JOURNAL LA MULTIAPP

VOL. 06, ISSUE 06 (1640-1655), 2025
DOI: 10.37899/journallamultiapp.v6i6.2234

Productivity Analysis of Production Department with Objective Matrix Method

Kristine Lumban Gaol[1], Enny Aryanny[1]

[1]Departement of Industrial Engineering Faculty of Engineering and Sains, University National Development "Veteran" East Java, Surabaya, East Java, Indonesia

**Corresponding Author: Kristine Lumban Gaol*
Email: kristineaguileralgaol2@gmail.com

Article Info

Article history:
Received 17 May 2025
Received in revised form 03 June 2025
Accepted 27 December 2025

Keywords:
Objective Matrix
Production
Productivity
Shoes

Abstract

PT XYZ is one of the international branded manufacturing companies engaged in the shoe industry and produces various brands of shoes. In 2024 the company's production on line 7 which produces Brooks brand shoes experienced a decrease in production results which caused the production target not to be achieved. From the production target of 526,624 units of Brooks brand shoes that have been targeted, line 7 production is only able to produce 473,405 units of shoes so that there is a decrease in the production of Brooks shoes by 10.10%. This research method used is Objective Matrix (OMAX). The results showed that the level of partial productivity in the production unit fluctuated with an increase and decrease in each period. Proposed improvements to increase productivity on line 7 are the establishment of a raw material inspection division with an analysis report (LA), integration of manufacturing information systems and ERP, and utilization of AI and IoT sensors for production efficiency.

Introduction

Productivity is one of the indicators of a company's success. Grönroos & Ojasalo (2004) said that Productivity is related to efficiency in the form of a ratio between the products produced and the resources used. This ratio will show the level of productivity of a company and can be used as material for management evaluation of operational processes that run to be more effective and efficient (Bernolak, 1997; Trojanowska et al., 2017; Parra et al., 2024).

PT XYZ is one of the international branded manufacturing companies engaged in the shoe industry and produces various well-known shoe brands such as Crocs, Under Armour, Asics, and Brooks which will be explored abroad. In 2024 the company's production on line 7, which produces Brooks brand shoes, experienced a decrease in production results which caused the production target not to be achieved. From the production target of 526,624 units of Brooks brand shoes that have been targeted, line 7 production is only able to produce 473,405 units of shoes so that there is a decrease in the production of Brooks shoes by 10.10%.

This research uses the Objective Matrix (OMAX) method as the main tool to measure productivity (Aliafari et al., 2019; Wahyuni et al., 2020; Indriani et al., 2024; Prakoso, 2022). To determine the weight of each indicator, the Analytical Hierarchy Process (AHP) method was used. After the productivity value is obtained, the analysis is continued with the Traffic Light System (TLS) to identify which indicators have low performance and need to be improved immediately. Then the root cause is analyzed using the Fishbone diagram. The

ISSN: 2716-3865 (Print), 2721-1290 (Online)

results of this analysis became the basis for developing an improvement plan outlined in the 5W+1H method.

Productivity

Berhe et al. (2017) Productivity is a key indicator in assessing a company's performance, measured through the ratio between outputs and inputs in the production process. Productivity measurement helps companies identify strengths and weaknesses, set targets, and drive innovation for continuous improvement. Increased productivity indicates that the company is in a good position, provides a competitive advantage, increases profitability, and improves customer satisfaction (Effendy et al., 2021; Obeng et al., 2025; Sani et al., 2024). Productivity is the ratio between the results of work with materials, time, and energy used in producing goods or services (Suryani et al., 2020). In Afianti et al., (2020) productivity is the ratio or ratio between total output and total input used by the company.

Objective Matrix (OMAX)

The objective matrix (OMAX) model is a partial productivity reduction system that can later be developed with the aim of monitoring productivity in accordance with predetermined productivity criteria. There are several parts in the OMAX model including productivity criteria, performance, level, target, standard performance, score, weight, and achievement indicators (Aurelia et al., 2023; Pratama et al., 2025; Arifin et al., 2024). Objective Matrix is a system of partial productivity measurement that has been developed with the aim of monitoring the productivity of each part of the company with productivity criteria appropriate to the existence of that part (Mukti et al., 2021; Zabidi et al., 2024; Jaradat et al., 2025).

Analytical Hierarchy Process (AHP)

AHP is a decision support model developed by Thomas L Saaty. This decision support model will describe complex multi-factor or multi-criteria problems and become a hierarchy. According to Dewi et al. (2021) hierarchy is defined as a representation of a complex problem in a multi-level structure where the first level is the goal, followed by the level of factors, criteria, sub criteria and so on down to the last level of alternatives. With hierarchy, a complex problem can be decomposed into its groups which are then organized into a hierarchical form so that the problem will appear more structured and systematic. The Analytic Hierarchy Process consists of two stages: recognizing the problem and selecting an appropriate course of action; constructing a hierarchy where the primary objective is at the top, then the criteria and other options (Iqbal, 2024; Saaty, 2005).

Traffic Light Sistem (TLS)

Traffic Light System (TLS) is one of the popular methods for calculating scores for each criterion (Magableh et al., 2020; Naziro et al., 2025). TLS includes an OMAX assessment, relating the system assessment used as a score mark calculated based on the performance criteria to indicate whether the criteria need to be improved or not. OMAX performance is measured to gauge system performance. TLS is used because it is easier to use, shows unresolved performance and needs to be improved immediately (Iqbal, 2024). In Wiwik (2019) the traffic light system serves as a sign of whether the score of a performance indicator requires improvement or not.

Fishbone Diagram

The cause and effect diagram is a diagram developed by Dr. Kaory Ishikawa in 1943 which is used to show the causal relationship of a problem or deviation. According to Ahmed & Ahmad (2011) and Hossen et al. (2017) the Cause and Effect Diagram is a tool that helps

ISSN: 2716-3865 (Print), 2721-1290 (Online)

identify, sort, and display the various possible causes of a particular problem or quality characteristic. This diagram illustrates the relationship between the problem and all the causal factors that affect the problem (Xu & Dang, 2020; Daniel et al., 2012; Jassbi et al., 2011). Fishbone diagram is an analytical method used to identify quality problems and check points that include four types of materials or equipment, labor and methods (Gustarico & Putri, 2023).

5W+1H Analysis

According to Pratomo & Prassetiyo, (2022) the 5W+1H support tool is a tool commonly used by an organization to describe problems from various points of view, thus enabling a more comprehensive and in-depth analysis. This method consists of six key elements: What, Who, When, Where, Why, and How. By asking these questions, organizations can dig deeper into an issue, which in turn helps in understanding the context and complexity of the problem at hand. 5W+1H is a tool commonly used by organizations to describe problems from various perspectives, allowing for a more comprehensive and in-depth analysis (Pratomo & Prassetiyo, 2022; Prasad & Kumar, 2022).

Methods

This study uses quantitative and qualitative approaches to analyze the factors that influence the productivity of production units at PT XYZ. There are two main types of variables in this study, namely independent variables and dependent variables. Independent variables consist of the amount of raw materials, the number of workers, the number of machine hours, the amount of electricity consumption, and the number of defective products. These variables were selected because they are theoretically and empirically considered to have a significant influence on production performance in a manufacturing environment. The dependent variable in this study is the level of production unit productivity. Productivity is defined as the ratio between the number of products produced (output) and the total resources used (input), which include raw materials, labor, machine hours, and electricity. Additionally, output quality is also considered through the number of defective products, which reflects the efficiency and effectiveness of the production process. Thus, productivity in this study is not only viewed from the quantity of production output but also considers the efficiency of resource utilization and product quality. The relationship between input variables and productivity is analyzed by considering the potential interactions between factors, such as how an increase in the number of workers can have different impacts depending on machine hour utilization, or how defective products contribute to a decrease in effective output. Therefore, the analytical approach in this study includes an exploration of both linear and non-linear relationships between variables.

The data used in this study consists of two types: Quantitative data: This includes historical data from PT XYZ's production unit on the amount of raw materials, total labor, machine hours, electricity consumption, number of defective products, and number of products produced during a certain period. This data is analyzed to calculate productivity and identify the influence of each input on the dependent variable; Qualitative data: Collected through the distribution of questionnaires to PT XYZ production unit staff. The questionnaire was designed to explore workers' perceptions of productivity barriers, process efficiency, machine usage, and constraints in resource utilization. The questionnaire structure includes closed and open-ended questions, with themes covering perceptions of product quality, causes of defective products, and suggestions for improving production performance. The use of qualitative data aims to enrich quantitative analysis and enable data triangulation, by comparing and linking quantitative findings with the subjective perspectives of operational

ISSN: 2716-3865 (Print), 2721-1290 (Online)

parties. This approach is expected to provide a deeper and more contextual understanding of the factors influencing productivity in a manufacturing environment.

Results and Discussion

The collection of input data for Brooks brand shoe products collected includes raw material data, labor data, machine working hours data, electrical energy usage data, and defective product data recapitulated during the period January 2024 to December 2024, as follows:

Table 1. Shoes production input data 2024

Month	Month Main raw material (Meter)	Labor (Person)	Sewing Machine Working Hours (Hours)	Electric Energy Usage (kWh)	Deffect Data (Unit)
January	8.522	243	13.024	18.300	217
February	7.343	243	10.656	17.150	171
March	7.428	243	10.656	16.950	162
April	6.989	248	9.728	16.800	157
May	7.601	248	11.552	17.750	183
June	7.452	248	10.944	17.250	176
July	8.614	254	14.352	18.430	231
August	8.367	254	13.104	18.100	203
September	7.992	254	12.480	18.000	198
October	8.577	260	14.080	18.380	228
November	8.476	260	13.440	18.130	221
December	8.411	260	13.440	18.250	216

Source: Internal Data of PT XYZ

Table 2. Shoes Production Output Data 2024

Month	Number of Products produced (Unit)
January	39.213
February	31.194
March	30.894
April	29.215
May	33.364
June	31.419
July	41.892
August	38.476
September	36.790
October	41.677
November	39.188
December	39.125

Source: Internal Data of PT XYZ

Productivity criteria are expressed in comparison (ratio) which will be measured in this data processing, there are 5 criteria, namely: (1) Criterion 1, is the productivity of raw material (ratio 1); (2) Criterion 2, is the productivity of labor (ratio 2); (3) Criterion 3 is the productivity of working hours of shoe sewing machines (ratio 3); (4) Criterion 4 is the productivity of Electric energy usage (ratio 4); (5) Criterion 5 is the productivity of deffect products (ratio 5)

ISSN: 2716-3865 (Print), 2721-1290 (Online)

The performance values for the five criteria are determined by dividing the input ratio for each period from January 2024 to December 2024 by the output for each criterion.

$$\text{Ratio 1} = \frac{\text{Number of Products Produced (units)}}{\text{Amount of Textile Raw Materials Used (meters)}}$$

$$\text{Ratio 2} = \frac{\text{Number of Products Produced (units)}}{\text{Number of Workers (people)}}$$

$$\text{Ratio 3} = \frac{\text{Number of Products Produced (units)}}{\text{Total Working Hours of Shoe Sewing Machines (hours)}}$$

$$\text{Ratio 4} = \frac{\text{Number of Products Produced (units)}}{\text{Amount of Electricity Consumed (kWh)}}$$

$$\text{Ratio 5} = \frac{\text{Number of Products Produced (units)}}{\text{Number of Defective Products (Units)}}$$

Table 3. Performance Ratio Value of Each Criterion or Ratio

Month	Month Main raw material	Labor	Sewing Machine Working Hours	Electric Energy Usage	Deffect Data
January	4,60	161,37	3,01	2,14	180,71
February	4,25	128,37	2,93	1,82	182,42
March	4,16	127,14	2,90	1,82	190,70
April	4,18	117,80	3,00	1,74	186,08
May	4,39	134,53	2,89	1,88	182,32
June	4,22	126,69	2,87	1,82	178,52
July	4,86	164,93	2,92	2,27	181,35
August	4,60	151,48	2,94	2,13	189,54
September	4,60	144,84	2,95	2,04	185,81
October	4,86	160,30	2,96	2,27	182,79
November	4,62	150,72	2,92	2,16	177,32
December	4,65	150,48	2,91	2,14	181,13
Average (Level 3)	4,50	143,22	2,93	2,02	183,22
Min Value (Level 0)	4,16	117,80	2,87	1,74	177,32
Max Value (Level 10)	4,86	164,93	3,01	2,27	190,70

Source: Calculation Result

Realistic productivity values are the values achieved by each criterion or ratio before the final target. The recapitulation of the calculations that have been obtained is recorded in a table that explains the entire value of level 1-2 increases and the value of level 4-9 increases in all criteria or ratios can be seen in Table:

Table 4. Level 1-2 and 4-9 Increment Value of each Criterion or Ratio

Level Increase Value	Criteria or Ratio 1	Criteria or Ratio 2	Criteria or Ratio 3	Criteria or Ratio 4	Criteria or Ratio 5
Level 1-2	0,11	8,47	0,02	0,09	1,97
Level 4-9	0,05	3,10	0,01	0,04	1,07

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Source: Calculation Result

Level increase level (1-2) = $\frac{Level\ 3 - Level\ 0}{(3-0)} = \frac{4{,}50-4{,}16}{(3-0)}$ = 0,11

Level increase level (4-9) = $\frac{Level\ 10 - Level\ 3}{(10-3)} = \frac{4{,}86-4{,}50}{(10-3)}$ = 0,05

Weighting of productivity criteria is done with the help of the Analytical Hierarchy Process (AHP) method. Weighting is done by distributing questionnaires to 4 employees in the production unit to get weighting results that describe the priority of each criterion or productivity ratio. Determination of AHP weights for each criterion or ratio is done using expert choice software.

Figure 1. Processing Questionnaire Data with Expert Choice Software

The results of the calculation of the weight of each criterion or ratio with expert choice software are shown in Table 5 below:

Tabel 5. Weight Value of Each Criterion or Ratio

No	Productivity Criteria or Ratio	Weight	Percentage
1	Textile Raw Material (m)	0,340	34.0%
2	Labor (person)	0,347	34.7%
3	Shoe Sewing Machine Working Hours (hour)	0.103	10.3%
4	Electric Energy Usage (kWh)	0.108	10.8%
5	Deffect Product (unit)	0.102	10.2%

Source: Calculation Result

Based on the performance value of each criterion or ratio containing the value of the calculation results of level 1-2 increases and level 4-9 increases, the calculation of level 0-level 10 score values will be used to fill in the values in the matrix cells in the Objective Matrix (OMAX) method. The following is the calculation of filling in the cells of the matrix score value level 0-level 10 for criterion or ratio 1.

The level 0 score is the score obtained from the calculation of the worst score of each criterion or ratio, where the level 0 score on criterion or ratio 1 is 3.21.

Level 1 score = level 0 score + 1-2 increment value
= 4,16 + 0,11 = 4,27

Level 2 score = level 1 score + 1-2 increment value
= 4,27 + 0,11 = 4,39

A level 3 score indicates that the company is at an average level (standard), can be obtained from the average of each ratio, where the level 3 score on criteria or ratio 1 is 4.50.

Level 4 score = level 3 score + increase value 4-9

ISSN: 2716-3865 (Print), 2721-1290 (Online)

= 4,50 + 0,05 = 4,55

Level 5 score = level 4 score + increment value 4-9

= 4,55 + 0,05 = 4,60

Level 6 score = level 5 score + increment value 4-9

= 4,60 + 0,05 = 4,65

Level 7 score = level 6 score + increment value 4-9

= 4,65 + 0,05 = 4,70

Level 8 score = level 7 score + increment value 4-9

= 4,70 + 0,05 = 4,75

Level 9 score = level 8 score + increment value 4-9

= 4,75 + 0,05 = 4,80

The level 10 score is the score obtained from the calculation of the best score of each ratio, where the level 10 score on criterion or ratio 1 is 4.85. Based on the performance value and weight value of each criterion or ratio, the productivity index calculation is carried out for each period from January to December 2024.

Table 6. Performance Indicator Matrix January 2024

Ratio	**Ratio 1**	**Ratio 2**	**Ratio 3**	**Ratio 4**	**Ratio 5**
Performance	4.60	161.37	3.01	2.14	180.71
Level	**Performance Value of Each Level**				
Level 10	4,85	164,93	3,01	2,27	190,70
Level 9	4,80	161,83	3,00	2,24	189,64
Level 8	4,75	158,73	2,99	2,20	188,57
Level 7	4,70	155,63	2,98	2,16	187,50
Level 6	4,65	152,52	2,97	2,13	186,43
Level 5	4,60	149,42	2,95	2,09	185,36
Level 4	4,55	146,32	2,94	2,06	184,29
Level 3	4,50	143,22	2,93	2,02	183,22
Level 2	4,39	134,75	2,91	1,93	181,26
Level 1	4,27	126,28	2,89	1,83	179,29
Level 0	4,16	117,80	2,87	1,74	177,32
Score	5	9	10	6	2
Percentage Weight	34	34,7	10,3	10,8	10,2
Value	170	312,3	103	64,8	20,4
Performance Indicator			*Current*		670,5
			Previous		-
			Index		-

Source: Calculation Result

Recapitulation of productivity level and productivity index for each period:

Table 7. Recapitulation of Value and Productivity Index

Period	**Productivity Value (*Current*)**	**Productivity Index (%)**
January	670,5	
February	141	-79%

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Period	Productivity Value (*Current*)	Productivity Index (%)
March	168,1	19%
April	153,9	-8%
May	199,9	30%
June	89,7	-55%
July	846,3	843%
August	575	-32%
September	419,8	-27%
October	852,7	103%
November	450	-47%
December	483,3	7%

Source: Calculation Result

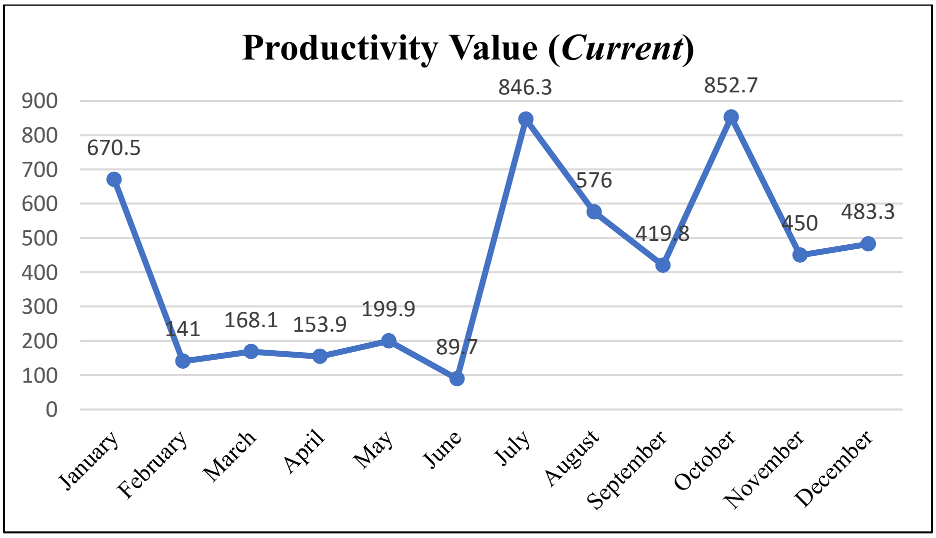

Figure 2. Graph of Productivity Value (Current)

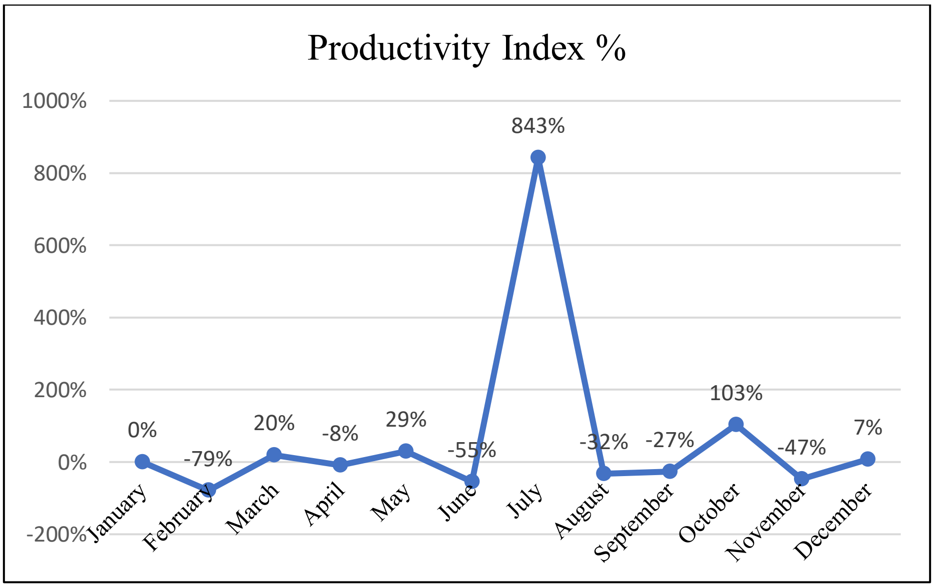

Figure 3. Graph of Productivity Index (%)

The productivity index shown in the table shows significant fluctuations, such as a decline of -79% in February and a sharp increase of 843% in July. The decline in February was likely

ISSN: 2716-3865 (Print), 2721-1290 (Online)

due to delays in raw material supplies and the absence of a number of workers due to annual leave, which impacted the smooth running of the production process. Conversely, the increase in July occurred alongside an increase in export order demand, the implementation of overtime production, and the commencement of improvements to the raw material management system and quality inspection processes. The validity of the data has been confirmed through cross-referencing with production reports and the ERP system, ensuring that these fluctuations accurately reflect actual operational conditions. Therefore, changes in the productivity index provide important insights into operational effectiveness and the production system's response to both internal and external factors. After calculating the productivity index with the Objective Matrix (OMAX) model, the achievement of each indicator is analyzed. The ups and downs of the productivity index are caused by the ups and downs of the score achievement value of each productivity criterion or ratio. Therefore, the evaluation of the score achievement of each criterion or ratio is used to see whether the score is below, right, or above the standard performance. According to the Traffic Light System, red color (in the score of 0 to 2) means that the performance is below standard or far from the expected target, yellow color (in the score of 3 to 6) means that the performance is close to the expected target, and for green color (in the score of 7 to 10) means that the performance has reached the expected target.

Table 8. Recapitulation of Score Achievement of Each Criterion or Ratio

Month	Month Main raw material	Labor	Sewing Machine Working Hours	Electric Energy Usage	Deffect Data
January	5	9	10	6	2
February	1	1	3	1	3
March	0	1	2	1	10
April	0	0	9	0	6
May	2	2	1	2	3
June	1	1	0	1	1
July	10	10	3	10	2
August	5	6	4	6	9
September	5	3	5	4	5
October	10	9	6	10	3
November	5	5	3	7	0
December	6	5	2	6	2
Total	50	52	48	54	46

Source: Calculation Result

Based on the cause-and-effect diagram constructed from insights gathered through interviews with the QC team, the logical next phase of the analysis is to formulate improvement proposals that directly address the identified root causes. To ensure that the recommendations are structured, measurable, and actionable, the 5W+1H framework becomes a relevant analytical tool. This framework allows each problem component to be reviewed from a practical intervention perspective by answering what issue needs to be resolved, why it should be prioritized, where the improvement must take place, when the actions should be implemented, who will be responsible, and how the corrective measures will be executed. Through this approach, proposed solutions can move beyond descriptive identification and transform into concrete improvement actions that support quality enhancement within the production process. The use of 5W+1H is expected to guide improvement planning in a systematic manner, ensuring that each corrective action is aligned with the core causes found in the

ISSN: 2716-3865 (Print), 2721-1290 (Online)

fishbone diagram and can later be evaluated for effectiveness through implementation outcomes.

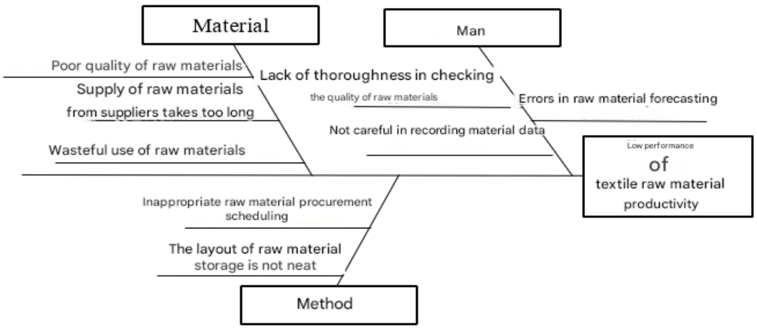

Figure 4. Low Performance of Textile Raw Material Productivity

Table 9. 5W+1H Improvement Proposal for Low Productivity Textile Raw Materials

Factor	What	Why	Who	Where	When	How
Man	Establishment of a special organizational structure for raw material quality inspection	So that the products produced are of high and consistent quality	QA (Quality Assurance) team and warehouse supervisor	Warehouse	Every day production	Create a raw material inspection division, including the creation of an analysis report (LA) as a document that records the implementation of the inspection of raw materials.
	Digitization of material data recording and management processes	To avoid raw material shortages and production delays	Warehouse supervisor	Warehouse	Every day production	Implementing an integrated manufacturing information system to efficiently manage material data
	Improved forecasting method with trend analysis approach and external factors for raw material demand accuracy	To avoid wasting costs, either due to unnecessary overstocking or due to stock shortages that disrupt production.	Warehouse supervisor	Warehouse	Every Month	Use of more sophisticated forecasting models and data analysis techniques to improve the accuracy of demand predictions and take into account external factors that may affect demand, such as market trends, seasonality and special events.
Material	Establishing a special raw material quality monitoring team	To avoid repetition in the production stage which results in non-optimal machine usage.	Quality Control (QC) Team and Procurement Team	Warehouse	Every day production	There is a need for supervision in selecting high-quality raw materials to produce consistent products and efficient use of machines in the production process.
	Affirm the commitment and responsibility	In order to reduce the risk of stopping production due	Quality Control (QC) Team and	Warehouse	Every day production	Improve (MOU) between the company and its suppliers, one of which is by imposing fines on

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Factor	What	Why	Who	Where	When	How
	of suppliers in the supply of raw materials through the revision of cooperation agreements	to lack of raw materials.	Procurement Team			suppliers who fail to meet the total supply of raw materials.
	Reduce excess inventory of raw materials through synchronization of production and procurement needs	So that the company can increase efficiency and reduce production costs	Quality Control (QC) Team and Procurement Team	Warehouse	Every day production	Implement a just in time production system to reduce excessive raw material inventory.
Method	Implementation of an integrated ERP system for raw material planning and management	So that production operations can run smoothly, storage costs can be minimized, and the risk of raw material shortages can be avoided.	Inventory planning team	Warehouse	Every Week	Using ERP (Enterprise Resource Planning) software that can integrate data from various departments, such as production, sales, and procurement.
	Reorganization of manual zoning-based raw material storage system	To reduce the time needed to find and retrieve raw materials, thus speeding up the production process.	Warehouse supervisor.	Warehouse	Every Day Production	Dividing the storage area into zones based on the type of raw materials, access requirements, and frequency of use.

Source: Calculation Result

The fluctuations in productivity observed in the case of PT XYZ show that the performance of production is dependent on material availability, labor discipline, machine-hour availability, energy efficiency, and effectiveness of the quality-control measures. This finding is consistent with other previous research indicating material delays, employee absenteeism, and instability in supply chains as usual triggers of productivity losses in the manufacturing industry, especially in the footwear and textile industries (Afianti et al., 2020; Gustarico & Putri, 2023; Mukti et al., 2021). During the smooth flow of materials, the high level of coordination in the processes, the productivity trends increase, which supports the suggestion made by Effendy et al. (2021) that the growth in productivity is not only due to the output but also the steady input and the control of processes.

ISSN: 2716-3865 (Print), 2721-1290 (Online)

The use of OMAX and AHP in the research will demonstrate how structured methods of measurement will help determine indicators that have the most significant impact on the achievement of productivity. OMAX offers a partial mapping of the productivity, but AHP offers priority weights, hence, focusing decision-making efforts, which is supported by the results of Iqbal and Dahda (2024). The literature on the topic within the last 5 years substantially supports the notion that organisations that use analytical measurement systems are more responsive to deviations in their operations and that they have a continuous-improvement attitude (Rumman et al., 2024; Bernasconi et al., 2025; Beraldin et al., 2022). When it comes to PT XYZ, labour and materials qualify as the determinative factors and this is whereby the assumption that technology can only be effective when paired with an optimum ratio of human resources and expertise is brought up.

The machine-hour performance is also seen as being steady but it is dependent on the beat of the material delivery and accurate timetable. According to the studies published in industrial-engineering, the efficiency of machines is higher in the event when companies introduce planned maintenance and optimisation of the layout of production areas (Kurniasih et al., 2021). The combination of monitoring devices and prediction strategies suggested in the present study is not new to the development of smart manufacturing that has proved effective in minimizing downtimes and improving throughput (Aurelia et al., 2023). The role of energy management also cannot be ignored because effective use of electricity has a positive impact on the smooth production process (Heydari et al., 2023; Bakare et al., 2023).

The product-defect indicator became the most important factor that lowers productivity. The finding is consistent with the quality-production research that reports that rework and scrap increase the duration of production and discontinuities in the workflow (Afianti et al., 2020; Pratomo and Prasetiyo, 2023). Fishbone analysis has revealed the root causes related to inconsistency in material checking, inaccurate forecasting, and inefficient warehouse layout. Increasing supplier loyalty, systematising material-storage zoning, and digitalising quality inspections have a high empirical foundations as evidenced by Gustarico and Putri (2023) who revealed that downstream losses can be avoided by initiating interventions at the quality-control phase early on.

This work by demonstrating the relationship between variables within the production system proves that the improvement of the productivity requires an integrative strategy in this context that will encompass material governance, enrichment of workforce competency, accurate scheduling of machines, defect control, and an integrated information-system system. Operational changes at PT can be supported with suggestions on the implementation of ERP, Just-in-Time inventory, sensor monitoring, which will help to shift towards a more flexible and resistant to disruption model of production.

Further studies have the prospect of creating anticipatory methods based on merging OMAX with Lean or statistical productivity models into more of an anticipatory, as opposed to a reactive, evaluation model.

Conclusion

The level of partial productivity in the production unit at PT XYZ fluctuates with an increase and decrease in each period. The highest partial productivity occurred in October with a productivity value of 852.7 and a productivity index of 103%. While the lowest level of partial productivity occurred in June with a productivity value of 89.7 and a productivity index of -55%. The decline in the productivity index to a negative value was due to the simultaneous decline in the performance of several key criteria, particularly raw materials, labor, machine hours, electricity, and defective products. Low scores on one or more criteria, such as material

ISSN: 2716-3865 (Print), 2721-1290 (Online)

delays, worker absenteeism, or high defective product rates, will lower the total score in OMAX, especially if these criteria carry significant weight. This issue is internal and not due to insufficient demand, as demand for Brooks shoes is actually high. However, high demand without adequate production capacity further exacerbates productivity issues. The Traffic Light Evaluation shows that many indicators remain in the red zone, with defective products being the weakest criterion.

Suggestion

The proposed improvements focused on the criteria of textile raw materials, shoe sewing machine working hours, and product defects that dominantly have productivity problems in the production unit by establishing a raw material inspection division with analysis reports (LA), integration of manufacturing information systems and ERP, and utilization of AI and IoT sensors for production efficiency. The importance of a just in time production system, selection of quality raw materials with tightened MOUs (including sanctions for suppliers), strategic division of storage zones, and technical and on-the-job training for operators and technicians were emphasized. Implementation of preventive maintenance SOPs, machine rotation, and use of technical checklists and inspection points at the production stage are recommended. Improving work comfort through ventilation arrangements, green roofs, noise reduction, and redesigning production lines for ergonomics and efficiency are also key focuses in this proposed update. Future researchers should be able to apply other methods to analyze the level of productivity in the production unit at PT XYZ so that the company will develop better.

References

Afianti, E. Z., Satriawan, I. K., & Sedana Yoga, I. W. G. (2020). Analisis Produktivitas Produksi PT. Bapak Bakery Badung Bali. Jurnal Rekayasa Dan Manajemen Agroindustri, 8(1), 127. https://doi.org/10.24843/jrma.2020.v08.i01.p13

Ahmed, M., & Ahmad, N. (2011). An application of Pareto analysis and cause-and-effect diagram (CED) for minimizing rejection of raw materials in lamp production process. *Management science and engineering*, *5*(3), 87. https://doi.org/10.3968/j.mse.1913035X20110503.320

Aliafari, N., Suryoputro, M. R., & Rahman, N. M. (2019). Productivity analysis on batik production line using objective matrix (OMAX) method. *Industrial Engineering & Management Systems*, *18*(4), 726-734. https://doi.org/10.7232/iems.2019.18.4.726

Arifin, M. M., Herlianti, R., Lukito, T., Lusia, V., & Agustin, M. (2024, December). Increasing productivity of stamping press manufacturing using ahp and objective matrix methods. In *Proceedings ASTRAtech International Conference* (Vol. 1, No. October, pp. 31-41). https://doi.org/10.52453/aic.v1iOctober.462

Aurelia, C., Noya, S., & Oktiarso, T. (2023). Analisis Produktivitas PT Torabika Eka Semesta Menggunakan Metode Objective Matrix (OMA) dan Fault Tree Analysis (FTA). *Jurnal Sains Dan Aplikasi Keilmuan Teknik Industri (SAKTI),* *3*(1), 33–48. https://doi.org/10.33479/jtiumc.v3i1.44

Bakare, M. S., Abdulkarim, A., Zeeshan, M., & Shuaibu, A. N. (2023). A comprehensive overview on demand side energy management towards smart grids: challenges, solutions, and future direction. *Energy Informatics*, *6*(1), 4. https://doi.org/10.1186/s42162-023-00262-7

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Beraldin, A. R., Danese, P., & Romano, P. (2022). Employee involvement for continuous improvement and production repetitiveness: a contingency perspective for achieving organisational outcomes. *Production Planning & Control*, *33*(4), 323-339. https://doi.org/10.1080/09537287.2020.1823024

Berhe, E., Abebe, B., & Azene, D. (2017). A new perspective to productivity measurement. *Total Quality Management & Business Excellence*, *28*(1-2), 205-217. https://doi.org/10.1080/14783363.2015.1053804

Bernasconi, M., Friedli, T., & von Dzengelevski, O. (2025). The impact of current good manufacturing practices inspections on continuous improvement mindset in the pharmaceutical industry. *Journal of Pharmaceutical Innovation*, *20*(6), 282. https://doi.org/10.1007/s12247-025-10200-7

Bernolak, I. (1997). Effective measurement and successful elements of company productivity: the basis of competitiveness and world prosperity. *International Journal of Production Economics*, *52*(1-2), 203-213. https://doi.org/10.1016/S0925-5273(97)00026-1

Daniel, R. M., Kenward, M. G., Cousens, S. N., & De Stavola, B. L. (2012). Using causal diagrams to guide analysis in missing data problems. *Statistical methods in medical research*, *21*(3), 243-256. https://doi.org/10.1177/0962280210394469

Dewi, K., Rusfiana, Y., Subagyo, A., & Nuradhawati, R. (2021). Teknik Analisa. *Bandung: Alfabeta. UMKM (studi pada pelaku UMKM di sekitar lingkungan Kampus IAI Darussalam Martapura). Musyarakah*, *1*(2), 89-99.

Effendy, H., Machmoed, B. R., & Rasyid, A. (2021). Pengukuran dan Analisis Produktivitas Menggunakan Metode Objective Matrix (OMAX) (Studi Kasus: di PDAM Kabupaten Gorontalo). *Jambura Industrial Review (JIREV),* *1*(1), 40–47. https://doi.org/10.37905/jirev.1.1.40-47

Grönroos, C., & Ojasalo, K. (2004). Service productivity: Towards a conceptualization of the transformation of inputs into economic results in services. *Journal of Business research*, *57*(4), 414-423. https://doi.org/10.1016/S0148-2963(02)00275-8

Gustarico, A., & Putri, E. P. (2023). Analisis Produktivitas Untuk Meningkatkan Hasil Produksi dengan Menggunakan Metode Objective Matrix (Omax) (Studi Kasus : CV Bakso Empal Sapi). *Jurnal Teknik Industri Terintegrasi,* *6*(3), 515–525. https://doi.org/10.31004/jutin.v6i3.15837

Heydari, M., Heydari, A., & Amini, M. (2023). Energy Management and Energy Consumption: A Comprehensive Study. *World Information Technology and Engineering Journal*, *10*(04), 22-28.

Hossen, J., Ahmad, N., & Ali, S. M. (2017). An application of Pareto analysis and cause-and-effect diagram (CED) to examine stoppage losses: a textile case from Bangladesh. *The journal of the textile institute*, *108*(11), 2013-2020. https://doi.org/10.1080/00405000.2017.1308786

Indriani, Y., Sari, R. K., & Marwa, S. (2024). Objective Matrix (OMAX) Analysis to Determine Production Productivity. *Journal of Engineering Science and Technology Management (JES-TM)*, *4*(1), 27-32. https://doi.org/10.31004/jestm.v4i1.150

Indriani, Y., Sari, R. K., & Marwa, S. (2024). Objective Matrix (OMAX) Analysis to Determine Production Productivity. *Journal of Engineering Science and Technology Management (JES-TM)*, *4*(1), 27-32.

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Iqbal, N. (2024). Analisis Produktivitas Divisi Produksi Menggunakan Metode Objective Matrix (OMAX) Dan Analytical Hierarchy Proses (AHP). *INTECOMS: Jurnal Teknologi Informasi dan Ilmu Komputer*, *7*(4), 1389-1397. https://doi.org/10.31539/intecoms.v7i4.10630

Jaradat, Z., AL-Hawamleh, A., Altarawneh, M., Al-Tahat, S., & Akram Nazzal, M. (2025). Effects of effective ERP system utilization on enterprise economic sustainability through product life cycle cost control. *Journal of Business and Socio-economic Development*, *5*(3), 240-258. https://doi.org/10.1108/JBSED-10-2024-0103

Jassbi, J., Mohamadnejad, F., & Nasrollahzadeh, H. (2011). A Fuzzy DEMATEL framework for modeling cause and effect relationships of strategy map. *Expert systems with Applications*, *38*(5), 5967-5973. https://doi.org/10.1016/j.eswa.2010.11.026

Magableh, A. A. A. R., Almakhadmeh, M. A., Alsrehin, N., & Klaib, A. F. (2020). Smart traffic light management systems: A systematic literature review. *International Journal of Technology Diffusion (IJTD)*, *11*(3), 22-47. https://doi.org/10.4018/IJTD.2020070102

Mukti, A. R., A'yun, Q., & Suparto, S. (2021). Analisis Produktivitas Menggunakan Metode Objective Matrix (OMAX) (Studi Kasus: Departemen Produksi PT Elang Jagad). *Jurnal Teknologi Dan Manajemen,* *2*(1), 13–18. https://doi.org/10.31284/j.jtm.2021.v2i1.1525

Naziro, K., Perdana, Y. R., & Kristanto, D. (2025). The Supply Chain Performance Measurement and Determination of Improvement Priorities Using the Supply Chain Operations Reference–Digital Standard (SCOR DS) and Analytic Network Process (ANP) Methods:(Case Study: Waste Management at Sendangsari). *Journal of Industrial Engineering and Halal Industries*, *6*(1), 81-88. https://doi.org/10.14421/jiehis.5294

Obeng, H. A., Arhinful, R., Mensah, L., & Mensah, C. C. (2025). The mediating role of service quality in the relationship between corporate social responsibility and sustainable competitive advantages in an emerging economy. *Business Strategy & Development*, *8*(1), e70099. https://doi.org/10.1002/bsd2.70099

Parra, C., Morán, C., Pizarro, F., Duque, P., Aránguiz, A., González-Prida, V., & Parra, J. (2024). Implementation of the asset management, operational reliability and maintenance survey in recycled beverage container manufacturing lines. *Information*, *15*(12), 784. https://doi.org/10.3390/info15120784

Prakoso, I. (2022). Productivity Analysis Of Split Stone Production Using Objective Matrix (Omax) Method (A Case Study). *Journal of Industrial Engineering and Halal Industries*, *3*(1), 41-48. https://doi.org/10.14421/jiehis.3498

Prasad, A. A., & Kumar, R. S. (2022). Challenges and opportunities of brand corporate social responsibility classification: A review, new conceptualization and future research agenda. International journal of consumer studies, 46(6), 2071-2103. https://doi.org/10.1111/ijcs.12844

Pratama, A. T., Ernawati, D., & Rahmawati, N. (2025). Performance Analysis Of Green Supply Chain Management Using AHP And OMAX Methods. *Jurnal Sistem Cerdas*, *8*(1), 99-112. https://doi.org/10.37396/jsc.v8i1.498

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Pratomo, M. H. P., & Prassetiyo, H. (2022). Usulan Pengurangan Kecacatan Produk Kaos Polo Menggunakan Metode Failure Mode and Effect Analysis (Fmea) & 5w 1h Di Cv New Bandung Mulia Konveksi. *e-Proceeding FTI*.

Rumman, M. A. A., & Alqudah, E. (2024). The impact of green HRM on lean soft practices implementation: a mediating role of organizational flexibility. *Global Journal of Flexible Systems Management*, *25*(4), 705-731. https://doi.org/10.1007/s40171-024-00406-y

Saaty, T. L. (2005). The analytic hierarchy and analytic network processes for the measurement of intangible criteria and for decision-making. In *Multiple criteria decision analysis: state of the art surveys* (pp. 363-419). New York, NY: Springer New York. https://doi.org/10.1007/978-1-4939-3094-4

Sani, I., Karnawati, T. A., & Ruspitasari, W. D. (2024). The Impact of Service Quality on Custumer Loyalty Through Customer Satisfaction of PT Multicom Persada International Jakarta. *Dinasti International Journal of Management Science (DIJMS)*, *5*(3).

Suryani, P., Cahyono, Y., & Utami, B. D. (2020). Pengaruh Motivasi Dan Gaya Kepemimpinan Terhadap Produktivitas Kerja Karyawan Produksi di PT Tuntex Garment Indonesia. *Journal of Industrial Engineering & Management Research*, *1*(1b), 70-82. https://doi.org/10.7777/jiemar.v1i1.28

Trojanowska, J., Kolinski, A., Galusik, D., Varela, M. L., & Machado, J. (2017). A methodology of improvement of manufacturing productivity through increasing operational efficiency of the production process. In *Advances in Manufacturing* (pp. 23-32). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-68619-6_3

Wahyuni, N., & Alya, R. (2020, December). Productivity measurement using Objective Matrix: case study in plate mill. In *IOP Conference Series: Materials Science and Engineering* (Vol. 909, No. 1, p. 012073). IOP Publishing. https://doi.org/10.1088/1757-899X/909/1/012073

Wiwik, S. (2019). Pengukuran Kinerja Supply Chain Menggunakan Scor dan Aplikasi Analytic Network Proses (ANP) di PT. Pertiwi Mas Adi Kencana Sidoarjo.

Xu, Z., & Dang, Y. (2020). Automated digital cause-and-effect diagrams to assist causal analysis in problem-solving: a data-driven approach. *International Journal of Production Research*, *58*(17), 5359-5379. https://doi.org/10.1080/00207543.2020.1727043

Zabidi, Y., Pirdaus, R., Mauidzoh, U., Astuti, M., & Nurdin, R. (2024, January). Productivity Analysis Using the Objective Matrix and Fishbone Diagram Methods in SMEs of Airplane Replicas. In *2024 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETSIS)* (pp. 904-907). IEEE. https://doi.org/10.1109/ICETSIS61505.2024.10459644

ISSN: 2716-3865 (Print), 2721-1290 (Online)