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PROPOSED DESIGN OF STRATEGIC SOURCING AND PRODUCTION BOTTLENECK MANAGEMENT FOR REVENUE MAXIMIZATION: AN OPERATIONAL PERFORMANCE ANALYSIS OF PT. ELSEWEDY ELECTRIC INDONESIA

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Abstract

This study aims to analyze strategic sourcing and production bottleneck management to maximize revenue of PT. Elsewedy Electric Indonesia. The company faces challenges in meeting increasing market demand, especially in the renewable energy sector. The company's main challenge is the mismatch between current production capacity, which is optimized for medium to high capacity transformers, and market demand that is shifting towards smaller transformers. This study uses qualitative and quantitative approaches. Qualitative data were collected through semi-structured interviews with five stakeholder: (1) General Manager, (2) Head of Production, (3) Production Manager and (4) Sourcing Manager from PT. EEI. Quantitative data include historical production data, cycle time data from MOST (Maynard Operation Sequence Technique) studies, and actual machine or workspace data. SWOT analysis is used to map sourcing strategies, and MOST studies are used to calculate production cycle time and plant capacity. The Balanced Scorecard (BSC) is implemented to align operational performance with long-term financial targets. The Balance Scorecard covers four perspectives, namely financial, customer, internal process, and learning & growth, with a total of 10 strategic objectives. The research findings show that the Dry Oven and testing stages are bottlenecks in the production process. The maximum monthly capacity is 14 units or equivalent to 840 MVA, while the winding process can produce 19 units or equivalent to 1140 MVA. Strategic recommendations include the application of vapor phase drying technology can reduce drying time by 20%, diversifying suppliers for long-term delivery materials by adding 2-3 new vendors, implementing the optional strategy of building Testbay 3 to increase testing capacity by 30%, and reallocating 50% of production to high-value MV/HV transformers, which is projected to increase annual output from 10,080 MVA to 12,983 MVA. The limitation of this study is that no investment calculations were made on the optional strategy of building the new Testbay 3. The scenario implementation recommendations are divided into two stages: (1) Short term, including the implementation of vapor phase drying technology, supplier diversification, and the implementation of effective product portfolio reallocation, and (2) Optional strategy including the construction of Testbay 3 taking into account the strategic evaluation of scenario 1.

Keywords: ***Strategic sourcing, Bottleneck management, Production capacity, Transformer, The Balance Scorecard, PT. Elsewedy Electric Indonesia***

INTRODUCTION

In renewable energy era, global electricity demand has surged significantly. This growth is driven by a societal shift towards increasing reliance on electrical and digital devices. Indonesia is no exception. As outlined in the National Electricity System General Plan (2023), the country has experienced a consistent uptick in electricity demand year-over-year. Projections indicate a increase in demand by 2060 compared to 2023. With an average annual economic growth of 6.3% and climate action initiatives, electricity consumption is expected to rise from 377 terawatt-hours (TWh) in 2023 to 2,152 TWh in 2060 (representing a 5.2% annual growth rate). This escalating demand is attributed to rising household incomes, fueling increased usage of electronic appliances such as air conditioners, refrigerators, electric stoves, and electric vehicles.

PT CG Power System Indonesia was established in 1990 as a joint venture industrial company between Pauwels International NV from Belgium and PT Arya Sada Perkasa operating under the name PT PASTI (Pauwels Arya Sada Trafo Indonesia). In 1993, the first transformer production was sent to PT PLN (Persero). Then followed by the first export with the destination of Malaysia in 1996. In 1997, Meta Epsi Engineering entered as one of the shareholders and the company name changed to PT Pauwels Trafo Asia. And in 1999, the company continued to progress by exporting to New Zealand.

The partnership arrangement was changed in 2005 when the Pauwels Group was acquired by CG Power and Industrial Solution Limited India. While the design and technology center remained based in Belgium. CG is recognized as one of the world's largest or international companies with production bases in nine countries, namely India, Belgium, USA, Canada, Ireland, UK, Hungary, Indonesia and France. CG is a market leader in many business areas in its respective geographies and has more than 8,000 employees worldwide, across nations and cultures. CG is part of the Avantha Group, a leading industrial group engaged in the fields of engineering, paper, food, chemicals, information technology, business processes with third parties and other business areas. Group Avantha is an international company with a presence in 10 countries with approximately 20,000 employees.

In 2009 the company's name was changed to PT CG Power Systems Indonesia. The company kept the Pauwels brand and its technology. In 2014, for the first time, the company succeeded in making a 500kV transformer for PT PLN (Persero). And made the company the first to produce a 500kV transformer in Southeast Asia. And in 2020, coinciding with Indonesia's 75th independence day, the company has completed 75 units of 500kV transformers for the needs of PT. PLN (Persero). Elsewedy Electric Indonesia has become a significant portion of the energy infrastructure sector focusing on the designing, manufacturing, and servicing of numerous power transformer types including three-phase, single-phase, generator step up, auto-transformers which fall under the power transformer category. Their scope of work also covers the designing and manufacturing of trackside transformers and mobile substations, for the specific requirements of power transmission and distribution.

Apart from manufacturing activities, Elsewedy has extended its scope of work and transforms into an active lifecycle support provider, including refurbishment, service and construction site repair upgrading of transformers. They are also engaged in Engineering, Procurement, and Construction (EPC) forms of contracts that allow them to provide complete solutions for developing energy infrastructure. Due to such broad scope, Elsewedy provided numerous industries and utilities with the support and development of power infrastructure in South East Asia as well as the Pacific region Despite its success in the electrical equipment manufacturing industry, PT. Elsewedy Electric Indonesia is struggling to survive with a lot of business challenges. Without fixing these challenges, the company's ability to stay competitive and capitalize on emerging market opportunities could be severely compromised.

The company's revenue stagnation has been accompanied by unfulfilled orders, which is a key issue that has persisted for the past eight years. This lack of order fulfillment is compounding the stagnation caused by the company. In 2022-2023, PT. Elsewedy Electric Indonesia facing deficit in order fulfillment was experienced by Elsewedy Electric Indonesia, indicating a significant imbalance between market demand and production capacity. Production bottlenecks and capacity constraints, the company's production processes are currently focused on producing medium to high-capacity transformers. Conversely, with the growing trend towards renewable energy, there is a rise in demand for compact and small transformers. Due to the inability of production to meet market demands, there is a significant bottleneck that limits the company's ability. A more detailed number of transformers production of PT. Elsewedy Electric Indonesia based on MVA Rating and quantity can be seen in Figure 1.

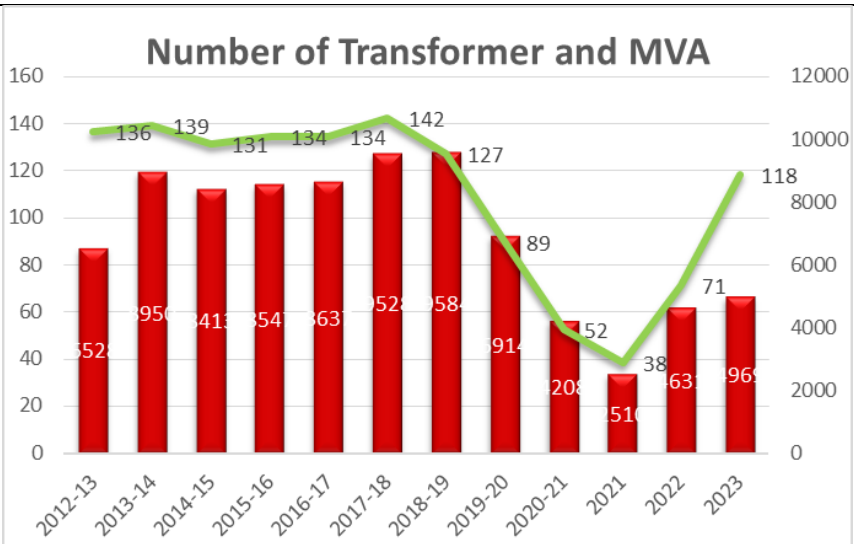


Figure 1. Research Methodology

From Figure 1 we can see that there was a decline in the number of factory outputs in 2019-2021 caused by the pandemic which can be ignored. However, it started to rise again in 2023 from the number of units produced but the MVA output is still below standard.

LITERATURE REVIEW

Theory of Constraints (TOC)

The Theory of Constraints (TOC) is a management methodology that focuses on identifying and managing constraints that limit the performance of a system. In the context of PT. Elsewedy Electric Indonesia, TOC can be applied to analyze and address production bottlenecks that hinder the company's ability to increase revenue. (Cox, J. F., & Schleier, J. G. 2010) PT. Elsewedy Electric Indonesia is facing challenges in meeting the market demand that is shifting towards smaller capacity transformers. Their current production capacity, which is optimized for medium to high capacity transformers, is not aligned with the market demand. This creates an imbalance between capacity and demand, potentially leading to missed sales opportunities and loss of revenue.

The Theory of Constraints (TOC) can help PT. Elsewedy Electric Indonesia overcome these challenges in the following ways:

Identify the Constraint: The first step is to identify the constraint or bottleneck in the production process. This could be a specific machine, the availability of skilled labor, or even a slow administrative process. Exploit the Constraint: Once the constraint is identified, the next step is to maximize the utilization of that constraint. This could mean ensuring that the constraint is operating at full capacity, reducing downtime, or improving the efficiency of the processes surrounding the constraint. Subordinate Other Processes to the Constraint: All other processes in the system should be aligned with the constraint. This means that the output from other processes should not exceed the capacity of the constraint, thus preventing inventory buildup and waste of resources. Elevate the Constraint: If exploiting the constraint is not enough to meet the demand, then the capacity of the constraint needs to be increased. This could mean investing in new equipment, providing additional training for the workforce, or even restructuring the process. Repeat the Process: Once a constraint has been addressed, new constraints may emerge. Therefore, the process of identifying and managing constraints should be ongoing to ensure continuous performance improvement.

METHOD

In this research, use the methodology as shown in Figure 2.

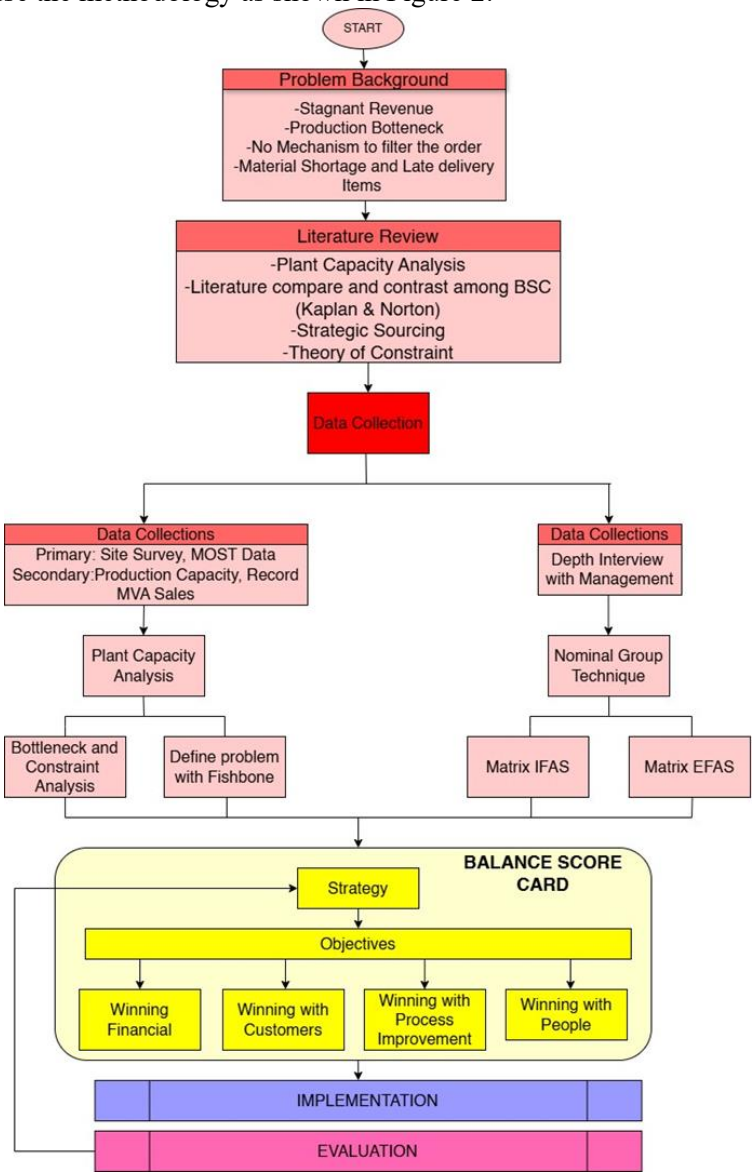


Figure 2. Research Methodology

The research design using qualitative and quantitative data. The qualitative data will be shown in table 2. Below and the quantitative data will be shown in table 3.

Table 2. Qualitatve Data

Qualitative	
Primary Data	Interview and Nominal Group Technique with General Manager, Head of Production, Production Manager and Sourcing Manager
Secondary Data	Satisfactory report from customers, Benchmarking of Capacity.
Output	SWOT Strategy Analysis, The Balance Scorecard strategy, Sourcing Strategy.

Table 3. Quantitative Data

Quantitative	
Primary Data	Actual Number of Machine, MOST Study Data.
Secondary Data	Record MVA Quantity Sales, Historical Production Data, Lead time delivery of transformers.
Output	Plant Capacity Analysis, De-bottlenecking plant Strategy.

RESULTS AND DISCUSSION

SWOT Analysis

From the results of the internal analysis containing elements of strengths and weaknesses and the results of the external analysis containing elements of opportunities and threats, it can be entered into a SWOT table that will produce strategies from several of these elements. The order of placement of each element in the SWOT table uses a weighted score order from the largest to the smallest score as shown in table 13. From the SWOT Analysis table, nine recommendations for sourcing strategies were obtained that can be implemented by PT. Elsewedy Electric Indonesia:

1. Utilizing 30 MUSD banking facilities and offering payment schemes through SKBDN for domestic suppliers and Letter of Credit for overseas suppliers to ensure timely payment.
2. Implementing quantity negotiation strategy by using standardized design basis of PT. Elsewedy Electric Indonesia which also refers to international standards that can be offered to potential new supplier candidates to saving material cost and increased profits.
3. Optimizing a comprehensive and automatic supplier performance evaluation system based on historical data from the ERP system.
4. Development of potential in resources who have special abilities in the field of market treasury with the aim of being able to forecast market fluctuations and respond quickly to global market activities.
5. Conducting consolidation and negotiation regarding hedging of long lead items with suppliers to anticipate rapid demand from factories to suppliers who are willing to dedicate their production lines to the company.
6. Increase the TKDN value to reduce transformer prices according to the specifications requested by PLN and the local market.
7. Make long-term agreements with suppliers to ensure material availability and get good prices for the supply of primary commodities whose prices depend on market fluctuations such as Copper, Silicon Steel and Oil.
8. Use bank facilities properly to hedge currency on local projects with long-term contracts to avoid currency fluctuations.
9. Conduct training for design employees so that they can create more competitive and more material efficient products and are supported by the required software.
10. Strengthening control over supporting materials that can be consolidated has the potential to reduce the risk of uncertainty in the availability of shipping slots and avoid highly volatile shipping prices.
11. Increasing transformers design adaptability to adapt to the types of commodities available in local and regional markets to reduce logistics risks and commodity shortages.
12. Development of human resource potential in the logistics department to prepare the analysis and strategies needed in the future to face increasingly tight business competition and increasingly challenging external logistics conditions that increasingly require new and adaptive strategies.

From the results of the internal analysis containing elements of strengths and weaknesses and the results of the external analysis containing elements of opportunities and threats, it can be entered into a SWOT table that will produce strategies from several of these elements. The order of placement of each element in the SWOT table uses a weighted score order from the largest to the smallest score as shown in table 4 and the result of SWOT Matrix in table 5.

Table 4. SWOT Matrix Strategy Mapping

STRENGTH	**WEAKNESS**
1)Have good banking facilities to make material purchases up to 30MUSD (0.60)	1)There are still many material suppliers who only rely on two or even just a single supplier (0.28)
2) Have good relations with local and foreign suppliers up to 20 years (0.40)	2) Unpredictable price fluctuations due to global influences such as the Middle East war (0.24)
3) Most of the designs and materials have been well standardized (0.40)	3) Not flexible in determining the country of origin of suppliers due to different customer demands (0.16)
4) Have a team with good negotiation skills to saving materials cost up to 5% every project (0.27)	4) Most of the manpower in the sourcing division who work do not come from engineering majors (0.08)
5) Using a reliable ERP system so that all sourcing planning is properly recorded (0.24)	5) Lack of strong control over stock and prices for non-primary materials (0.08)
OPPORTUNITY	**THREATS**
1)Increased the market demand of Power Transformers supply in Worldwide (0.56)	1)Shortages for critical materials during the increased of demand (0.30)
2) New suppliers provide lower prices than competitors due to volume quantity negotiation strategies (0.40)	2)Very long delivery times for critical material (0.26)
3) Improve relationships with new and old suppliers for business continuity (0.27)	3)Uncertainty of availability of delivery slots that match with the project scheduling (0.20)
4) Government policy regarding TKDN which requires PLN to purchase transformers from Local Supplier (0.24)	4)There are many new competitors in the power transformer manufacturing sectors (0.10)
5) Increase TKDN contribution to meet government regulations on domestic supply (0.21)	5)Currency fluctuations in local projects caused in currency loss (0.06)

Table 5. SWOT Matrix Strategy Result

S-O Strategy	**W-O Strategy**
Utilizing 30MUSD banking facilities and offering payment schemes through SKBDN for domestic suppliers and Letter of Credit for overseas suppliers to ensure timely payment. (S1, S2, S4, O1, O2, O3)	Development of potential in resources who have special abilities in the field of market treasury with the aim of being able to forecast market fluctuations and respond quickly to global market activities. (W2, W3, W4, O1. O3)
Implementing quantity negotiation strategy by using standardized design basis of PT. Elsewedy Electric Indonesia which also refers to international standards that can be offered to potential new supplier candidates. (S2, S3, S4, O2, O3, O4)	Conducting consolidation and negotiation regarding hedging of long lead items with suppliers to anticipate rapid demand from factories to suppliers who are willing to dedicate their production lines to the company. (W1,
Optimizing a comprehensive and automatic supplier performance evaluation system based on historical data from the ERP system (S5, O3)	Increase the TKDN value to reduce transformer prices according to the specifications requested by PLN and the local market (W1, W3, O4, O5)
S-T Strategy	**W-T Strategy**
Make long-term agreements with suppliers to ensure material availability and get good prices for the supply of primary commodities whose prices depend on market fluctuations such as Copper, Silicon Steel and Oil. (S1, S2, S4, T1, T2, T3)	Strengthening control over supporting materials that can be consolidated has the potential to reduce the risk of uncertainty in the availability of shipping slots and avoid highly volatile shipping prices. (W1, W2, W5, T1, T2)
Use 30 MUSD bank facilities properly to hedge currency on local projects with long-term contracts to avoid currency fluctuations. (S1, S5, T3, T5)	Increasing transformers design adaptability to adapt to the types of commodities available in local and regional markets to reduce logistics risks and commodity shortages. (W2, T1, T2, T4)
Conduct training for design employees so that they can create more competitive and more material efficient products and are supported by the required software. (S3, S5, T4)	Development of human resource potential in the logistics department to prepare the analysis and strategies needed in the future to face increasingly tight business competition and increasingly challenging external logistics conditions that increasingly require new and adaptive strategies. (W5, T1, T2, T3, T4, T5)

Debottlenecking Productions Process

The bottleneck of the production process is in the Oven Process and Testing process. This causes an imbalance in the production process between Production Section I such as Winding and Core Stacking processes with productions Section II such as Testing and Oven. This condition often occurs when the winding machine and core stacking process are only operating at 70% but testing and oven are very busy and overloaded. Therefore, the author will provide a solution to make the process balanced and fully effective.

In this oven process, one of the causes of overload in the oven process is the minimum number of oven machines. The factory only has 2 oven machines operating so far. In addition to the method of setting the product mixing carried out above, in this oven process, an improvement process can be carried out from the engineering side related to the heating process in this oven. In heating with a dry oven, it is carried out at a temperature of 100ºC using Insulation Kraft Paper. To speed up the heating process, improvements can be made from the design engineering side to change the insulation paper to Thermally Upgraded Paper and spray Kerosene during the heating process. According to the study "Vapor phase transformer drying - Part I: Vapor phase drying as part of the transformer manufacturing process. Transformers Magazine, Volume 3, 52-6." This process can save 40% of time because the heating temperature can be increased to 120ºC with the help of the kerosene spraying process and the use of Thermally upgraded Paper. However, in practice, several transformers in factories that use this method save 20% of time with this change, it will change the cycle times from the man shift side. It can be seen from tables 6 and 7 that these are the results of the method changes made.

Table 6. Most Calculation Comparation Dry Oven vs Vapor Dry

MOST (in Manshift)				
Sl.No	**Desc**	**Details**	**Dry Oven**	**Vapor Dry Oven**
1	LV TRX	WC	6.4	5.3
		CT	6.4	5.3
2	MV TRX (References)	WC	8.0	6.4
		CT	8.0	6.4
3	HV TRX	WC	11.2	9.1
		CT	11.2	9.1
4	ExtraHV TRX	WC	11.2	9.1
		CT	11.2	9.1
MOST With (in Hour)				
Sl.No	**Desc**	**Details**	**Dry Oven**	**Vapor Dry Oven**
1	LV TRX	WC	48	40.0
		CT	48	40.0
2	MV TRX (References)	WC	60	48.0
		CT	60	48.0
3	HV TRX	WC	84	68.0
		CT	84	68.0
4	ExtraHV TRX	WC	84	68.0
		CT	84	68.0

Table 7. Plant Capacity after Improvement methods in Dry Oven

Plant Capacity									
No	Description	Winding	Core Stacking	Core Coil	Lead Connection	Dry Oven	Final Assembly	Testing	Finishing & Packing
1	No of working days per month	21	21	21	21	21	21	21	21
2	No of shift per day	3	2	2	2	3	2	3	2
3	No of machine or work station	16	3	3	2	2	2	2	2.5
4	Machine effeciency	90%	90%	90%	90%	90%	90%	90%	90%
5	Cycle Time in shift	47.8	6.7	6.8	3.9	6.4	4.5	8	5.6
6	Monthly Capacity (for 60 MVA Equivalent)	19	17	17	19	18	17	14	17
7	Monthly capacity in MVA	1140	1020	1020	1140	1080	1020	840	1020
8	Installed factory capacity output (MVA)	13680	12240	12240	13680	12960	12240	10080	12240

Debottlenecking using Product Mixing.

Looking back to 2023, PT. Elsewedy Electric Indonesia produced 118 Transformer Units per year but only produced an output of 4969MVA, while in 2018 it was able to produce 127 Units but was able to produce an output of 9528 MVA. The difference between 2023 and 2018 was only 9 Units, but there was almost a two times difference in output. The author will implement a strategy to do product mixing in order to increase the Average MVA Product. In this product mixing, the reference product MV Transformers is used with a value of 60MVA, the reason is that in 2018 where this company reached Peak revenue order, the average MVA output that was successfully degenerated was 60 MVA. It can be seen from the table 8 is a reference for the product Mixing reference at PT.EEI.

Table 8. Product Mix References in PT.EEI Factory

Product Mix References								Percentage of Order	AVG MVA
Type Trx	MVA	Qty	Testing Hour	Oven Hour	Total H Testing	Total H Oven	Total MVA		
LV Trx	30	-	55	48	-	-	-		
MV Trx	60	168	64	60	10,752	10,080	10,080	100%	60
HV Trx	120	-	90	84	-	-	-		
EHV Trx	167	-	108	84	-	-	-		
		168			10,752	10,080	10,080		

From the table 7, it can be seen from the total capacity of the Oven and Testing which are the bottlenecks in the production process, it is found that during a year the Testing process takes 10,752 hours and the Oven process takes 10,080 hours for a generated order of 10,080 MVA with an Average of 60MVA. Furthermore, it can be simulated for Product Mixing 1 with the majority loading leading by MV Transformers. It can be seen from Table 9 which simulates if the factory is loaded with the majority of MV transformers:

Table 9. Product Mix 1 in PT.EEI Factory

Product Mix 1 (MV Majority Loading)								Percentage of Order	AVG MVA
Type Trx	MVA	Qty	Testing Hour	Oven Hour	Total H Testing	Total H Oven	MVA		
LV Trx	30	31	55	48	1,705	1,488	930	20%	
MV Trx	60	77	64	60	4,928	4,620	4,620	50%	
HV Trx	120	27	90	84	2,430	2,268	3,240	17%	78.258065
EHV Trx	167	20	108	84	2,160	1,680	3,340	13%	
		155			11,223	10,056	12,130		

In the table above, product mixing 1 is focused on MV and HV Transformers by limiting orders with LV capacity. With each portion as follows, LV Transformers by 20%, MV Transformers by 50%, and a combination of HV and EHV by 30%. With this product mixing, it increased from the previous 10,080 MVA to 12,130 MVA or around 20.3%. However, in Product Mix 1, Testing experienced Over Hours of 471 Hours for a year, but this can be overcome by implementing an overtimes system on Saturdays for 3 times each month with a 2 shifts system. Next, the author will conduct a simulation by implementing Product Mix 2 by focusing on LV Transformers as the majority of output in the factory. It can be seen from Table 10 which simulates if the factory is loaded with the majority of LV transformers:

Table 10. Product Mix 2 in PT.EEI Factory

Product Mix 2 (LV Majority Loading)								Percentage of Order	AVG MVA
Type Trx	MVA	Qty	Testing Hour	Oven Hour	Total H Testing	Total H Oven	MVA		
LV Trx	30	110	55	48	6,050	5,280	3,300	61%	51.657459
MV Trx	60	49	64	60	3,136	2,940	2,940	27%	
HV Trx	120	12	90	84	1,080	1,008	1,440	7%	
EHV Trx	167	10	108	84	1,080	840	1,670	6%	
		181			11,346	10,068	9,350		

It can be seen from the table 9 if the company focuses on loading the LV Transformer then in the same Oven time period of 10,068 hours, the factory is only able to generate orders of 9,350 MVA. With the effort to work on a large number of transformers of 181 units compared to product mix 1 which is only 155 units but the output results do not match the effort made. The company must strengthen the sales team so that incoming orders are orders that can really be produced effectively in the factory. If production is filled with all transformers with LV capacity, the business will be disrupted because it will decrease in the amount of output revenue. Then the Product Mix 3 simulation is carried out with a focus on the loading majority for HV and EHV transformers. It can be seen from table 11 which simulates if the factory is loaded with the majority of HV and EHV Transformers

Table 11. Product Mix 3 in PT.EEI Factory

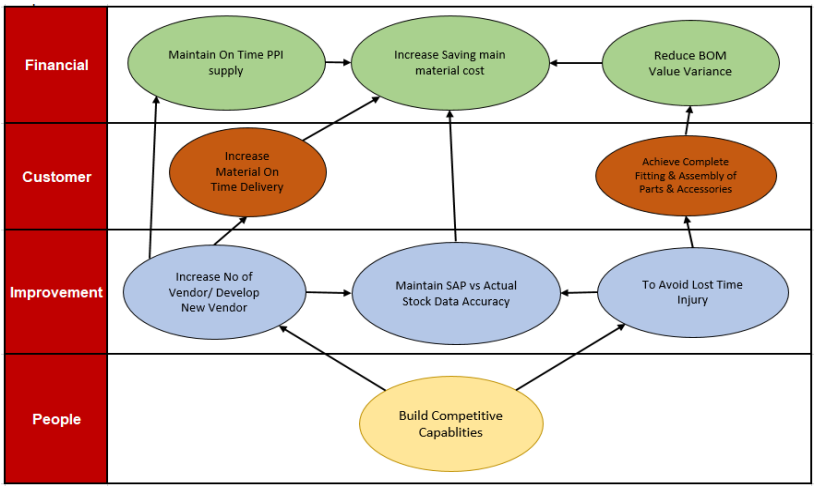
Product Mix 3 (HV Majority Loading)								Percentage of Order	AVG MVA
Type Trx	MVA	Qty	Testing Hour	Oven Hour	Total H Testing	Total H Oven	MVA		
LV Trx	30	33	55	48	1,815	1,584	990	23%	89.537931
MV Trx	60	39	64	60	2,496	2,340	2,340	27%	
HV Trx	120	54	90	84	4,860	4,536	6,480	37%	
EHV Trx	167	19	108	84	2,052	1,596	3,173	13%	
		145			11,223	10,056	12,983		

It can be seen from the table 10 by focusing the factory loading on HV and EHV Transformers by 50%, the maximum MVA that can be degenerated in the Oven and Testing with the same treatment is 12,983 MVA. However, this strategy is not necessarily a good option because the market demand in Indonesia and Asia does not focus on HV and EHV Transformers. If PT.EEI wants to increase to a fairly high level, PT.EEI must penetrate into large countries that also require large electricity networks, for example: America, China, and Russia.

Implementation The Balance Scorecard for Sourcing Divison

Sourcing Division plays an important role in the sustainability of the transformer business at PT. Elsewedy Electric Indonesia. This division is responsible for the material side starting from the amount of stock requirements, competitive prices, punctuality in delivery of goods, and ensuring that the material is available and can be used properly until the transformer is completed. The image below shows the relationship between sourcing strategy and proposed measurement for sourcing division. From Table 12, we can see the sourcing strategic mapping.

Table 12. Sourcing Strategy Map



From Table 12, it can be seen that it is a mapping of the sourcing strategy applied to the Balance Scorecard and implemented in the form of targets in Table 13.

Table 13. Proposed Measurement for Sourcing Divison

BSC Perspective	Corporate Strategy	Business Unit Goals	Sourcing Objectives	KPI	Measures	Formula	Target
Financially	Decrease operational cost	Increased Profitability	Increase Saving main material cost	% Saving Main Material Cost	Productivity Log	A = $ DCP B = $ Actual Price (A-B)/A	3%
	Decrease operational cost	Maintain Cost Structure	To Maintain On Time PPI supply	# Quarterly PPI Update	PPI quarterly report	Number of PPI submit per Quarter	1
	Decrease operational cost	Maintain Cost Structure	Reduce BOM Value Variance	% BOM Value Variance	SAP Report	A= Delivered Qty B= BOM Qty) KPI = ((A-B)/B) x100%	2%
Customer	Increase Customer Base	Increase Customer Satisfaction	Increase Material On Time Delivery	% of Material on time Delivery	Projects delivery report	A = No. of ontime Delivered Equipment B = No. of Delivered Equipment KPI = A/B*100	95%
	Increase Customer Base	Increase Customer Satisfaction	Reduce the number of customers complaints	#Valid Customer Complaints	Correspondence	No. of logged valid customer complaints	5
Improvement	Increase the effectiveness of quality services & processes	Achieve Operational Efficiency	Increase No of Vendor/ Develop New Vendor	Number of New Vendor	New Vendor Report per Year	No of new vendor per Year	2
	Increase the effectiveness of quality services & processes	Achieve Operational Efficiency	Maintain SAP vs Actual Stock Data Accuracy	% SAP vs Actual Stock Data Accuracy	SAP Report	A = Value on actual B = Value on SAP (A/B) x 100%	99%
	Maintain HSE Excellence factors	Maintain Safe and Healthy Workplace	To Avoid Lost Time Injury	# LTI Rate	HSE report	No of lost time injury	0.00%
People	Build Competitive Capablities	Build Competitive Capabilities	Build Competitive Capablities	% Training Plan completion	Training report	A = No of training attended B = Approved training (A/B) x 100%	85%

From table 12 are the targets of the sourcing division that must be achieved and below is an explanation of each of these targets.

- Increase Saving main material cost

To increase the company's EBIT, sourcing also has an important role and contribution to the company's EBIT. Sourcing can save on the material cost side. Some ways to save include the quantity negotiation approach and long-term frame agreements to lock in prices for a certain period of time. The company's target for saving costs on the material side is 3%

- Reduce BOM Value Variance

Price fluctuations caused by supply and demand or turmoil in the global market sometimes cause differences in material prices during Tender and Execution. In this case, sourcing is responsible for maintaining the price value so that there is no difference that is too far and is expected to buy materials below the bid price. The company's target for BOM Variance is 2%

- Increase Material On Time Delivery

To ensure the efectiveness operations, sourcing is responsible for the timeliness of the material to the factory for processing. Starting from the timeliness of the PO release to follow up to the vendor for the purchased material. The target for Material on Time delivery is 95% of the total amount of material ordered.

- Reduce the number of customers complaints

The quality of a transformer made by PT. Elsewedy Electric Indonesia depends on the quality of the material purchased from the vendor. Therefore, sourcing has a full task to determine which vendor is the best and has high quality standards and meets the requirements contained in the IEC Standard and ANSI standards. The maximum complaint received by PT.EEI is targeted at a maximum of 5 customer complaints per year.

- Increase No of Vendor/ Develop New Vendor

As one of the strategies to avoid operational dependency of PT.EEI on one or two Vendors, Sourcing is required to be agile and more open to potential new vendors. However, apart from the number of vendors, sourcing must also consider the quality of materials from all vendors. The company has a target to get two or three new vendors every year.

- Maintain SAP vs Actual Stock Data Accuracy

To ensure the continuity of an effective production process, sourcing has the responsibility of maintaining the availability of goods in the warehouse. Especially materials related to consumer goods such as insulation paper, nomex paper, transformers woods, and others. The company's target for this stock value is 99%

CONCLUSION

The research analyzed strategic sourcing and production bottleneck management to maximize the revenue of PT. Elsewedy Electric Indonesia (EEI) faces significant challenges in aligning its production capacity and sourcing strategies to maximize revenue. A primary issue is the mismatch between the company's current production setup optimized for medium-to-high capacity transformers and shifting market demand toward smaller transformers. The research reveals that the drying and testing stages are major bottlenecks in the production process, limiting the company's ability to meet the growing demand for smaller transformers in the renewable energy sector. To address these challenges, the study proposes strategic recommendations, including the adoption of new drying technology, supplier diversification, and potential expansion of testing facilities. Additionally, The Balanced Scorecard (BSC) framework is proposed to align operational performance with long-term financial targets, incorporating four perspectives: financial, customer, internal process, and learning & growth. The plant capacity analysis showed that there are production bottlenecks at several stages of the production process. To better illustrate the potential impact of the proposed design changes, the following table compares the existing conditions with the projected conditions after implementing the recommendations in table 14:

Table 14. Comparation Existing Condition vs After proposed design strategy

No	Aspect	Existing Condition	Condition after Proposed Deisgn	Explanation
1	**Revenue**	Revenue stagnation due to mismatch between capacity and demand.	25-30% increase in revenue through increased MVA output and sales of high value products.	A combination of capacity increases, product diversification and global market penetration drove revenue growth.
2	**Productions Capacity**	10,080 MVA/year (limited by bottleneck in Dry Oven and testing).	12,983 MVA/year (~29% increase)	The adoption of vapor-phase drying technology reduced process time, increasing throughput. And can apply optional strategy for addition of Testbay 3 after evaluation of previous strategy
3	**Productions Time**	Dry Oven: 3-5 days per transformer	Vapor Dry Oven: 20% faster (2.4-4 days)	Vapor-phase drying technology improvement make faster in oven process
4	**Product Flexibility**	Focus on low-medium voltage transformers (60 MVA and below).	Portofolio includes LV (30 MVA), MV (60 MVA), HV (120 MVA), and EHV (167 MVA)	Portfolio reallocation to high economic value products and capacity increases allow for output
5	**Supplier**	70% of critical materials (copper, silicon steel) depend on 1-2 suppliers. there are often delays in arrival due to material shortages	Diversify to 3-4 major suppliers for critical materials.	Supplier diversification strategy reduces the risk of supply disruptions and price fluctuations.

From table 14 above we can see by implementing the recommendations of this study, PT. Elsewedy Electric Indonesia can enhance its operational efficiency, meet the evolving market demand, and achieve sustainable revenue growth.

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