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Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics
Düsternbrooker Weg 120
24105 Kiel (Germany)
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)
<https://www.zbw.eu/>

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Planning Strategy of Operation Business and Maintenance by Analytical Hierarchy Process and Strength, Weakness, Opportunity, and Threat Integration for Energy Sustainability

Suriyanti¹, Ahmad Firman², Nurlina³, Gunawan Bata Ilyas⁴, Aditya Halim Perdana Kusuma Putra^{1*}

¹Department of Management, Faculty of Economics and Business, Universitas Muslim Indonesia, South Sulawesi, Indonesia,

²Department of Management, STIE Nobel Indonesia, South Sulawesi, Indonesia, ³Department of Management, Stimi Yapmi, Makassar, Indonesia, ⁴Department of Management, STIE AMKOP, South Sulawesi, Indonesia.

*Email: adityatrojhan@gmail.com

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ABSTRACT

This study integrates analytical hierarchy process (AHP) and strength, weakness, opportunity, and threat (SWOT) in strategic planning or strategy formulation to demonstrate the qualitative and quantitative integration of techniques between SWOT and AHP in developing business strategies in operation and maintenance (O&M) of power plants. Apart from that, it is to evaluate essential factors in strategic planning and to utilize them in developing effective strategies for the O&M of power plants in the CEPA. Ltd. There are two stages of testing in this study, namely the first stage is data collection and SWOT and TOWS strength analysis. The second stage is the integration of SWOT and AHP. The study was conducted at CEPA. Ltd. as a private company operating in the power generation sector with a research period in the mid to end of 2019. Result of this study shown Some elements of the strategy that can be done (1). The contract of cooperation with the industry parts supplier, (2). Cooperation contracts can be pursued, one of which is by re-construction of a structured and timely payment process (3). Optimizing company value can be achieved by optimizing CSR (4). Website optimization is a digital-based promotion tool (5). Support in terms of resource development can be completed through training, for example, Basic Welder Scaffolder and Basic Mechanical (6). Any transactions process in foreign currencies to avoid fluctuating exchange rates at the time of purchase or payment.

Keywords: Strength, Weakness, Opportunity, and Threat, Analytical Hierarchy Process, Business Operation Management

JEL Classifications: C44, D02, L00, L60

1. INTRODUCTION

Sustainability of energy supply, especially electricity, is fundamental in supporting various production needs and all community needs. To support the continuity of electricity supply Operation and maintenance (O&M) of a power plant is one crucial factor in the implementation of electricity supply to the community because electricity is a form of energy that is very important in human life. Electricity plays a vital role in life. It can be a resume that power has become the primary energy

source in every activity both in the household and industry (Marcelina, 2016). Some national energy problems in Indonesia that must be resolved include; utilization of domestic energy that has not been optimal and limited energy infrastructure whose value-added has not been maximized, decreased production, and exploration, which is not yet optimal and complicated bureaucratic licensing. Various challenges in energy management in Indonesia, including government regulations and changes in the micro and macroeconomic cycle which can undoubtedly have a systemic impact on the planning and business strategy of electricity

companies that are operating in Indonesia. Based on the Indonesia Energy Policy Number 79 year 2014, The policy is expected that energy sustainability must focus on independence, which was previously more dominantly obtained from imports.

The challenge for global-scale energy for the next 50 years is to meet the needs of more than 2 billion people globally, so it is estimated that energy demand at that time will double the current request. In the context of meeting energy and electricity supply needs in Indonesia, it must focus on access and affordability without compromising environmental responsibility (Murdifin et al., 2019). Besides electricity, other natural resources originating from Indonesia are liquefied natural gas (LNG), which also places Indonesia as one of the largest exporters of LNG, along with Qatar, Australia, and Malaysia. The gas produced by Indonesia is consumed by the world's largest LNG importers as well as Japan and South Korea, as well as the United Kingdom and Southern Europe. In South Sulawesi Province, Indonesia, there is a Sengkang gas and steam power plant owned by PT Energi Sengkang and has been operating since 1997. Its O&M have been submitted to PT Consolidated Electric Power Asia (PT. CEPA), which is a company engaged in O&M services (O&M) electricity generation. The operation and management services offered by PT CEPA are the management and operation of LNG-based power plants. At present many new power plants are operating, and many of these companies are just investors who do not have expertise in power plant management. Therefore CEPA. Ltd., which has expertise in operating and maintaining power plants as well as governance of power plants, has quite a long experience and has the opportunity to get this market but CEPA. Ltd. is not the only company that provides O&M services for power plants in South Sulawesi and several other places in Indonesia, several different companies that are also competent in this field, such as Poso Energy. Ltd., Malea Energy. Ltd., D&C Engineering Company, Sulawesi Mini Hydro Power. Ltd., Cogindo Daya Bersama. Ltd., Bakara Bumi Energi Ltd., Bima Golden Powerindo. Ltd., Sumber Sewatama. Ltd., Pembasing Jawa Bali Services. Ltd., Medco Power Indonesia, Indonesia Power Ltd., and Wartsila Indonesia. Ltd.

Responding to various challenges that not only come from the macroeconomic climate but also competition between Operations and Management (O&M) service providers. So that companies are required to be able to provide the best service through careful strategic planning and integrated business operations to support sustainable production. Therefore the role of effective and efficient operations management is the cornerstone of the success of every company, and all investors will look at the operational conditions of a company before making an investment commitment. Effective maintenance and management in power plants play a vital role in ensuring the availability of electric power (Mutloane, 2009). Because sustainability is fundamental to be understood and built into the business environment (Wallis and Valentinov, 2017). In Theories of Sustainability, a business can be stated to have a dynamic continuity as long as it does not collide with several important aspects such as aspects of social responses, environment, and culture (Murdifin et al., 2019). Some previous research results using analytical hierarchy process (AHP) applied in the evaluation of energy problems reveal that the application

of the AHP method provides conclusions for top management in projecting and evaluating the utilization of renewable energy in various sectors (Karakaş and Yildiran, 2019). Previous study by (Gottfried et al., 2018) Who analyzed the investment behavior in the energy sector by combining the AHP-strength, weakness, opportunity, and threat (SWOT) method found the fact that business strategies and investment behavior in the energy sector also showed maximum results to provide an overview of the operations management section on investment policies and even professional work objectives. other studies also reveal that the use of the AHP model combined with SWOT can also be used as a useful decision-making tool for business planning (Barusman and Redaputri, 2018)

Objectively this research integrates AHP and SWOT in strategic planning or strategy formulation to demonstrate the qualitative and quantitative integration of techniques between SWOT and AHP in developing business strategies in O&M of power plants. The purpose of this study is to evaluate essential factors in strategic planning and to utilize them in developing effective strategies for O&M power generation businesses. It will be imperative for policymakers to understand the importance of corporate environmental factors and to support the decision-making process. In this study, a SWOT analysis is used in conjunction with the AHP. The formulation of strategies that can be done by the company to develop and be sustainable is to formulate its business strategy. The wording of this strategy will be carried out through an industrial strategy management approach using strategic management tools. The weighting of internal and external vital factors in this study will be processed by the AHP method, and these strategic factors are then used in the input stage (IFE and EFE Matrix) then the matching stage will be used (Matrix SWOT/TOWS).

2. LITERATURE REVIEW

2.1. Operation Sustainable as a Comprehensive Strategic Business Planning

Business continuity illustrates the sustainability of the economy and society that can coexist continuously for a long time on a global scale (Felix, 2018). Business continuity is closely related to TQM (Total Quality Management), which includes process quality, human resources, strategic quality planning, and information/analysis (Ramlawati and Putra, 2018), (Jenkins, 2009). Teori Keberlangsungan mencakup empat capital model seperti: social sustainability yang meliputi human capital (labour and skills, intelligence, social networks, political systems, trust and reputation and influence/power (Šlaus and Jacobs, 2011). In addition, the sustainability of a venture can be said to be sustainable if it exists on financial sustainability (cash, debt, investment, monetary instruments) (Van Bardeleben, 2011), (Francois, 2018), and environmental sustainability element (resources, living systems dan ecosystems services) (Geerlings and Vellinga, 2017), (Lal, 2016), (Goodland, 2003). Business continuity must also include elements of manufactured capital (infrastructure, machine and tools factories) (Costanza and Daly, 1992).

The development of a sustainable operations strategy is a subset of business strategy planning related to supply chain management

(SSCM) (Seuring and Müller, 2008). Specifically “Sustainability” is generally measured using the conceptual triple-bottom-line concept (Elkington, 1998), (Murdifin et al., 2019). So it is very closely related to the duties of the company regarding profit and social and environmental responsibility. The main focus of corporate objectives has recently become very complex and requires companies to focus more on social and environmental issues that are more inclusive. Operational sustainability’ is a method of evaluating whether a business can maintain existing practices without placing future potential resources at risk. Sustainability can refer to any one of a variety of areas, say ecological resources, social or economic resources.

Operational management is a business that maximizes the use of all factors of production, both labor (HR), machinery, equipment, the raw material (raw materials), and other elements of production in the transformation process to become various kinds of products or services (Huo and Hong, 2013). The role and function of operations management are to carry out all features of the management process, starting from the planning process (Gregory, 2012), organizing (Faber et al., 2013), (Teece et al., 1997), staff development, leadership and control (Garg and Deshmukh, 2006). The orientation of the operational part of the company, that directs output results in quantity, quality, price, time, and a specific place following user or consumer demand. In this case, the company’s operations are also responsible for producing goods or services, making decisions about the operating functions and transformation systems, and reviewing the decisions related to company operations (Huo and Hong, 2013). Decision making for operations management in developing a sustainable business strategy, the operational part plays a vital role in maintaining the quality of physical processes and ensuring that the physical operations and production facilities are in place (in the right amount, on time, and in the right place). Apart from that, the company’s services are also fully responsible for inventory management. In this case, to achieve sustainable business is a business goal to increase valued in the long run and create a positive image for everyone (Laurence, 2011). Sustainable business outcomes can be achieved by involving employees in an integrated management process because the value generally derived from employee involvement in the organization can be strengthened by implementing a comprehensive management pattern. Most executives/leaders in the organization will articulate the company’s vision that can grow the economy and contribute to social values and encourage environmental management together. In today’s corporate strategy, the 3P concept (people, profit, and planet) relates to one another, and society depends on the economy and the company. Profit is the most critical element and becomes the primary goal of every business activity. The benefit itself is essentially an additional income that can be used to ensure the survival of the company. While events that can be taken to boost profits include increasing productivity and carrying out cost efficiencies, so companies have a competitive advantage that can provide maximum added value (Murdifin et al., 2019), People. Realizing that the community is a stakeholder important for the company because their support is needed for the existence, survival, and development of the company. Hence, as an integral part of the environmental community, the company needs to be committed to working to

provide maximum benefits to them. It is essential to realize that the company’s operations have the potential to have an impact on society, so companies need to carry out various activities that touch community needs (Murdifin et al., 2019), (Gimenez et al., 2012). The planet. The environment is related to all areas of our lives. Our relationship with the environment is a causal relationship, where if the company takes care of the situation, the situation will also benefit the global environment (Elkington, 1998), (Gimenez et al., 2012).

2.2. AHP and SWOT

Thomas Saaty developed AHP in the 1970s (Saaty, 2011), (Khazaii, 2016). AHP is a decision making factor by using a mathematical model. AHP helps in determining the priority of several criteria by conducting a pairwise comparison analysis of each measure. AHP is a measurement theory through pairwise comparisons and relies on expert judgment to get a priority scale. AHP is based on a systematic pattern of human thought to deal with the complexity it captures so that it is realized in a method that formulates the problem in the form of a hierarchy and consideration is included to produce a relative priority scale. Hierarchy is defined as a representation of a complicated issue in a multi-structure the level where the first level is the goal followed by the level of factors, criteria, sub-criteria, and so on until the last level of alternatives. With hierarchy, a complex problem can be broken down into groups, which are then arranged into a form of the hierarchy so that the problem will appear more structured and systematic.

SWOT analysis is a technique to identify various factors systematically to formulate the Company’s strategy (Leigh, 2010), (Piercy and Giles, 1989) SWOT analysis has an essential role in business progress, which has been increasingly competitive in achieving its objectives. The meaning of SWOT is strengths, weaknesses, opportunities, and threats. Which means strengths, weaknesses, opportunities, and threats. There are eight stages in building a SWOT matrix namely: Make a list of critical external opportunities of the company, Make a list of significant external threats of the company, Make a list of essential internal strengths of the company, Make a list of significant internal weaknesses of the company, Match inner forces with external opportunities and record the results of SO (Strength and Opportunity) strategy in the specified cell, Match internal weaknesses with external opportunities and record the results of WO (Weakness and Opportunity) strategies in the specified cell, Match internal strengths with external threats and record the results of ST (Strength and Threat) strategies, Match internal weaknesses with external threats and record the results of the WT (Weakness and Threat) strategy in the sections specified (Piercy and Giles, 1989). In the SWOT analysis, Factor weights are not calculated to determine the effect of each factor on proposed alternative strategies. The SWOT analysis does not provide a way to systematically determine the relative importance of criteria or to assess alternative decisions according to standards. To overcome this, the SWOT framework was changed to a hierarchical structure, and the model was integrated and analyzed using the AHP method. The purpose of the AHP method in the SWOT analysis is to be able to determine the strategic factors that affect the company systematically (Kurttila et al., 2002) and (Görener et al., 2012).

Stages in the integration of AHP and SWOT: (1). Determine Internal (Strengths, Weaknesses) and External (Opportunities, Threats) factors for strategic planning in the SWOT analysis. (2). Make a pairwise comparison of each Internal and External subfactor. (3). Using the AHP method to determine the priority factor levels of each internal and external subfactor. The integration of SWOT and AHP analysis in strategic planning is carried out where the priority of internal and external factors is obtained by the AHP method, and then those priorities are used in the SWOT/TOWS analysis to provide alternative strategies (Oreski, 2012), (Karakaş and Yildiran, 2019) and (Gottfried et al., 2018). AHP helps as an effective means of handling complex decision making for strategies to be prioritized and optimized. AHP will help to reduce bias in decision making during the SWOT analysis process (Mu and Pereyra-Rojas, 2017).

3. RESEARCH METHOD AND MATERIALS

3.1. Sample and Method

The method approach in this study is an explorative qualitative analysis using the AHP, and SWOT approaches as a measure of its investigation. Where the purpose of using AHP and SWOT is directed to test managerial, strategic decisions. The object of research is Consolidated Electric Power Asia, Ltd. (CEPA), which is one of the companies engaged in O&M electricity generation services operating in South Sulawesi Province, Indonesia. This research took place from March through November 2019.

3.2. Measurement

Data collection includes primary data through the results of observations and interviews with the company's internal parties, namely the operational and financial management. The stages in data analysis in this study are the first stage; (1) make a list of CEPA. Ltd. external opportunities. (2). List the company's external threats (3). Compile a list of important internal strengths of the company, (4). Compile a list of company internal weaknesses, (5). Matching internal strengths to external opportunities and compiling the results of the company's Strategy - Opportunity (SO) analysis, (6). Matching internal weaknesses to external opportunities and compiling company Weakness-Opportunity (WO) results, (7). Matching internal forces with external threats and compiling company Strategy - Threat (ST) results, (8). Matching internal weaknesses with external threats and compiling company Weakness-Threat (WT) results. The weighting of measurement instruments starts from 0.0 (not important) - 1.0 (very important).

The second stage is to integrate SWOT and AHP, where the scenes in this integration are: (1). Determine internal factors (Strengths - Weaknesses) and External (Opportunities and Threats) for strategic planning in the SWOT analysis, where the measurement weight of the instrument is multiplied by the rating level of the tool. To get a weighted score, the value of the instrument weight is multiplied by the rating level (2). Make a pairwise comparison of each internal and external subfactor, (3). Using the AHP method in determining the level of priority factors of each internal and external subfactor (TOWS).

4. RESULT AND DISCUSSION

4.1. SWOT Analysis

Table 1 shows the clustering of SWOT analysis on the object of study, which concluded that in terms of strength of PT. CEPA several strength factors include resource strength, organizational capacity, and supporting administrative capabilities. PT CEPA's weakness map includes weaknesses in financial organization, operational weaknesses in the machine's timeframe. Opportunity map of PT. CEPA consists of opportunities for cooperation contracts and organizational commitment as well as market potential. At the same time, the threat factor is in the form of regulatory threats and economic, strategic policy threats.

In the SWOT assessment analysis, as shown in Table 2, which explains the relationship between the strength-opportunity (SO) factor, weakness-opportunity (WO), strength-threat (ST), weakness-threat (WT).

Furthermore, based on the Internal Factor Evaluation (IFE) matrix in Table 3, it explains that the total weighted score obtained by Consolidated Electric Power Asia (CEPA. Ltd.) for internal factors is 2,833 which means that the Consolidated Electric Power Asia (CEPA) company has a position muscular internal strength. The strength factors that have the most significant role are quality human resources with a score of 0.558, followed by the company's ability in the field of O&M. Strength factors that have a decisive role must be utilized as well as possible by the company. From the IFE matrix, it can also be seen that the most significant weakness factor for the company is the potential for machine reliability to be reduced due to a considerable outage delay with a score of 0.393 and some payments to suppliers were delayed due to the approved payment system with a score of 0.203. Negative factors for the company must be avoided and enhanced by the strengths and opportunities the company has to continue to carry out this O&M business. Following Table 4 explains the comparison matrix scale of SWOT and TOWS analysis.

While in the EFE matrix results in Table 3 it can be seen that the total weighted score obtained by CEPA for external factors is 2,566 which means that the company Consolidated Electric Power Asia has a position of external opportunities that is quite supportive. Opportunity factors that have the biggest role are making contracts with Nobel Part suppliers through the LTSA method: Long term Service Agreement or OPSA: Operating Plant Service Agreement with a score of 0.599 and followed by Planning purchases and making agreement agreements with spare part suppliers for the year to come come at the current price of 0.345. Opportunity factors that have a positive role must be utilized as well as possible by the company. From the EFE matrix above, it can also be seen that the biggest threat factor for the company is the exchange rate of the rupiah against the dollar for the purchase of Nobel Part with a score of 0.203 and followed by the factor of delays in the completion of the Mini LNG Plant project which affects the cost of preparing a CEPA O&M LNG plant with a score of 0.200. Threat factors that have a negative role for the company must be faced with the strengths

Table 1: SWOT analysis internal

Strength	Weakness
<ul style="list-style-type: none"> • Have quality human resources • The company's ability in the field of operation • The ability of the company in the field of maintenance • Ability to make identification of routine maintenance schedules • Ability in occupational safety and health and environmental protection • Ability to create a company's budget and cash flow • Company reputation • Have contractual certainty until 2022 • Capabilities in Management Information Systems (XP-CMMS) • IMS based on ISO 9001, ISO 14001 & OHSAS 18001 standards 	<ul style="list-style-type: none"> • The potential for engine reliability is reduced due to significant outage delays • Some payments to suppliers are often delayed • Enormous potential for Corporate Income Tax (CIT) payments due to delays in purchasing spare parts • Dependence on Original Equipment Manufacturer (OEM) • Knowledge and experience for the initial CEPA O&M LNG team is still limited • Limitations of the ability of the tool to assess used parts that will be reconditioned • Limitations of the strength of the tools to analyze the condition of supporting equipment (Wire rope test, Boiler certification) • The company does not have an official website yet
Opportunities	Threats
<ul style="list-style-type: none"> • Making contracts with nobel part suppliers through the LTSA method: Long term service agreement or OPSA: Operating plant service agreement • Plan purchases and make agreements with spare part suppliers for the coming year at current prices • Pre-mobilization of CEPA O&M LNG follows the progress of the Keera LNG project • Licensing and competency certification for CEPA O&M employees for the mini LNG Plant must be prepared • The company's commitment to environmental management efforts must be stated in the protection policy • Hire local workers per needs and meet the requirements as a form of company whitening to the surrounding community • Potential O&M Contract extension occurs if the PSC contract extension between EEES and SKK Migas and PPA between ES and PLN is also approved • O&M market for energy in Indonesia is still wide 	<ul style="list-style-type: none"> • Rupiah exchange rate against the dollar for Nobel Part purchases • Delay in completion of the Mini LNG Plant project affects the cost of preparing the CEPA O&M LNG plant • The operational activities of the power plant and mini LNG Plant can have several impacts on the environment, such as air, water, soil pollution, noise, and produce hazardous and toxic waste. • Every year the government announces the results of the PROPER (Company • Performance Rating Rating Program) in the environmental field and is always published annually and ranks companies for the category, Black, Red, Blue, Green, and Gold in ecological management • PSC agreement between EEES, Ltd. and SKK Migas ends October 2022, Power • Plant Purchase Agreement (PPA) between ES, Ltd. and PLN ends October 2022, and this will have an impact on the O&M Contract breaking up between CEPA, Ltd. and ES, Ltd. • If the contract extension is successful, then the new government policy in Minister of Energy and Mineral Resources Regulation No. 10 of 2017 requires IPP to follow the "Delivery or Pay" mechanism in addition to the "Take or Pay" mechanism that will affect the O&M Contract • Government policy in the Minister of Energy and Mineral Resources Regulation No. 8 of 2017 for new contracts and extensions that change the PSC Cost recovery method with the Gross Split way, this condition will positively also affect the renewal of the gas sales agreement between EES, Ltd. and ES, Ltd. and the O&M Contract between ES and CEPA, Ltd. • Threats to private O&M companies in South Sulawesi (D&C Engineering, Poso Energi, Bakara Bumi Energi, Cogindo Daya Bersama, Bima Golden Powerindo, Sumber Daya Sewatama)

SWOT: Strength, weakness, opportunity, and threa, O&M: Operation and maintenance

and opportunities the company has in order to continue to carry out this O&M business.

In the IFE and EFE analysis tables (Table 3), we obtained a total weight score of Strength 1,928 Weakness 0.905 Opportunity 1,864 and Threat 0.702. Next calculate internal and external analysis coordinates, coordinate of internal analysis (Total strength weight score–Total weakness weight score) = $1,928 - 0.905 = 1,023$. Coordinate of External Analysis (Total score of probability weight–Total score of threat weight) = $1,864 - 0.702 = 1,162$.

Whereas in Figure 1 shows the results of the analysis of the Cartesian diagram above, PT Consolidated Electric Power Asia is included in Quadrant 1, which is a very favorable situation for the company because it has the strength and opportunities that can be exploited. Based on Table 3 in the TOWS matrix of PT Consolidated Electric Power Asia, there are several strategies that are appropriate for the company, including:

1. Backward Integration Strategy, From the TOWS matrix included in this strategy, are SO-1, WO-1, and WO-7.
2. Market development, From the TOWS matrix included in this strategy, are SO-2, ST-4, and WO-5
3. Development of O&M service products, From the TOWS matrix included in this strategy, are ST-2, ST-5, ST-6, SO-3, SO-4, WO-4, WO-5, and WO-6.

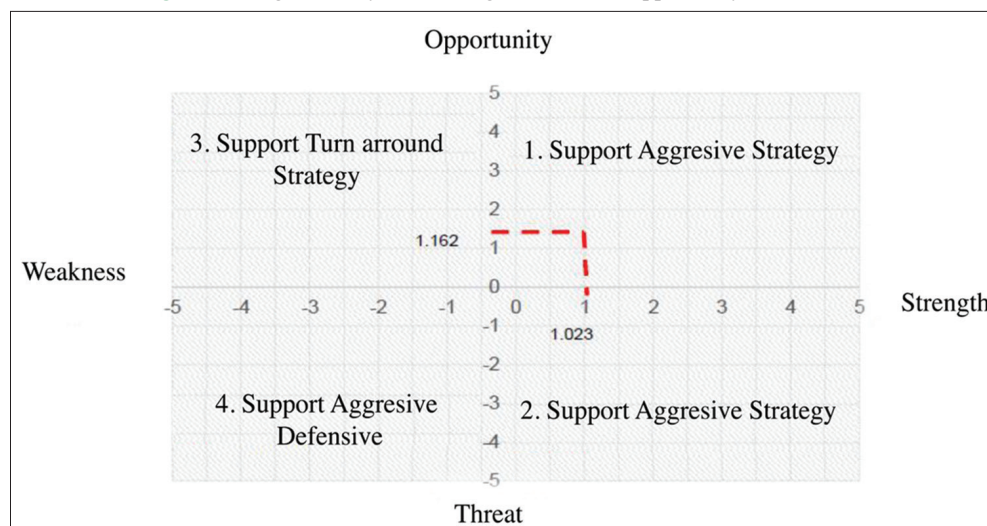
5. DISCUSSION

Some elements of the strategy that can be carried out by CEPA. Ltd. in the future, as a supporting factor for the success of business operations and supporting the continuity of electricity supply, is a contract of cooperation with the industry of spare parts suppliers, considering the engine factor as a driving force and the element of production. With a cooperation contract with a major parts supplier, the opportunity to get positive feedback and the opportunity to increase production will be even more

Table 2: TOWS analysis strategy external

SO - Strategy	WO - Strategy
<ol style="list-style-type: none"> 1. Immediately enter into a cooperation contract with a major parts supplier (S6, S7, S10+O1, O2) 2. Actively participating in tenders for O&M services for new and old power plants that were upgraded as a form of O&M market penetration in Indonesia (S1, S2, S3, S4, S5, S6, S7, S9, S10+O7, O8) 3. Optimizing internal human resources and combining them with a new workforce for the LNG Plant O&M team (S1+O3) 4. Provide optimal internal training as preparation for obtaining LNG Plant competency certification (S1, S2, S3+O4) 5. Create a system procedure and implement it professionally (S10+O5) 6. Provide training to local workers around the company such as basic Welder, Scaffolder and basic mechanics (S1, S7+O6) 7. Improve performance and ensure consistent work optimally so that it can be used as bargaining power when contract extension (S1, S2, S3, S4, S5, S6, S7, S9, S10+O7, O8) 	<ol style="list-style-type: none"> 1. Maximize opportunities for cooperation with suppliers through LTSA or OPSA to guarantee parts approval so that machine availability and reliability is guaranteed (W1, W4, W6+O1, O2) 2. Implement improvements to the payment process internally and communicate with the head office in HK (W2+O2) 3. A contract with the leading parts supplier will reduce CIT (W3+O1, O2) 4. With a contract with a major parts supplier, the opportunity to get training becomes excellent for the work of specialists (W7+O1, O2) 5. Website creation must be made to be able to take on other O&M markets (W9+O8) 6. Send employees for training and certification to be able to have competence in conducting assessments (W6, W8+O7, O8) 7. Look for and maximize alternatives from several reconditioning companies to reduce dependence on OEMs (W4+O1, O2)
ST - Strategy	WT - Strategy
<ol style="list-style-type: none"> 1. If the transaction is in foreign currency, then the exchange rate as the basis for payment in rupiah value, the determination of the exchange rate is adjusted to the BI exchange rate and takes the highest value, to avoid exchange rate spikes at the time of payment. (S6+T1) 2. maximize internal human resources to help new workers in the preparation of the O&M LNG Plant team (S1, S2, S3+T2) 3. Implement standard environmental management and monitoring procedures based on international standards ISO 14001: 2015 (S10+T3, T4) 4. Looking for new contract O&M opportunities in other fields in preparation if in 2022 the deal is not renewed (S1, S2, S3, S4, S5, S6, S7, S9, S10+T5) 5. Improve performance and ensure consistent work optimally so that it can be used as a positive record in contract renewal (S1, S2, S3, S4, S5, S6, S7, S9, S10+T6, T7, T8) 6. Maximizing contracts that are still 5 years away to demonstrate consistently efficient O&M capabilities (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10+T8) 	<ol style="list-style-type: none"> 1. Perform regular internal assessments to ensure that major outage delays are acceptable and not endanger the condition of the machine (W1, W2, W4, W6+T3) 2. Make Training Need Analysis for CEPAL LNG O&M and provide training internally (W5+T2)

O&M: Operation and maintenance

Figure 1: Diagram analysis of strength, weakness, opportunity, and threat

excellent. One of these (cooperation contracts) can be pursued, one of which is the re-construction of payment processes to structured

and timely suppliers to increase the value of trust between the internal company and the supplier as an external party. Forms of

Table 3: Internal factor evaluation and external factor evaluation

No.	Rating of external factor priorities	Weight	Rating	Weight score
Opportunities				
1.	Enter into a contract with a nobel part supplier through the LTSA method: Long term service agreement or OPSA: Operating plant service agreemen	0.150	4	0.599
2.	Plan purchases and make agreements with spare part suppliers for the coming year at current prices	0.086	4	0.345
3.	Pre mobilization of the CEPA O&M LNG follows the progress of the Keera LNG project	0.068	4	0.272
4.	Licensing and competency certification for CEPA O&M employees for mini LNG Plant must be prepared. Licensing and certification for CEPA O&M employee competencies for mini LNG Plant must be prepared	0.061	4	0.243
5.	The company's commitment to environmental management efforts must be stated in a protection policy	0.045	3	0.136
6.	Hire local workers according to the needs and meet the requirements as a form of company whitening to the surrounding community	0.044	3	0.131
7.	Potential O&M Contract extension occurs if the PSC contract extension between PT EEES and SKK Migas & PPA between PT ES & PLN is also approved	0.023	3	0.070
8.	The O&M market for energy in Indonesia is still broad	0.023	3	0.068
	Sub total			1.864
Threat				
1.	Rupiah exchange rate against the dollar for Nobel Part purchases	0.101	2	0.203
2.	The delay in completing the Mini LNG Plant project affects the cost of preparing the CEPA O&M LNG plant	0.100	2	0.200
3.	Operational activities of the power plant and mini LNG Plant can have several impacts on the environment, such as air, water, soil pollution, noise, and produce hazardous and toxic waste	0.082	1	0.082
4.	Every year the government announces the results of the PROPER (Company Performance Rating Rating Program) in the environmental field and is always published annually and ranks companies for the category, Black, Red, Blue, Green, and Gold in ecological management	0.078	1	0.078
5.	PSC agreement between PT EEES and SKK Migas ends October 2022, Power Plant Purchase Agreement (PPA) between ES and PLN ends October 2022, and this will have an impact on the O&M Contract breaking up between CEPA and ES	0.052	1	0.052
6.	If the contract extension is successful, then the new government policy in Minister of Energy and Mineral Resources Regulation No. 10 of 2017 requires IPP to follow the "Delivery or Pay" mechanism in addition to the "Take or Pay" mechanism that will affect the O&M Contract	0.031	1	0.031
7.	Government policy in the Minister of Energy and Mineral Resources Regulation No. 8 of 2017 for new contracts and extensions that change the PSC Cost recovery method with the Gross Split method, and this condition will positively also affect the renewal of the gas sales agreement between EES and PT ES and the O&M Contract between ES and CEPA	0.030	1	0.030
8.	Threats against private O&M companies in South Sulawesi (D&C Engineering, Poso Energi, Bakara Bumi Energi, Cogindo Daya Bersama, Bima Golden Powerindo, Sumber Daya Sewatama)	0.025	1	0.025
	Sub total			0.702
	Total	1.00		2.566

O&M: Operation and maintenance

Table 4: Pairwise comparison matrix scale

Intensity of interest	Definition	Explanation
1	Equally important element compared to other elements (Equal importance)	Both elements contribute equally to these properties.
3	One element is slightly more important than the other elements (Moderate more importance)	Experience states a little in favor of one element
5	One element is clearly more important than other elements (Essential, Strong more importance)	Experience shows strongly in favor of one element
7	One element is clearly more important than another element (Demonstrated importance)	Experience shows strongly liked and dominant seen in practice
9	One element is absolutely more important than another (Absolutely more importance)	Experience shows that one element is clearly more important
2,4,6,8	When in doubt between the two adjacent space values (gray area)	This value is given when compromise is needed

cooperation can be done both involving the private sector and the government, including in terms of CSR optimizers. To maintain the continuity of the electricity supply business, as an effort to penetrate the market, keeping in mind the increasing consumer demand is to participate in several project auctions based on O&M Tender and the creation of a website as a digital-based promotion tool.

The drivers of production, which include aspects of human resources as intangible assets, play an essential role; therefore, the optimization of internal human resources is also a key element as a strategic policy unit of the company. Of course, it must also be supported by the application of fair and professional reward and punishment rules. Supports in terms of resource development can be achieved through training, for example, Basic Welder Scaffolder and Basic Mechanical.

Apart from what has been previously stated, given the uncertain economic conditions, the company's strategy to deliver business management to be more optimal with minimal risk is transactions in the form of foreign currencies to avoid fluctuations in the exchange rate at the time of purchase or payment.

6. CONCLUSION

Based on the results of the strategy formulation that has been carried out with strategic management tools namely the SWOT/TOWS matrix, there are three alternative strategies per Consolidated Electric Power Asia; there are three, namely: (a) Backward Integration, this strategy tries to increase control over suppliers company by making a particular contract on the supplier of main parts or original equipment manufacturer (OEM). (b) Market development. This strategy introduces existing O&M services to new geographical areas. (c) Product or service development. This strategy is a strategy where companies increase sales by improving existing O&M products or services or developing O&M services for sectors other than the power generation sector.

Based on the results of this study, the suggestions that can be given to CEPA. Ltd. O&M so that the findings in this study can be input for management in the O&M service development strategy and strategy formulation needs to be done regularly to get a picture of a dynamic business environment, for example, once a year and discussed at the management review meeting.

REFERENCES

- Barusman, M.Y.S., Redaputri, A.P. (2018), Decision making model of electric power fulfillment in Lampung province using soft system methodology. *International Journal of Energy Economics and Policy*, 8(1), 128-136.
- Costanza, R., Daly, H.E. (1992), Natural Capital and Sustainable Development. *Conservation Biology*, 6, 37-46.
- Elkington, J. (1998), Partnerships from cannibals with forks: The triple bottom line of 21st century business. *Environmental Quality Management*, 6, 37-51.
- Faber, N., de Koster, M., Smidts, A. (2013), Organizing warehouse management. *International Journal of Operations and Production Management*, 33(9), 1230-1256.
- Felix, E. (2018), Theory of Sustainability. Available from: <http://www.sustainability-justice-climate.eu/en/nachhaltigkeit.html>. [Last accessed on 2019 Mar 01].
- Francois, E.J. (2018), Financial sustainability for nonprofit organizations. In: *Financial Sustainability for Nonprofit Organizations*. United States: Spinger Publishing Company. p1-384.
- Garg, A., Deshmukh, S. (2006), Maintenance management: Literature review and directions. *Journal of Quality in Maintenance Engineering*, 12(3), 205-238.
- Geerlings, H., Vellinga, T. (2017), Sustainability. In: *Ports and Networks: Strategies, Operations and Perspectives*. London: Routledge. p1-406.
- Gimenez, C., Sierra, V., Rodon, J. (2012), Sustainable operations: Their impact on the triple bottom line. *International Journal of Production Economics*, 140(1), 149-159.
- Goodland, R. (2003), The concept of environmental sustainability. *Annual Review of Ecology and Systematics*, 26, 1-24.
- Görener, A., Toker, K., Uluçay, K. (2012), Application of combined SWOT and AHP: A case study for a manufacturing firm. *Procedia Social and Behavioral Sciences*, 58, 1525-1534.
- Gottfried, O., De Clercq, D., Blair, E., Weng, X., Wang, C. (2018), SWOT-AHP-TOWS analysis of private investment behavior in the Chinese biogas sector. *Journal of Cleaner Production*, 184, 632-647.
- Gregory, L.K. (2012), *Introduction to Homeland Security*. New York: Routledge. p1-428.
- Huo, J., Hong, Z. (2013), Operation management. In: *Service Science in China*. United States: Springer. p1-166.
- Jenkins, W. (2009), Sustainability theory. In: *Berkshire Encyclopedia of Sustainability*. United States: Berkshire Publishing Group. p1-493.
- Karakaş, E., Yildiran, O.V. (2019), Evaluation of renewable energy alternatives for Turkey via modified fuzzy AHP. *International Journal of Energy Economics and Policy*, 9(2), 31-39.
- Khazaii, J. (2016), Analytical hierarchy process. In: *Advanced Decision Making for HVAC Engineers*. Switzerland: Springer, Cham. p73-85.
- Kurttila, M., Pesonen, M., Kangas, J., Kajanus, M. (2002), Utilizing the analytic hierarchy process (AHP) in SWOT analysis-a hybrid method and its application to a forest-certification case. *Forest Policy and Economics*, 1(1), 41-52.
- Lal, R. (2016), Environmental sustainability. In: Lal, R., Kraybill, D., Hansen, D., Singh, B., Mosogoya, T., Eik, L., editors. *Climate Change and Multi-dimensional Sustainability in African Agriculture*. Switzerland: Springer, Cham. p3-11.
- Laurence, D. (2011), Establishing a sustainable mining operation: An overview. *Journal of Cleaner Production*, 19(2-3), 278-284.
- Leigh, D. (2010), SWOT analysis. In: Watkins, R., Leigh, D., editors. *Handbook of Improving Performance in the Workplace: Selecting and Implementing Performance Interventions*. United States: Wiley Online Library. p2.
- Marcelina, S.C. (2016), Tanggung jawab perusahaan listrik negara terhadap konsumen. *Lex Et Societatis*, 4(5), 97-105.
- Mu, E., Pereyra-Rojas, M. (2017), Practical decision making. In: *Springer Briefs in Operations Research*. Berlin, Germany: Springer, Cham. p43-58.
- Murdfin, I., Pelu, M.A.F., Putra, A.H.P., Arumbarkah, A.M., Rahmah, A., Muslim, U., Rahmah, A. (2019), Environmental disclosure as corporate social responsibility: Evidence from the biggest nickel mining in Indonesia. *International Journal of Energy Economics and Policy*, 9(1), 115-122.
- Mutloane, O.E. (2009), Maintenance Management for Effective Operations Management at Matimba Power Station. North-West: Doctoral Dissertation, North-West University. p1-80.
- Oreski, D. (2012), Strategy development by using SWOT-AHP. *TEM Journal*, 1(4), 283-291.
- Piercy, N., Giles, W. (1989), Making SWOT analysis work. *Marketing Intelligence and Planning*, 7(5/6), 5-7.
- Ramlawati, R., Putra, A.H.P. (2018), Total quality management as the key of the company to gain the competitiveness, performance achievement and consumer satisfaction. *International Review of Management and Marketing*, 8(5), 60-69.
- Saaty, T.L. (2011), What is the analytic hierarchy process? In: *Mathematical Models for Decision Support*. Vol. 48. Heidelberg: Springer.
- Seuring, S., Müller, M. (2008), From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699-1710.
- Šlaus, I., Jacobs, G. (2011), Human capital and sustainability. *Sustainability*, 3(1), 97-154.
- Teece, D.J., Pisano, G., Shuen, A. (1997), Dynamic capabilities and strategic management. *Strategic Management Journal*, 18, 509-533.
- Van Bardeleben, M. (2011), Implementing sustainability. *European Coatings Journal*, 11, 38-40.
- Wallis, S.E., Valentinov, V. (2017), What is sustainable theory? A luhmannian perspective on the science of conceptual systems. *Found of Science*, 22, 733-747.