



## Analysis of Kapuk Waste at PT. Raja Indonesia Perkasa Suwayuwo Using the SWOT Method

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### ABSTRACT

This study aims to analyze the management of kapuk seed waste at PT. Raja Indonesia Perkasa Suwayuwo uses the SWOT (Strengths, Weaknesses, Opportunities, Threats) method. Kapuk seed waste, which is produced in significant quantities (5 tons/day), has not been optimally utilized despite containing economic potential such as oil (24-40%) and bioactive compounds. The research method involved qualitative and quantitative approaches, with data collected through observation, interviews, and questionnaires of 15 respondents. The SWOT analysis identifies internal (strengths and weaknesses) and external (opportunities and threats) factors, which are assessed using a Likert scale of 1-4. The results of the validity and reliability test showed a reliable research instrument (Cronbach's Alpha > 0.60). The SWOT cartesian chart places companies in Quadrant II, showing external opportunities such as government and technology support, but internal weaknesses such as reliance on manual machines and a lack of innovation. The recommended strategy is a turn around, which is to take advantage of external opportunities to address internal weaknesses, such as employee training and technology adoption.



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## 1. Introduction

The problem of industrial waste is increasingly emerging along with the rapid development of the manufacturing sector in Indonesia. The waste generated not only has an impact on the production process but also threatens environmental sustainability if not managed properly. This is in line with Utomo (2019) opinions that emphasize the importance of environmentally friendly industry regulations to overcome these problems. He Jasrotia et al (2013) further explained that waste management must be carried out comprehensively from the beginning of the production process to the final stage to prevent the wider impact of pollution.

One of the real examples of industrial waste problems can be found in the processing of kapuk randu (*Ceiba pentandra L.*) at PT. The King of Indonesia Perkasa Suwayuwo. This plant originating from India and South America has long been cultivated in Indonesia with a land area of 1,383.64

hectares. However, the processing process of kapuk produces quite significant seed waste, where every 100 kg of kapuk logs can produce 26 kg of seed waste. So far, the kapuk seed waste has not been utilized optimally and is only thrown away, even though according Erliyanti et al (2020) to research the kapuk seeds contain oil of 24-40% of their dry weight. In addition, Pratiwi (2014) it is mentioned that kapuk seeds also contain various bioactive compounds such as alkaloids, saponins, and flavonoids that have the potential to be further developed.

This research focuses on the analysis of kapuk seed waste management at PT. King of Indonesia Perkasa Suwayuwo using the SWOT method. The selection of research objects is based on several important considerations, including the volume of waste that reaches 5 tons per day during the harvest season, the absence of an integrated waste treatment system, and the economic potential that has not been optimally exploited. Through a SWOT analysis approach, this study aims to identify the characteristics of waste, analyze internal and external factors that affect its management, and formulate the right strategy for optimizing the use of waste.

## 2. Literature Review

### 1) SWOT Analysis

SWOT analysis is a strategic planning method used to evaluate strengths, weaknesses, opportunities, and threats or threat in a project or a business speculation (Mukhlisin & Pasaribu, 2020). And it can be applied by analyzing and sorting out various things that affect several factors (Bakhri et al., 2019). According to the statement, SWOT stands for the internal environment strengths and weaknesses as well as the external environment Opportunities and Threats faced by the business world Rahmayati (2015). The SWOT analysis compares the external factors of Opportunities and Threats with internal factors of strengths and weaknesses. Meanwhile Kotler (2002), stating that SWOT analysis is an evaluation of the overall strengths, weaknesses, opportunities and threats is called a SWOT analysis.

#### a. Internal Analysis

Internal analysis in the SWOT framework focuses on the identification and evaluation of the endogenous factors that make up the capabilities of an organization (Fatimah, 2016). This section is divided into two main components:

- Strengths

Strength or strength is a situation or condition that is the strength of the company. Strength is an internal factor that supports the company in achieving its goals (Mahfud, 2019). Supporting factors can be in the form of technology, resources, expertise, marketing strength, and customer base owned or other advantages that may be obtained thanks to financial sources, image, market advantage, and good relations between buyers and suppliers.

- Weaknesses

Weaknesses or weaknesses are activities that do not run well or resources that are needed by the company but not owned by the company (Cahyono, 2016). Weaknesses are sometimes easier to see than strengths, but there are some things that make those weaknesses not given the right solution because they are not maximized by existing strengths. Weaknesses are internal factors that hinder the company in achieving its goals. Inhibiting factors can be incomplete facilities, lack of financial resources, manageability, marketing expertise, and company image.

#### b. External Analysis

The external analysis in SWOT addresses exogenous factors that affect the competitiveness of the organization, consisting of two main elements:

- Opportunities

Opportunity or opportunity is a positive factor that arises from the environment and provides opportunities for companies to take advantage of it (Asriyadi, 2019). Opportunity is an

external factor that supports a company in achieving its goals. External factors that support the achievement of goals can be in the form of policy changes, technological changes, economic developments and the development of supplier and buyer relationships.

- Threats

Threats or threats are negative factors of the environment that provide obstacles to the development or running of a company (Fatimah, 2016). This threat is something that is sometimes overlooked because many want to try to get controversial or go against the grain. However, in reality, the company withered more before it expanded. Threats are external factors that hinder companies in achieving their goals. External factors that hinder the company can be in the form of the entry of new competitors, slow market growth, increasing gaining power from main suppliers and buyers, technological changes and new policies.

2) The company's position in SWOT Analysis

- a. Quadrant I: It is a very favorable situation.
- b. Quadrant II: The company faces a large market share opportunity, but the company faces internal weaknesses.
- c. Quadrant III: This is a very unfavorable situation for the company.
- d. Quadrant IV: This position signifies a strong company but faces great challenges.

### 3. Methodology

a. Data Collection Techniques

This study uses a qualitative and quantitative approach to collect data related to the management of kapuk seed waste at PT. The King of Indonesia Perkasa Suwayuwo. Data was obtained through three main methods, namely observation, interviews and questionnaires of 15 respondents consisting of employees to assess internal (strengths and weaknesses) and external factors (opportunities and threats). The Likert scale of 1-4 is used with the following criteria:

- 1 = Very less influential
- 2 = Less influential
- 3 = Influential
- 4 = Highly influential

b. SWOT Analysis

SWOT analysis is applied to identify and evaluate strategic factors that affect waste management. The stages of analysis include:

- a. Identification of Factors:
  - Internal Factors: Strengths and Weaknesses
  - External Factors: Opportunities and Threats

3) Validity and Reliability Tests

Validity Test: Conducted using SPSS software by comparing the value of the Corrected Item-Total Correlation to the value of the r-table. The question item is declared valid if the value r is calculated  $> r$  of the table. Reliability Test: Measured using Cronbach's Alpha. The research instrument is declared reliable if Cronbach's Alpha value  $> 0.60$ .

4) Rating and Weight Calculation

- Rating: Each factor was rated on a scale of 1-4 by respondents. Total scores are calculated to determine the degree of influence of each factor.
- Weight: Calculated by dividing the total score per factor by the total score overall. This weight is used to determine priorities in strategy analysis.

5) Cartesian SWOT Chart

Cartesian diagrams are used to visualize the company's position based on the results of the SWOT analysis. The coordinates are determined by the formula:

- X-Axis: (Total strength score - Total weakness score) / 2
- Y-axis: (Total chance score - Total threat score) / 2

The results of these coordinates will indicate the appropriate strategic quadrant for company.

#### 4. Results and Discussion

Table 1. Internal Factors Questionnaire

Yes	Strength	Yes	Debilitation
S1	Location of waste disposal pt. The Mighty King of Indonesia Suwayuwo Strategic	W1	Employees are less skilled in waste handling
S2	Have reliable workers in terms of waste handling	W2	Lack of innovation in waste products is not in demand
S3	There are no complaints from the community in terms of waste	W3	The owner is still in the main decision-making power of waste management
S4	Kapuk waste is easy to recycle	W4	Sewage treatment machines still depend on humans
S5	Adequate infrastructure (buildings, machinery and means of transportation)	W5	The variety of processed waste product models is still small
S6	The cost of processing kapuk waste is considerable. Cheap	W6	Cheaper competitor prices
S7	Kapuk waste does not decompose easily	W7	Less varied waste promotion strategies
S8	The cost of handling kapuk waste is very affordable	W8	Owners still go directly to waste sales
S9	The waste collection building owned by the company is a building Proprietary	W9	The profit from the sale of waste that is not optimal
S10	Quick Waste Disposal	W10	Waste management strategy is still weak
S11	The price of resold waste is affordable for consumers	W11	Distribution of shipments is still an obstacle if the departure schedule is late

Table 2. External Factors QuestionnaireNo

Yes	Chance	Yes	Threat
O1	There is government support in terms of handling company waste	T1	Relatively cheap waste prices
O2	Kapuk waste can be processed into several products	T2	Fuel price increase
O3	Current technological advances in terms of waste treatment	T3	More and more companies are processing their waste products
O4	Many enthusiasts from the surrounding community are exposed to PT. The Mighty King of Indonesia Suwayuwo	Q4	The development of waste product design related to consumer consumption currently still needs to be considered
O5	High waste business activities	Q5	Increase in raw material prices
O6	Waste business activities are getting wider	T6	Growing marketing technology makes competitors mimic waste product models
O7	Relationship with a good waste supplier	T7	Attractive promotional activities and discount offers from competitors
O8	Market share is quite high	T8	Competitive competition of waste products with competitors

Ket: The statements in table 1 and table 2 are statements before calculating the data validity test. The rating on the statement table is based on the following information:

Scale 1 : If the factor is very less influential for the company (less than enough)

Scale 2: If these factors are less influential for the company (enough).

Scale 3: If these factors have an effect on the company (good).

Scale 4: If the factor has a very strong effect on the company (very good).

1) Validity and Reliability Tests

Compile a paired comparison by comparing all the elements for each sub-hierarchy in pairs. Aim to determine the priority order of elements. To assess the ratio of the level of importance of one element to another, a scale of 1 to 9 is used. After assessing each comparison between the elements, a *pairwise comparison matrix* is prepared to determine the priority. Then test consistency and analyze the sensitivity of the overall priorities to changes in the comparison.

Table 3. SPSS Falidation Test

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
S1	67.87	91.410	.637	.750
S2	67.80	91.600	.604	.751
S3	67.87	88.124	.785	.739
S4	68.07	95.352	.366	.764
S5	67.93	89.067	.734	.743
S6	68.07	87.924	.778	.739
S7	67.80	90.171	.728	.746
S8	67.87	92.981	.648	.755
S9	68.47	89.695	.684	.745
S10	67.93	95.067	.452	.762
S11	67.93	86.352	.830	.733
Total_S	35.60	24.829	1.000	.896

Table 4. Continued SPSS Falidation Test

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
W1	65.00	270.429	.888	.765
W2	65.47	271.124	.891	.766
W3	65.13	268.981	.886	.763
W4	65.53	277.552	.705	.773
W5	65.47	265.410	.932	.760
W6	65.47	274.410	.861	.769
W7	65.40	266.829	.918	.761
W8	65.13	269.981	.932	.764
W9	65.20	275.171	.858	.770
W10	65.33	276.810	.767	.772
W11	65.07	270.352	.901	.765
Total W	34.20	74.457	1.000	.971

Table 5. Continued SPSS Faldation Test

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
O1	45.53	94.838	.798	.771
O2	46.00	89.286	.818	.754
O3	45.73	94.067	.692	.770
O4	46.13	95.124	.719	.772
O5	46.07	90.924	.846	.758
O6	45.93	91.210	.814	.760
O7	45.87	92.124	.802	.763
O8	45.73	92.924	.773	.765
Total O	24.47	26.267	1.000	.924

Table 6. Continued SPSS Faldation Test

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
T1	49.20	88.314	.862	.752
T2	49.13	92.695	.737	.767
T3	49.20	87.314	.846	.750
Q4	49.47	99.552	.320	.791
Q5	49.33	88.667	.880	.753
T6	49.33	91.667	.771	.764
T7	49.13	88.838	.908	.753
T8	49.20	93.886	.788	.770
Total T	26.27	25.924	1.000	.919

Table 7. is a table that is directly input from SPSS which is the result of the validity test. A question item is declared valid if  $r$  is calculated  $> r$  table, then the summary of the validity test results of the *Corrected Item-Total Correlation* variable can be seen as follows:

Table 7. Summary of Validity Test Results

No Question	r count	r Table	Information
S1	0.674	0.533	Valid
S2	0.644	0.533	Valid
S3	0.812	0.533	Valid
S4	0.411	0.533	Invalid
S5	0.766	0.533	Valid
S6	0.806	0.533	Valid
S7	0.757	0.533	Valid
S8	0.676	0.533	Valid
S9	0.721	0.533	Valid
S10	0.489	0.533	Invalid
S11	0.854	0.533	Valid
W1	0.898	0.533	Valid
W2	0.901	0.533	Valid
W3	0.897	0.533	Valid
W4	0.729	0.533	Valid
W5	0.939	0.533	Valid
W6	0.873	0.533	Valid
W7	0.927	0.533	Valid

No Question	r count	r Table	Information
W8	0.939	0.533	Valid
W9	0.870	0.533	Valid
W10	0.785	0.533	Valid
W11	0.911	0.533	Valid
O1	0.820	0.533	Valid
O2	0.848	0.533	Valid
O3	0.730	0.533	Valid
O4	0.750	0.533	Valid
O5	0.868	0.533	Valid
O6	0.841	0.533	Valid
O7	0.829	0.533	Valid
O8	0.802	0.533	Valid
T1	0.884	0.533	Valid
T2	0.769	0.533	Valid
T3	0.872	0.533	Valid
Q4	0.327	0.533	Invalid
Q5	0.898	0.533	Valid
T6	0.801	0.533	Valid
T7	0.922	0.533	Valid
T8	0.811	0.533	Valid

Judging from table 4.7 there are several invalid statements, namely questions S4, S10 and T4 the statements are no longer used to the next discussion because they are declared invalid.

2) Reliability test The following is below the results of the reliability test using SPSS software

Table 8. Statistical Reliability

**Reliability Statistics**

Cronbach's Alpha	N of Items
.615	42

From the table mentioned above, it can be concluded that the reliability test obtained a Cronbach's Alpha value of 615 or 61.5%. According to Nunnally's criteria, if Cronbach's Alpha value greater than 60%, then the questionnaire or indicator is declared reliable. Thus, the table above shows that *Cronbach's Alpha* value of 61.5% > 60% is declared reliable.

3) Ratings

a. Calculation of Internal Factor Rating

Table 10. Questionnaire Results and Rating Data from Internal Factors

Yes	Strength	Rating			
		1	2	3	4
1	Location of waste disposal pt. The Mighty King of Indonesia Strategic Suwayuwo	0	1	8	6
2	Have reliable workers in terms of waste handling	0	1	7	7
3	There are no complaints from the community in terms of waste	0	2	6	7
4	Adequate infrastructure (buildings, machinery and equipment transportation)	0	2	6	7
5	The cost of processing kapuk waste is fairly cheap	1	3	7	5
6	Kapuk waste does not decompose easily	0	1	7	7

7	The cost of handling kapuk waste is very affordable	0	0	10	5
8	Company-owned waste disposal building is a proprietary building	0	6	2	7
9	The price of resold waste is affordable for consumers	0	3	5	7
<b>Yes</b>	<b>Debilitation</b>				
1	Employees are less skilled in waste handling	1	1	4	9
2	Lack of innovation in waste products is not in demand	1	3	7	4
3	The owner is still in the main power of the take Waste Handling Decisions	1	2	4	8
4	Sewage treatment machines still depend on humans	1	3	8	3
5	The variety of processed waste product models is still small	2	2	6	5
6	Cheaper competitor prices	1	2	9	3
7	Less varied waste promotion strategies	2	1	7	5
8	Owners still go directly to waste sales	1	1	6	7
9	The profit from the sale of waste that has not been obtained Optimal	0	3	6	6
10	Waste management strategy is still weak	1	1	9	4
11	There are still obstacles in the distribution of shipments if Late departure schedule	1	1	5	8

In the calculation of table 4.6 is the data on the number of respondents who fill in the rating score scale on each statement. Example of a waste disposal location of PT. Raja Perkasa Indonesia Suwayuwo is strategic, with the number of respondents who filled in the rating value of 1 there were 0 respondents, the rating value of 2 there was 1 respondent, the rating value of 3 there were 8 respondents and the rating value of 4 there were 6 respondents who filled in.

b. External Factor Rating Calculation

Table 11. Questionnaire Results and Rating Data from External Factors

Ye s	Chance	Rating			
		1	2	3	4
1	There is government support in terms of handling company waste	0	1	7	7
2	Kapuk waste can be processed into several products	1	4	5	5
3	Current technological advances in terms of waste treatment	0	3	6	6
4	Many enthusiasts from the surrounding community are exposed to PT. The Mighty King of Indonesia Suwayuwo	1	2	11	1
5	High waste business activities	1	3	8	3
6	Waste business activities are getting wider	1	2	8	4
7	Relationship with a good waste supplier	1	1	9	4
8	Market share is quite high	1	0	9	5
<b>Yes</b>	<b>Threat</b>				
1	Relatively cheap waste prices	1	1	5	8
2	Fuel price increase	0	2	5	8
3	More and more companies are processing their waste products	1	2	3	9
4	Increase in raw material prices	1	1	7	6
5	Growing marketing technology makes competitors mimic waste product models	0	3	6	6

6	Attractive promotional activities and discount offers from competitors	1	0	6	8
7	Competitive competition of waste products with competitors	0	1	8	6

#### 4) Weight Calculation

##### a. Calculation of Internal Factor Weights

Internal factors originating from within the company environment in the form of strengths and weaknesses are then calculated based on the level of importance or handling ranging from a scale of 0.00 (non-important) to 1.00 (very important) and where the weight is added does not exceed a total score of 1.00. The following is a table of internal factor weight calculations.

Table 12. Calculation of Internal Factor Weights

No	Strength	Data Processing Questionnaire	Weight
1	Location of waste disposal pt. The strategic King of Indonesian Suwayuwo	50	0.05
2	Have reliable workers in terms of waste handling	51	0.05
3	There are no complaints from the community in terms of waste	50	0.05
4	Adequate infrastructure (buildings, machinery and means of transportation)	49	0.05
5	The cost of processing kapuk waste is fairly cheap	47	0.04
6	Kapuk waste does not decompose easily	51	0.05
7	The cost of handling kapuk waste is very affordable	50	0.05
8	The waste collection building owned by the company is a property building	41	0.04
9	The price of resold waste is affordable for consumers	49	0.05
<b>Total power</b>		<b>438</b>	<b>0.43</b>
No	Debilitation	Questionnaire Data Processing	Weight
1	Employees are less skilled in waste handling	51	0.05
2	Lack of innovation in waste products is not in demand	44	0.04
3	The owner is still in the main decision-making power of waste management	49	0.05
4	Sewage treatment machines still depend on humans	43	0.04
5	The variety of processed waste product models is still small	44	<b>0.04</b>
6	Cheaper competitor prices	44	0.04
7	Less varied waste promotion strategies	45	0.04
8	Owners still go directly to waste sales	49	0.05
9	The profit from the sale of waste that is not optimal	48	0.05
10	Waste management strategy is still weak	46	0.04
11	Distribution of shipments is still an obstacle if the departure schedule is late	50	0.05
<b>Total Weaknesses</b>		<b>513</b>	<b>0.48</b>
<b>Total Internal Factors</b>		<b>951</b>	<b>1.00</b>

Example of calculation of questionnaire data processing and weight for internal factors: The strength factor in No.1 is obtained from the total answers of 15 respondents, namely  $3 + 4 + 3 + 3 + 4 + 4 + 4 + 3 + 3 + 4 + 3 + 3 = 50$ , and for the calculation of the weight

on the strength factor No. 1 is obtained from the total answers of 15 respondents divided by the total processing of questionnaire data, Examples of calculations are:

$$\text{Weight} = 0.05 \frac{50}{951}$$

b. Calculation of External Factor Weights

In the calculation of the weight, external factors originating from outside the company's environment are determined based on the level of importance or handling ranging from a scale of 0.00 (non-important) to 1.00 (very important) and where the weight is added does not exceed a total score of 1.00. The following is a table of the results of the calculation of the weight of external factors.

Table 12. Calculation of External Factor Weights

No	Chance	Questionnaire Data Processing	Weight
1	There is government support in terms of handling company waste	51	0.07
2	Kapuk waste can be processed into several products	44	0.06
3	Current technological advances in terms of waste treatment	48	0.06
4	Many enthusiasts from the surrounding community are exposed to PT. The Mighty King of Indonesia Suwayuwo	42	0.05
5	High waste business activities	43	0.06
6	Waste business activities are getting wider	45	0.06
7	Relationship with a good waste supplier	46	0.06
8	Market share is quite high	48	0.06
<b>Total Odds</b>		367	0.45
No	Threat		
1	Relatively cheap waste prices	50	0.06
2	Fuel price increase	51	0.07
3	More and more companies are processing their waste products	50	0.06
4	Increase in raw material prices	48	0.06
5	Growing marketing technology makes competitors mimic waste product models	48	0.06
6	Attractive promotional activities and discount offers from competitors	51	0.07
7	Competitive competition of waste products with competitors	50	0.06
<b>Total Threat</b>		<b>348</b>	<b>0.44</b>
<b>Total External Factors</b>		<b>715</b>	<b>1.00</b>

5) Cartesian Diagram SWOT Analysis

From the results of the calculation on these factors, it can be described in the SWOT Diagram. The formula to find the coordinate point is as follows:

$$= \frac{\text{Internal analysis coordinates}}{\text{Total skor kekuatan} - \text{total skor kelemahan}} \quad ; \quad \frac{\text{External analysis coordinates}}{\text{Total skor peluang} - \text{total skor ancaman}}$$

$$= \frac{S - W}{2} \quad ; \quad \frac{O - T}{2}$$

$$= \frac{S - W}{2} \quad ; \quad \frac{O - T}{2}$$

$$= \frac{1.29 - 1.55}{2} ; \frac{1.44 - 1.32}{0,12}$$

$$= -0.26 ; 0,12$$

So the coordinate point is located at (-0.26; 0.12)

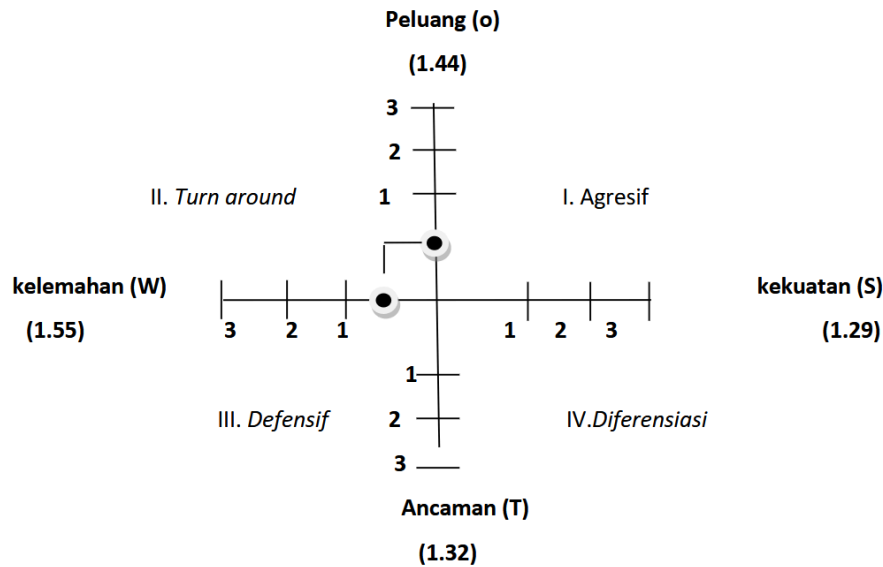


Figure 1. SWOT Analysis

Based on the results of the SWOT analysis carried out, the company PT. The King of Indonesia Perkasa Suwayuwo is located at the coordinate point (-0.26; 0.12) in the Cartesian diagram. This position indicates that the company is in Quadrant II, which is an area that describes a situation where the company has considerable external opportunities (an opportunity score of 1.44 is higher than a threat score of 1.32), but is faced with significant internal weakness (a weakness score of 1.55 is higher than a strength score of 1.29).

The X-axis value (-0.26) is derived from the difference between the total strength score (1.29) and weakness (1.55) divided by two, which indicates that the company's internal factors are dominated by weaknesses. This can be seen from several problems such as reliance on manual machines, lack of product innovation, and unvaried promotional strategies. Meanwhile, the Y-axis value (0.12) indicates that external opportunities are slightly superior to threats, such as government support, technological advancements, and broad market share.

Positions in Quadrant II require a turnaround strategy, which is to focus on utilizing external opportunities to overcome internal weaknesses. Companies need to make fundamental improvements, such as training employees to improve competencies, investing in more modern waste treatment technologies, and developing more creative marketing strategies. Additionally, collaborations with external parties (e.g., governments or research institutions) can help take advantage of opportunities such as funding programs or green technologies.

Thus, even if the company has a less strong foundation internally, the external opportunities that exist can be leveraged to achieve growth and sustainability. The right strategic measures will help the company move from a "turn around" position to a more favorable quadrant, such as Quadrant I (aggressive), where internal strengths and external opportunities are balanced.

## 5. Conclusion

Based on the SWOT analysis, PT. The King of Indonesia Perkasa Suwayuwo has great potential in the management of kapuk seed waste, but is faced with significant internal challenges. The main strength factors include strategic location, affordable processing costs, and adequate facilities, while the main weaknesses are reliance on manpower, lack of product innovation, and weak marketing strategies. On the external side, opportunities such as government support, technological advancements, and broad market share can be leveraged, although threats such as price competition and rising raw material costs need to be watched out.

The company's position in Quadrant II shows the need for a turnaround strategy to turn weaknesses into strengths by taking advantage of external opportunities. Concrete steps that can be taken include: (1) investment in more efficient waste treatment technology, (2) employee training to improve competence, (3) development of innovative products from kapuk seed waste, and (4) more aggressive marketing strategies. Collaboration with governments or research institutions can also help access funding or environmentally friendly technologies.

This research provides strategic guidance for companies to optimize waste management while increasing their economic value. For further research, it is recommended to explore the implementation of specific technologies (such as oil extraction from kapuk seeds) or economic feasibility analysis of waste derivative products. Thus, a holistic and sustainable approach can make waste no longer a problem, but a value-added resource.

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