

## Strategy to Reduce Lightning Disruption to Improve PT PLN (Persero) Performance UPT Purwokerto

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**Abstract.** *Indonesia is an archipelago comprising more than 17,000 islands located along the equator. This results in a tropical climate with relatively high temperatures throughout the year, high humidity, and abundant rainfall. Indonesia's location between two large oceans also contributes to dynamic weather patterns, which often affect the stability of the country's electricity system. The research method used in this research is a qualitative approach with a case study approach using SWOT analysis. In this method there are observation activities, interviews and data analysis. Qualitative research is a research method that aims to deeply understand social meanings, processes, or experiences. SWOT analysis is a fairly good, effective, efficient analysis tool and is a fast tool for finding possibilities related to the initial development of new innovation programs within a company, in addition to being able to be used as a decision-making tool within an organization. Based on the EFE matrix analysis, a total score of 3.4 was obtained, indicating that PT PLN (Persero) UPT Purwokerto was able to respond to opportunities and threats above average. Meanwhile, based on the IFE matrix analysis, a total score of 3.0295 was obtained, which identified the existence of influential internal strengths within the Company. 3. Based on the IE matrix analysis, EFE 3.4 and IFE 3.0295 fall into cell I (Growing and developing). This indicates that the growth and development efforts of PT PLN (Persero) UPT Purwokerto are the main strategy to improve performance by reducing disturbances due to lightning.*

**Keywords:** *Disruption; Lightning; Performance; Strategy.*

### 1. Introduction

Indonesia is an archipelago comprising more than 17,000 islands located along the equator. This results in a tropical climate with relatively high temperatures throughout the year, high humidity, and abundant rainfall. Indonesia's location between two large oceans also

contributes to dynamic weather patterns, which often affect the stability of the country's electricity system.

Lightning is a form of electrical energy discharge that occurs in the atmosphere when there is a potential difference between clouds and the ground, or between clouds themselves. In the context of Indonesia, which is located on the equator, lightning is a highly prevalent phenomenon compared to other countries in the world. Indonesia's location on the equator makes it more susceptible to high-intensity lightning, especially during the rainy season.

Lightning is one of the most frequent natural phenomena in Indonesia. With relatively high temperatures throughout the year and high humidity, this high frequency of lightning often causes disruptions to PT PLN (Persero)'s electrical infrastructure, including the transmission system connecting power plants to consumers.

PT. PLN (Persero) in the transmission sector uses a 150 volt voltage system.kv and 500 kV in distributing electrical energy to substations through an overhead transmission system, namely High Voltage Air Lines (SUTT) and Extra Voltage Air Lines (SUTET). This transmission system consists of tall towers and conductor wires that transmit electricity from generators to distribution substations. Transmission systems, especially overhead lines, are vulnerable to lightning strikes. When a tower, cable, or tower is struck by lightning, a current will flow through the tower, cable, or tower to the base and then grounded.

With frequent disturbances due to lightning on transmission lines belonging to PT PLN(Persero) Purwokerto Transmission Implementation Unit which resulted in a decrease in transmission reliability, then In this study we analyzed data from lightning disturbances for the last 2 years (2023-2024) along with the impact of disturbances that occurred from lightning strikes in the work area of PT PLN (Persero) Purwokerto Transmission Implementation Unit. Then also carried out mitigation and prevention of lightning disturbances for the next few years. From this study, it is hoped that it can help to determine anticipatory and accelerated steps to reduce lightning disturbances in the 150 kV and 500 kV transmission systems. Below we present data related to disturbances in the 150 kV and 500 kV transmission systems as follows:



Figure Data on 150 kV and 500 kV Transmission System Disturbances in 2023

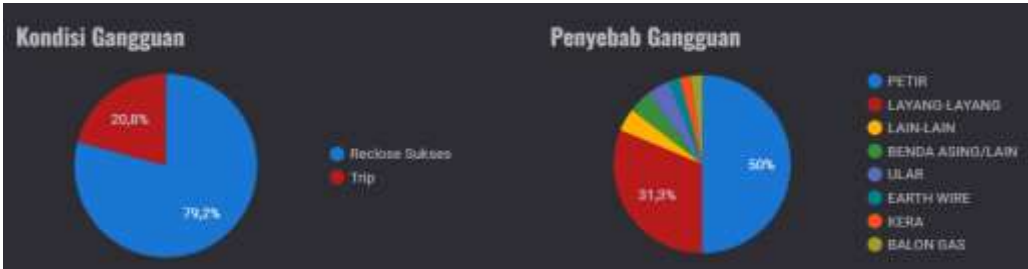


Figure Data on Disturbance Conditions and Causes of Disturbances in the 150 kV and 500 kV Transmission Systems in 2023



Figure Monthly Disturbance Data on the 150 kV and 500 kV Transmission Systems in 2023

| ULTG               | Gangguan  | Jumlah |
|--------------------|-----------|--------|
| 1. ULTG Purwokerto | Transmisi | 30     |
| 2. ULTG Tegal      | Transmisi | 11     |
| 3. ULTG Wonosobo   | Transmisi | 7      |

Table Disturbances in the 150 kV and 500 kV Transmission Systems in 2023

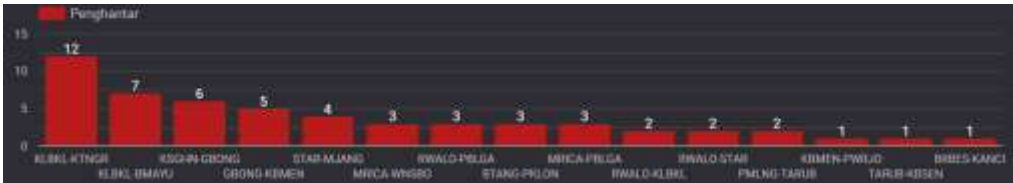


Figure Data on Disturbances in the 150 kV and 500 kV Transmission Systems in 2024



Figure Monthly Disturbance Data on the 150 kV and 500 kV Transmission Systems in 2024

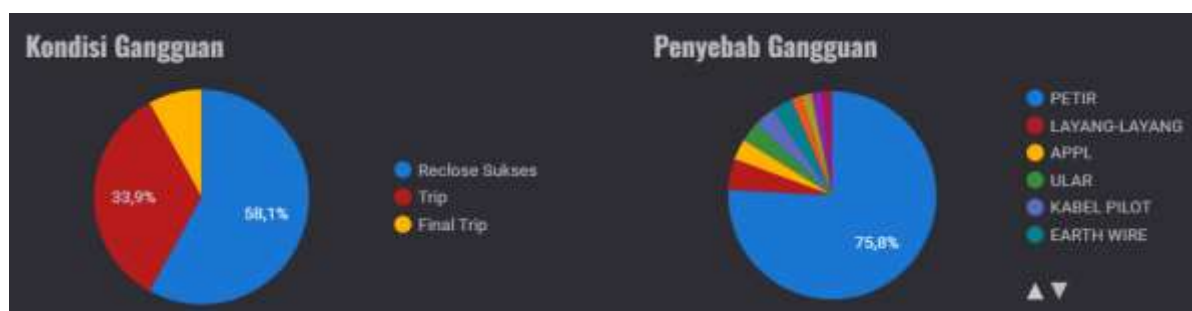


Table Disturbances in the 150 kV and 500 kV Transmission Systems in 2024

## 2. Research Methods

The research method used in this research is a qualitative approach.(Palazzolo, 2023)with a case study approach using SWOT analysis(R, 2009). In this method there are observation activities, interviews and data analysis. Qualitative research is a research method that aims to deeply understand social meanings, processes, or experiences. This method is interpretive, contextual, and flexible, placing the researcher as the primary instrument in data collection and analysis. Returning to the definition, it highlights the crucial role of concepts, behaviors, perceptions, and issues concerning the individuals being studied.

## 3. Results and Discussion

### 3.1. Strategy Formulation

Identifying and evaluating alternative strategies should involve many of the managers and employees who previously developed the organization's vision and mission statements, conducted external audits, and conducted internal audits. Representatives from every department and division of the organization should be involved in this process, as they were in the previous strategy formulation activity. Proposed strategies should be listed in writing. Once all feasible strategies identified by participants are presented and understood, they should be ranked individually according to their attractiveness to each participant, with 1 = should not be implemented, 2 = should probably be implemented, 3 = should be

implemented, and 4 = should be implemented. The strategy with the highest number of alternatives is considered the best, resulting in a prioritized list of strategies.(David, FR, & David, nd).

Strategy formulation techniques can be integrated into three stages of decision-making (as seen in Figure 1). The tools presented in this framework are applicable to all sizes and types of organizations in identifying, evaluating, and selecting strategies. The first stage, or input stage, in strategy formulation analysis consists of the External Factor Evaluation (EFE) Matrix, the Internal Factor Evaluation (IFE) Matrix, and the Competitive Profile Matrix (CPM). The second stage, or matching stage, consists of the Strengths-Weaknesses-Opportunities-Threats (SWOT) Matrix, the Boston Consulting Group (BCG) Matrix, the Internal-External (IE) Matrix, and the Grand Strategy Matrix. The third stage, or decision stage, involves a single technique, the Quantitative Strategic Planning Matrix (QSPM).(David, FR, & David, nd). Based on the results of observations and documentation of high voltage transmission system disturbances (150 kV and 500 kV) in the PT PLN (Persero) UPT Purwokerto area in 2023 to 2024, it is known that disturbances due to lightning strikes are still the main cause of disruption to electricity supply.

### 3.1.1. Strategy formulation analysis with EFE and IFE matrix

*Table Matrix External Factor Evaluation*

| No                 | Opportunities                                      | Weight | Rating | Score |
|--------------------|----------------------------------------------------|--------|--------|-------|
| 1                  | BMKG weather monitoring technology support         | 0.14   | 4      | 0.56  |
| 2                  | Transmission line arrester                         | 0.11   | 3      | 0.33  |
| 3                  | Digitalization of protection systems               | 0.1    | 4      | 0.4   |
| 4                  | The existence of investment funding sources (debt) | 0.08   | 3      | 0.24  |
| 5                  | Modern assessment and testing technology           | 0.07   | 3      | 0.21  |
| Total Chance score |                                                    | 0.5    |        | 1.74  |

| No                 | Threats                                                 | Weight | Rating | Score |
|--------------------|---------------------------------------------------------|--------|--------|-------|
| 1                  | Heavy rainfall and extreme lightning                    | 0.13   | 4      | 0.52  |
| 2                  | Climate change and unpredictable weather                | 0.12   | 3      | 0.36  |
| 3                  | Company performance declined                            | 0.1    | 4      | 0.4   |
| 4                  | Corporate debt continues to swell as the rupiah weakens | 0.08   | 3      | 0.24  |
| 5                  | Investing in modern technology is expensive             | 0.07   | 2      | 0.14  |
| Total threat score |                                                         | 0.5    |        | 1.66  |
| Total score        |                                                         | 1.0    |        | 3.4   |

*Table Matrix Internal Factor Evaluation*

| No | Strengths                               | Weight | Rating | Score  |
|----|-----------------------------------------|--------|--------|--------|
| 1  | Experienced technical human resources   | 0.0179 | 4      | 0.0716 |
| 2  | Protection SOP has been implemented     | 0.0357 | 3      | 0.1071 |
| 3  | Responsive when there is a disturbance  | 0.0536 | 4      | 0.2144 |
| 4  | Collaboration between units is solid    | 0.0714 | 3      | 0.2142 |
| 5  | Openness to new technologies            | 0.0893 | 3      | 0.2679 |
| 6  | Increasingly modern assessment patterns | 0.1071 | 3      | 0.3213 |

|                      |                                                         |       |   |        |
|----------------------|---------------------------------------------------------|-------|---|--------|
| 7                    | The longest SUTT and SUTET installation in Central Java | 0.125 | 4 | 0.5    |
| Total Strength score |                                                         | 0.5   |   | 1.6965 |

| No                   | Weaknesses                                      | Weight | Rating | Score  |
|----------------------|-------------------------------------------------|--------|--------|--------|
| 1                    | Uneven grounding and land systems               | 0.0238 | 4      | 0.0952 |
| 2                    | Limited early detection tools (TLA & LCD)       | 0.0476 | 2      | 0.0952 |
| 3                    | Not all installations use MDG, retrofit and MRG | 0.0714 | 3      | 0.2142 |
| 4                    | Limitations of test equipment                   | 0.0952 | 3      | 0.2856 |
| 5                    | Execution in the field does not meet standards  | 0.119  | 3      | 0.357  |
| 6                    | Changing management policies                    | 0.1429 | 2      | 0.2858 |
| Total weakness score |                                                 | 0.5    |        | 1.33   |
| Total score          |                                                 | 1.0    |        | 3,0295 |

### 3.1.2. Internal-External (IE) Matrix

The Internal-External Matrix is a strategy-building strategy divided into nine cells. The benchmarks used are internal strengths and weaknesses (IFE) for the horizontal line, and external opportunities and threats (EFE) for the vertical line. The following table shows the Internal-External (IE) matrix.

Table Matrix *Internal-External (IE)*

| Matrix IE       |     | Strong                                    | Average                      | Weak                        |
|-----------------|-----|-------------------------------------------|------------------------------|-----------------------------|
|                 |     | 3.0-4.0                                   | 2.0-2.99                     | 1.0-1.99                    |
|                 | 4.0 | 3.0                                       | 2.0                          | 1.0                         |
| High 3.0-4.0    | 3.0 | I (Grab and Build)<br><b>3.4 ; 3.0295</b> | II (Draw and Build)          | III (Hold and Maintain)     |
| Medium 2.0-2.99 | 2.0 | IV (Grab and Build)                       | V (Hold and Maintain)        | VI (Harvest and Diversity)) |
| Low 1.0-1.99    | 1.0 | VII (Hold and Maintain)                   | VIII (Harvest and Diversity) | XI (Harvest and Divers)     |

Based on the Internal and External (IE) matrix table for lightning disturbances, the horizontal axis shows the total score axis of the IFE matrix of 3.0295 and the vertical axis shows the total score axis of the EFE matrix of 3.4. These two scores are then mapped into the IE matrix to obtain position 1 with coordinates (3.0295: 3.4). This position indicates Grow and Build.

### 3.2. Grand Strategy Matrix

The root of the problem actually stems from the organization's internal weaknesses in facing threats resulting from competitive business conditions. Meanwhile, the source of problem solving stems from the organization's potential to optimally address opportunities. Based on these internal and external strategies, a grand strategy is developed. The grand strategy can be developed using the following matrix:

Table SWOT Strategy Matrix

|                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>IFE/EFE</b>                                                                                                                                                                                                                                                                                                      | <b>Strengths</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Weaknesses</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                                                                                                                                                                                                                                                                     | <ol style="list-style-type: none"> <li>1. Experienced technical human resources</li> <li>2. Protection SOP has been implemented</li> <li>3. Responsive when there is a disturbance</li> <li>4. Collaboration between units is solid</li> <li>5. Openness to new technologies</li> <li>6. Increasingly modern assessment patterns</li> <li>7. The longest SUTT and SUTET installation in Central Java</li> </ol>                                                                                                          | <ol style="list-style-type: none"> <li>1. Uneven grounding and land systems</li> <li>2. Limited early detection tools (TLA &amp; LCD)</li> <li>3. Limitations of test equipment</li> <li>4. Execution in the field does not meet standards</li> <li>5. Changing management policies</li> </ol>                                                                                                                                                                                                              |
| <b>Opportunities</b>                                                                                                                                                                                                                                                                                                | <b>SO Strategy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>WO Strategy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ol style="list-style-type: none"> <li>1. BMKG weather monitoring technology support</li> <li>2. Transmission line arrester</li> <li>3. Digitalization of protection systems</li> <li>4. The existence of investment funding sources (debt)</li> <li>5. Modern assessment and testing technology</li> </ol>         | <ol style="list-style-type: none"> <li>1. Optimizing technical human resources and protection SOPs to support the implementation of digital protection systems and modern technology.</li> <li>2. Strengthen collaboration between units to leverage investment support and accelerate the implementation of new technologies.</li> <li>3. Leveraging modern assessment patterns and distributed installations to accelerate the adoption of line arrester technology and the BMKG weather prediction system.</li> </ol> | <ol style="list-style-type: none"> <li>1. Standardize grounding and lightning protection systems through investment and operation programs.</li> <li>2. Replacing old detection tools with digital systems through the support of new technology procurement.</li> <li>3. Aligning protection testing, assessment and evaluation policies with modern technology to align with digitalization opportunities.</li> </ol>                                                                                     |
| <b>Threats</b>                                                                                                                                                                                                                                                                                                      | <b>ST Strategy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>WT Strategy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ol style="list-style-type: none"> <li>1. Heavy rainfall and extreme lightning</li> <li>2. Climate change and unpredictable weather</li> <li>3. Company performance declined</li> <li>4. Corporate debt continues to swell as the rupiah weakens</li> <li>5. Investing in modern technology is expensive</li> </ol> | <ol style="list-style-type: none"> <li>1. Using protection SOPs and technical human resources to respond quickly to disruptions due to extreme weather and lightning.</li> <li>2. Enhance cross-unit cooperation to develop mitigation against the risks of high rainfall and extreme conditions.</li> <li>3. Developing modern assessment patterns to prioritize assets against extreme weather risks and high investment costs.</li> <li>4. Utilizing installations spread across Central Java for</li> </ol>          | <ol style="list-style-type: none"> <li>1. Perform protection and grounding system updates to avoid damage due to extreme lightning strikes.</li> <li>2. Develop risk management policies that are more adaptive to changes in weather and natural phenomena.</li> <li>3. Conduct periodic evaluations of detection and protection testing equipment to ensure it is in accordance with its function.</li> <li>4. Adopt more efficient technologies gradually to reduce the pressure of expensive</li> </ol> |

|  |                                                |              |
|--|------------------------------------------------|--------------|
|  | early detection and mitigation of disruptions. | investments. |
|--|------------------------------------------------|--------------|

### 3.2.1. Quantitative Strategic Planning Matrix (QSPM)

*Quantitative Strategic Planning Matrix* (QSPM) a method for determining the relative attractiveness of various strategies built on external and internal critical success factors, the relative attractiveness of each strategy in a set of alternatives is calculated by determining the cumulative impact of each external and internal critical success factor. Any number of alternative strategy sets can be included in the QSPM. *Quantitative Strategic Planning Matrix* (QSPM) which can be presented based on the strategies that have been determined based on the SWOT strategy matrix analysis as follows:

Table Strategic Planning Matrix (QSPM)

| STRATEGY    | STRATEGY DESCRIPTION                                                                                                                                               | SCORE       | STRATEGY SEQUENCE |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------|
| Strategy 1  | Optimizing technical human resources and protection SOPs to support the implementation of digital protection systems and modern technology.                        | <b>4.42</b> | <b>1</b>          |
| Strategy 2  | Strengthen collaboration between units to leverage investment support and accelerate the implementation of new technologies.                                       | 3.36        | 7                 |
| Strategy 3  | Leveraging modern assessment patterns and distributed installations to accelerate the adoption of line arrester technology and the BMKG weather prediction system. | <b>4.05</b> | <b>2</b>          |
| Strategy 4  | Standardize grounding and lightning protection systems through investment and operation programs.                                                                  | 3.32        | 9                 |
| Strategy 5  | Replacing old detection tools with digital systems through the support of new technology procurement.                                                              | 3,445       | 5                 |
| Strategy 6  | Aligning protection testing, assessment and evaluation policies with modern technology to align with digitalization opportunities.                                 | 3.06        | 11                |
| Strategy 7  | Using protection SOPs and technical human resources to respond quickly to disruptions due to extreme weather and lightning.                                        | 3.6         | 4                 |
| Strategy 8  | Enhance cross-unit cooperation to develop mitigation against the risks of high rainfall and extreme conditions.                                                    | 3.28        | 8                 |
| Strategy 9  | Developing modern assessment patterns to prioritize assets against extreme weather risks and high investment costs.                                                | <b>3.64</b> | <b>3</b>          |
| Strategy 10 | Utilizing installations spread across Central Java for early detection and mitigation of disruptions.                                                              | 2.88        | 12                |
| Strategy 11 | Perform protection and grounding system updates to avoid damage due to extreme lightning strikes.                                                                  | 3.38        | 6                 |
| Strategy 12 | Develop risk management policies that are more adaptive to changes in weather and natural phenomena.                                                               | 2.25        | 14                |
| Strategy 13 | Conduct periodic evaluations of detection and protection testing equipment to ensure it is in accordance with its function.                                        | 3.15        | 10                |
| Strategy 14 | Adopt more efficient technologies gradually to reduce the pressure of expensive investments.                                                                       | 2.72        | 13                |
| TOTAL       |                                                                                                                                                                    | 46.46       |                   |

The QSPM matrix has been proven to have many positive benefits, including being able to evaluate the feasibility of proposed solutions against HR, financial, organizational management and environmental conditions that apply in the research, and can help strategists to integrate related external and internal factors into the decision-making process.(David, FR, & David, nd)Every organization is required to always pay attention to changes in its environment, because every change can be a potential opportunity for any organization that wants to grow. Organizations must anticipate every change and achieve their goals both in the medium and long term. SWOT and QSPM analysis show that ignoring opportunities and threats can put an organization in a critical condition. To prevent critical situations, key opportunities and strategies must be considered. By making the right decisions, opportunities and strengths can be collaborated to improve the organization towards success.(Hamidian et al., 2014)Therefore, by developing a QSPM matrix in strategy formulation, it can minimize the possibility that key factors will be ignored or weighted inappropriately.(Manouchehr, 2016). In addition to helping strategists integrate relevant external and internal factors into the decision-making process, QSPM analysis is able to define the strategy to be implemented.(Putrikusuma et al., 2016). QSPM analysis also shows that organizations need greater control, organizations need to implement a consolidation strategy, the goal of this strategy is relatively more defensive, especially for organizations that are oriented towards company performance.

In this study, fourteen alternative strategies generated from the qualitative SWOT matrix were then analyzed using the QSPM matrix to answer which alternative strategies were the top priority for UPT Purwokerto. Based on the QSPM analysis, it can be seen that the Total Attractive Score (TAS) is 46.46. Referring to the TAS value of each strategy, it is known that the order of alternative strategies that can be implemented by UPT Purwokerto to be implemented as a strategy to reduce disturbances due to lightning is as follows:

1. The first strategy that UPT Purwokerto needs to implement is to optimize technical human resources and protection SOPs to support the implementation of digital protection systems and modern technology. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.
2. Secondly, the strategy that UPT Purwokerto needs to implement is to utilize modern assessment methods and distributed installations to accelerate the adoption of line arrester technology and the BMKG weather prediction system. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.
3. Third, the strategy that UPT Purwokerto needs to implement is developing a modern assessment model to prioritize assets against the risks of extreme weather and high investment costs. This strategy is derived from a combination of weaknesses and

opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

4. In fourth place, the strategy that needs to be implemented by UPT Purwokerto is to use protection SOPs and technical human resources to respond quickly to disruptions due to extreme weather and lightning. This strategy is obtained from the results of a combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

5. Fifth, the strategy that UPT Purwokerto needs to implement is replacing old detection equipment with a digital system through the procurement of new technology. This strategy is derived from a combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

6. In sixth place, the strategy that UPT Purwokerto needs to implement is to update the protection and grounding system to prevent damage from extreme lightning strikes. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning strikes in the PT PLN (Persero) UPT Purwokerto area.

7. In seventh place, the strategy that UPT Purwokerto needs to implement is strengthening collaboration between units to leverage investment support and accelerate the implementation of new technologies. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

8. In eighth place, the strategy that the Purwokerto UPT needs to implement is to increase cross-unit collaboration to develop mitigation measures against the risks of high rainfall and extreme conditions. This strategy is derived from a combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the Purwokerto UPT area of PT PLN (Persero).

9. In ninth place, the strategy that UPT Purwokerto needs to implement is standardizing the grounding and lightning protection system through investment and operational programs. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

10. In tenth place, the strategy that UPT Purwokerto needs to implement is to conduct regular evaluations of detection and protection testing equipment to ensure it is functioning properly. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

11. In eleventh place, the strategy that UPT Purwokerto needs to implement is to adapt its testing, assessment, and protection evaluation policies to modern technology to align with

digitalization opportunities. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

12. In twelfth place, the strategy that UPT Purwokerto needs to implement is utilizing installations spread across Central Java for early detection and mitigation of disturbances. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

13. In thirteenth place, the strategy that UPT Purwokerto needs to implement is to gradually adopt more efficient technology to reduce the pressure of expensive investments. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

14. In fourteenth place, the strategy that UPT Purwokerto needs to implement is developing a risk management policy that is more adaptive to changes in weather and natural phenomena. This strategy is derived from the combination of weaknesses and opportunities in the qualitative SWOT matrix for lightning disturbances in the PT PLN (Persero) UPT Purwokerto area.

From this sequence, the results of the strategy formulation analysis using the QSPM matrix show that the priority strategic decision that needs to be implemented immediately is to optimize technical human resources and protection SOPs to support the implementation of digital protection systems and modern technology (4.42).

#### 4. Conclusion

Conclusions and Research Results: 1. SWOT analysis is a fairly good, effective, efficient analysis tool and is a fast tool for finding possibilities related to the initial development of new innovation programs within a company, in addition to being able to be used as a decision-making tool within an organization. 2. Based on the EFE matrix analysis, a total score of 3.4 was obtained, indicating that PT PLN (Persero) UPT Purwokerto was able to respond to opportunities and threats above average. Meanwhile, based on the IFE matrix analysis, a total score of 3.0295 was obtained, which identified the existence of influential internal strengths within the Company. 3. Based on the IE matrix analysis, EFE 3.4 and IFE 3.0295 fall into cell I (Growing and developing). This indicates that the growth and development efforts of PT PLN (Persero) UPT Purwokerto are the main strategy to improve performance by reducing disturbances due to lightning. 4. The strategic output generated through a SWOT analysis is essentially a derivative that supports the organization's primary strategy. By identifying the company's position in Quadrant I (Growth and Build) of the IE Matrix, the 14 SWOT strategies developed serve as operational instruments for implementing the growth and development strategy. Thus, SWOT strategies do not stand

alone but rather reinforce and connect the core strategies in Quadrant I. 5. The results of the Quantitative Strategic Planning Matrix (QSPM) analysis show that the Total Attractive Score (TAS) is 4.46. This analysis provides a sequence of alternative strategies that need to be implemented by PT PLN (Persero) UPT Purwokerto. However, of the fourteen resulting strategic sequences, there is one alternative strategy that is a priority and needs to be implemented immediately with the highest TAS score, namely the strategy of Optimizing technical human resources and protection SOPs to support the implementation of digital protection systems and modern technology (4.42).

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