark
12	A	Fast Moving
11	A	Fast Moving
10	A	Fast Moving
9	B	Fast Moving
8	B	Fast Moving
7	C	Fast Moving
6	C	Fast Moving
5	D	Fast Moving
4	E	Slow Moving
3	F	Slow Moving
2	G	Slow Moving
1	H	Slow Moving
0	I	Non Moving

A rank month movement, Indonesian Wild (RMM IW), was also considered in this study. RMM IW is the rank month movement for all PT XYZ branches. RMM for the Washer is shown in Table 6.

Table 6. Rank Month Movement (RMM) of Washer

SKU	DESC	11.2022	12,2022	01.2023	02.2023	03.2023	04.2023	05.2023	06.2023	07.2023	08.2023	09.2023	10.2023	11.2023	12.2023	TOTAL	AVG	RATING
10892006	WASHER	12	175	196	27	175	147	367	189	149	174	369	360	189	2	2471	206	A

This study formulates LIB based on RMM. We input all fast-moving (RMM and RMM IW = A-D) items to LIB, and for slow-moving (RMM = E-H) items, we only input fast-moving RMM IW (RMM IW = A-D) and did not input non-moving items to LIB. Of the 593 items in LIB, 129 are fast-moving, and 464 are slow-moving.

4. Design a New Support Point Based on Stock Level (SL) Using the Warehouse Space Estimator Tool

This study calculates space for the warehouse based on LIB stock to stock in the new warehouse. It converts LIB to parts location and shows the calculation space warehouse in Table 7.

1. Small Parts Location
   - B1 = Doos 11 (1-row small rack is 11 boxes) = 0 bin
   - B2 = Doos 6 (1-row small rack is six boxes) = 226 bins

- B3 = Doos 4 (1-row small rack is four boxes) = 116 bins
- B4 = Doos 3 (1-row small rack is three boxes) = 45 bins
- B5 = Doos 2 (1-row small rack is two boxes) = 22 bins

2. Other Parts Location
   - Quantity of filters = 1319 pcs
   - Quantity of heavy-duty items = 389 pcs
   - Quantity of undercarriage items = 194 pcs
3. Warehouse Office
   This calculation is based on the total workforce of the warehouse crew. For this study, the workforce will stay in a warehouse. 3.
4. Tools & Fire Extinguisher
   This calculation is based on forklift 1 unit, hand pallet 1 unit, trolley 1 unit. There are 10 pcs fire extinguishers.
5. Projected Growth
   This calculation already covers revenue growth during five years, which is 15%.
6. Key Assumptions
   This calculation already covers the safety factor of 15%, and the min-max deviation is 10%

Table 7. Calculation of Warehouse Area

Warehouse Area Estimator

Legend
User input =
Output =

INPUT	
SMALL PARTS	
Quantity of bins (number of bins)	
Quantity of Bin B1 =	0
Quantity of Bin B2 =	226
Quantity of Bin B3 =	116
Quantity of Bin B4 =	45
Quantity of Bin B5 =	22
Total bins =	***409***
OTHER PARTS (number of parts)	
Quantity of filters =	1319
Quantity of heavy duty items =	389
Quantity of under carriage items =	194
WAREHOUSE OFFICE (office for warehouse crew only)	
Number of on-duty warehouse crew =	3
TOOLS & FIRE EXINGUISHER	
Forklift quantity =	1
Hand pallet quantity =	1
Trolley quantity =	2
Fire extinguisher quantity =	10
PROJECTED GROWTH	
Projected percentage of revenue growth over 5 years =	15%
KEY ASSUMPTIONS	
Safety factor / buffer for estimated storage area =	10%
Min and max deviation from averaged ratio =	10%

RECOMMENDED WAREHOUSE AREA (sq m)			
1. STORAGE AREA	Min	Max	Can be stored at mezzanine level?
1.1. Area for small parts =	15	18	Yes
1.2. Area for filters =	46	56	Yes
1.3. Area for heavy duty items =	22	27	No
1.4. Area for under carriage =	45	55	No
Total storage area =	***128***	***156***	
2. WORK AREA			
2.1. Area for receiving =	2	3	
2.2. Area for QI =	2	2	
2.3. Area for ready to bin =	2	2	
2.4. Area for QC =	1	2	
2.5. Area for shipping / packing =	1	2	
2.6. Area for ready to ship =	3	4	
Total work area =	***12***	***14***	
3. AISLES, WALKWAYS AND WAREHOUSE OFFICE			
3.1. Main aisles, walkways	21	26	
3.2. Warehouse office area	8	8	
4. TOOLS & FIRE EXTINGUISHER			
4.1. Area for forklift	10	10	No
4.2. Area for hand pallet	1	1	No
4.3. Area for trolley	2	2	No
4.4. Area for fire extinguisher	1	1	Yes
Total tools & fire extinguisher area =	***14***	***14***	
TOTAL ESTIMATED AREA	***183***	***218***	

Notes:
This estimator is based on empirical data taken from several samples of existing warehouses
Assume that for small parts each line items is stored in a single bin
Based on the samples taken of existing warehouses the average distribution of bins are as follows

Percentage of bin B1 =	18,3%
Percentage of bin B2 =	38,4%
Percentage of bin B3 =	19,5%
Percentage of bin B4 =	14,4%
Percentage of bin B5 =	9,4%
Total =	100%

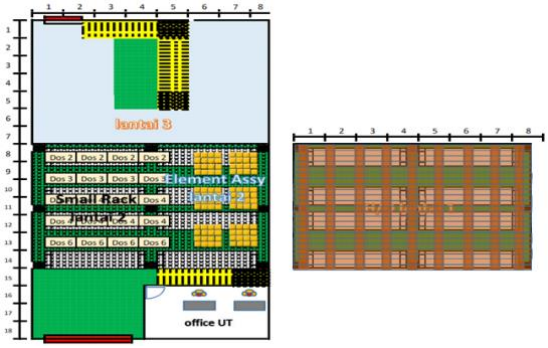

Figure 7. Layout Warehouse

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From Table 7, the minimum space for this warehouse is 183 m2, and the maximum is 218 m2. This yard is ready at 8 m x 18 m = 144 m2. Since this yard is not enough, we added a ducting rack to the second floor, which is 8 m x 7 m = 56 m2. Furthermore, Figure 7 shows the total area of 200 m2. Lastly, based on the analysis, the study found several potential improvements or actions to increase the availability of parts through developing new support points based on an effective parts supply chain, such as inventory control and demand forecasting. Accordingly, this information can answer the third question in this study.

5. Design Feasibility Study Using Internal Rate of Return (IRR) Analysis

PT XYZ decided to build a new support point after assessing the project's feasibility using IRR analysis via a cash flow report, as shown in Figure 8.

CASH FLOW REPORT

In Million IDR, Year Ended 31 December

		2023	2024	2025	2026	2027	2028
Operating Profit (Income)		-81	3.149	3.877	3.860	3.345	1.485
Add back : Depreciation		362	362	362	362	362	0
EBITDA		281	3.511	4.238	4.222	3.707	1.485
Income Tax		0	-693	-853	-849	-736	-327
Working Capital		-774	-3.610	-663	-485	-631	230
Capex	-1.809						
Free Cash Flow	-1.809	-493	-792	2.723	2.888	2.341	1.388
Adjusted free cash flow	**-1.809**	**-493**	**-792**	**2.723**	**2.888**	**2.341**	**1.388**
WACC	**18,0%**						
Period	0	1	2	3	4	5	6
Factor	100%	85%	0,72	0,61	0,52	0,44	0,37
PV	(1.809)	-418	-568	1.657	1.490	1.023	514

NPV: Rp	1.888,56
IRR:	37%

THIS PROJECT IS FEASIBLE

Telecomunication	CITRIX
Sales Unit	
CP Unit (in days)	

Figure 8. Cash Flow Report

6. Improvement Implementation and Verification Results

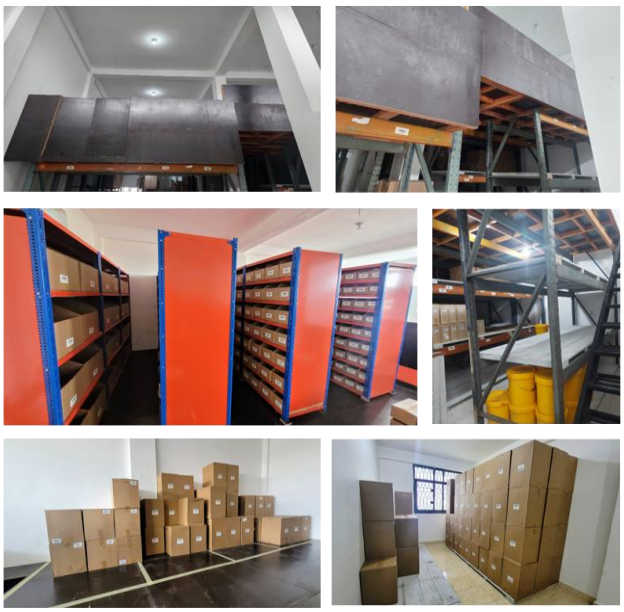

Figure 9. New Warehouse at Martabe Site

Figure 9 shows an implementation of the improvement to build a new support point. After this implementation, a significant improvement was noted in the availability of parts, OTIF, and sales achievement.

Table 8. Growth in Availability and OTIF Before and After Building a New Warehouse

BEFORE (PLANT AVAILABILITY)													
Bulan	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**
Plan Availability	90	90	90	90	90	90	90	90	90	90	90	90	90.00
Aktual Availability	80	76	75	70	72	79	75	78	75	74	85	83	76.83
Achievement	89%	84%	83%	78%	80%	88%	83%	87%	83%	82%	94%	92%	85%
AFTER (PLANT AVAILABILITY)													
Bulan	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**
Plan Availability	90	90	90	90	90	90	90	90	90	90	90	90	90.00
Aktual Availability	92	90	90	90	91	92	90	90	91	92	92	93	91.08
Achievement	102%	100%	100%	100%	101%	102%	100%	100%	101%	102%	102%	103%	101%
BEFORE (OTIF RATES)													
Bulan	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**
Plan OTIF Rates	90	90	90	90	90	90	90	90	90	90	90	90	90.00
Aktual OTIF Rates	86	85	84	82	83	86	85	86	85	84	89	86	85.08
Achievement	96%	94%	93%	91%	92%	96%	94%	96%	94%	93%	99%	96%	95%
AFTER (OTIF RATES)													
Bulan	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Average**
Plan OTIF Rates	90	90	90	90	90	90	90	90	90	90	90	90	90.00
Aktual OTIF Rates	91	91	93	90	90	92	91	91	92	91	92	95	91.58
Achievement	101%	101%	103%	100%	100%	102%	101%	101%	102%	101%	102%	106%	102%

Table 8 shows that constructing the new warehouse significantly improved plant availability and OTIF (On-Time In-Full) rates. Before the warehouse was built, actual plant availability averaged 76.83%, falling short of the 90% target, with an achievement rate of 85%. However, after the addition, availability rose to an average of 91.08%, achieving 101% of the target. It indicates that the new facility helped reduce downtime and streamline operations. Similarly, OTIF rates improved from an average of 85.08% (95% achievement) before the warehouse to 91.58% (102% achievement) afterward. This growth suggests that the new warehouse enhanced inventory management and distribution, enabling more reliable and timely deliveries. These improvements reflect the positive impact of the warehouse on operational efficiency and customer service.

Table 9 shows that constructing the new warehouse at Martabe has led to significant sales growth across key customers. For customer UA, sales increased from 10.79 to 17.66, marking a 64% growth. Similarly, customer MMS saw a rise from 6.5 to 11.18, achieving a 72% growth rate. The most remarkable increase was with customer TAS, where sales surged from a minimal 0.01 to 1.2, resulting in an extraordinary growth rate of 11,900%. Overall, total sales grew from 17.3 before the warehouse to 30.04 afterward, reflecting the positive impact of the new warehouse on Martabe's ability to meet demand and improve distribution capabilities for these clients. This growth indicates that the additional storage and logistical efficiency provided by the new warehouse has substantially enhanced sales performance.

Table 9. Growth Sales at Martabe Before and After Building New Warehouse

No	Customer	Sales Before	Sales After	Growth
1	UA	10.79	17.66	64%
2	MMS	6.5	11.18	72%
3	TAS	0.01	1.2	11900%
	Total	**17.3**	**30.04**	

CONCLUSION

This study addresses PT XYZ's challenge in achieving high spare parts sales. A key solution proposed is developing a new support point to enhance customer service levels, measured by OTIF (On-Time In-Full) rates, thereby boosting spare parts sales. Several

insights and recommendations were established through qualitative and quantitative research. Customers at the Martabe Mine highly value customer service levels, particularly OTIF rates, because timely and accurate parts delivery reduces equipment downtime and boosts productivity. Although genuine parts are more expensive than locally sourced alternatives, customers prefer genuine products when they are readily available. Therefore, to increase sales, PT XYZ Medan Branch must prioritize maintaining high customer service at the Martabe site, building trust, and encouraging repeat orders. The low customer service levels at PT XYZ Medan Branch, based on OTIF rates, were found to stem from two primary factors: insufficient inventory control, which leads to part shortages and affects the "In-Full" component of OTIF, and the long-distance delivery (367 km) from Medan to the Martabe site, which delays delivery times due to the absence of a support point nearby. Establishing a new support point and improving demand forecasting and supply chain distribution practices are recommended to address these issues and ensure parts availability (In-Full) and timely delivery. Establishing a new support station at the Martabe site led to a 19% increase in parts availability and an 8% improvement in OTIF rates, as parts were guaranteed to be in stock and delivery times were minimized. This improvement in OTIF rates resulted in a remarkable 74% increase in sales at the Martabe site, contributing 44% of the overall sales growth in the Medan area. Therefore, increasing parts availability and reducing lead times in line with OTIF rates substantially impact sales.

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