



Combination of the SWOT Analysis Technique and the AHP Method to Prioritize the Selection of Business Strategy at Packaging Manufacturing Companies

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ABSTRACT

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This study aims to prioritize the production and business strategies of packaging manufacturing companies in Vietnam. An extensive literature review and expert discussions to identify the strengths and weaknesses of the company, along with the opportunities and challenges of the packaging printing industry, and a SWOT analysis were conducted to develop SO, ST, WO, and WT strategies. Next, structured interviews with experts were conducted to collect data comparing each pair of criteria. Then, the Analytical Hierarchy Process (AHP) was applied to prioritize the strategies. The first priority result was the ST strategy, the strategy of replacing modern machinery and equipment, with an overall weighted result of 0.399168. The second priority was the WT strategy—the strategy of completing the production plan, focusing on lean production, with an overall weighted result of 0.212431. The third priority is the WO strategy, the sales team renewal strategy—with an overall weighted result of 0.20174, and finally in 4th place is the SO strategy, the marketing strategy to find new customers, with an overall weighted result of 0.18666. Every company has different strengths and weaknesses, and every industry has its own opportunities and challenges. According to research results, it shows that packaging manufacturing enterprises have given the highest priority to ST strategy, taking advantage of the strengths of the business in the face of common challenges of the packaging industry.

1. INTRODUCTION

Nowadays, the economy is growing, the average income per capita is also increasing, and consumers are therefore more demanding in choosing consumer products; they not only care about quality but also pay attention to the form and design of product packaging. In recent years, the packaging industry has made extremely important contributions to the Vietnamese economy and is considered an industry with great potential for development, with opportunities coming from the growth of industries, e-commerce, and digital media, with many trade agreements signed between foreign partners and Vietnam. The size of the packaging market in Vietnam is estimated to reach 2.6 billion USD in 2024 and is expected to reach 4.14 billion USD in 2029, with an average growth rate of 15% to 20% in the coming years. The packaging printing industry is considered one of the fastest-growing industries in Vietnam. The packaging market in Vietnam is expected to expand significantly in the coming period, with several companies expecting strong sales growth in the coming years. The country's stable economic situation and high urbanization rate are expected to boost the use of packaging formats, which is also why more and more businesses are entering this sector. This is also the reason why more and more businesses are participating in this field [1]. Many new packaging printing production enterprises are established; the market is becoming

more and more competitive. Many higher requirements must be met from the international market as Vietnam increasingly integrates deeply, causing many manufacturing sectors in Vietnam to face new challenges, and the packaging manufacturing sector is no exception. On the other hand, the current situation is that many companies are facing some problems arising in production and business activities after many years of operation, which shows that they need new production and business strategies to adapt to increasingly strong competition in order to maintain sustainable business development. What is necessary now is that the company's leadership needs to have a reasonable approach to choosing a production and business strategy suitable for the company's internal capacity as well as the opportunities and challenges arising from the external market.

SWOT analysis is used by many businesses to analyze and propose business strategies. SWOT identifies and examines existing resources within the business, considers trends that positively or negatively impact business operations, and then develops appropriate strategies [2]. The hierarchical analysis method is a multi-criteria decision-making technique that helps to formulate problems in a hierarchical manner, supporting the evaluation, analysis, and decision-making of given options or handling multi-attribute decision-making problems [3]. SWOT analysis is one of the effective methods to implement business strategies in different industries.

However, the proposed strategies need to be prioritized to implement them effectively. Using SWOT analysis alone cannot solve this problem; the combination of AHP and SWOT will help overcome the above limitations. Several studies have used a combination of SWOT analysis and AHP methods for different purposes. Sharma and Beg [4] applied a combination of AHP and SWOT for the strategic analysis of a fiber cement board company. Kaymaz et al. [5] applied SWOT-AHP to evaluate the sustainable development goals of Erzurum province. Bakalár et al. [6] proposed a model for sustainable management of river basins using a combination of SWOT and AHP methods. Fahim et al. [7] evaluated the quality of sustainable higher education reform in Morocco through the use of SWOT analysis with the integration of AHP and entropy methods. Lee et al. [8] used SWOT-AHP analysis to propose a development strategy for the Korean satellite and space industry. Islam et al. [9] used a combination of SWOT analysis and AHP to develop a strategy for the ceramics industry in Bangladesh. Chidavaenzi et al. [10] applied a combination of AHP and SWOT for innovation ecosystem management. Saputra et al. [11] developed a post-harvest strategy for Duku fruit in Indonesia by applying a combination of SWOT analysis and AHP. Daoutis et al. [12] applied AHP and SWOT for the design and construction of a forest road network. Aldilax and Pfoertsch [13] applied a combination of AHP and SWOT to develop a strategy for a fashion brand in Bandung, Indonesia. Yilmaz and Yilmaz [14] integrated AHP and SWOT methods for proposing an export model, a study in the naval shipbuilding industry. Alam and Waluyo [15] used AHP-SWOT as a solution to increase sales volume through analyzing marketing strategy options. Yi et al. [16] used the AHP-SWOT model to propose a new development strategy for amateur table tennis matches in Shanghai, China. Liu [17] used AHP-SWOT as a way to propose an economic development strategy in a new context for Northeast China. This study uses a combination of SWOT analysis and AHP methods. SWOT analysis is performed to develop SO, ST, WO, and WT strategies. Then, the AHP is applied to prioritize the business strategies of a packaging manufacturing company in Vietnam. The above research results are the basis for the company's leaders to make decisions on the company's business strategy in the coming time.

2. THEORETICAL LITERATURE

2.1 Analytical Hierarchy Process

AHP is a measurement theory applied in the decision-making process, which supports decision-making by analyzing a complex problem into a hierarchical structure containing multiple levels of objectives, primary criteria, secondary criteria, and alternative options [18]. In this method, the importance of each criterion is assigned a numerical value that represents the relative importance of this criterion compared to other criteria [19]. AHP aims to quantify the relative priorities of alternative options, which is based on the judgment of the decision maker as well as the consistency of comparing options in the decision-making process [20]. AHP allows us to determine the weights of criteria at different hierarchical levels [21]. The strength of this method is that it arranges tangible and intangible factors in a systematic way and provides a simple but effective solution to choose the optimal option [22].

2.2 SWOT analysis

SWOT analysis is a technique for analyzing strengths, weaknesses, opportunities, and threats. It has become a basic tool for businesses to evaluate their position in the market and is widely used to analyze the internal and external environments of businesses [23, 24]. The four components of SWOT include strengths, referring to the internal factors of a business that help achieve its goals, while weaknesses are internal factors that hinder the success of the business, opportunities are external aspects that help the organization achieve its goals, and threats are aspects of the external environment of the business that are barriers to achieving the goals of the business [25]. SWOT recognizes the internal and external aspects that are important to achieving the goals of the business. Internal aspects refer to the features that are within the control of the business, while external aspects are factors that are beyond the control of the business [26, 27]. Dyson [28] argues that SWOT is a tool for businesses to assess their position in market analysis; it is a flexible model, so it can be combined with other methods and techniques. According to Benzaghta et al. [29], the SWOT matrix can be summarized as follows: SO strategy: Take advantage of opportunities; ST strategy: Avoid threats; WO strategy: Create new opportunities by reducing weaknesses; WT strategy: Avoid threats by minimizing weaknesses.

3. RESEARCH METHOD

3.1 Qualitative research

3.1.1 Form a team of experts

Expert group of 20 members, of which, 10 experts outside the company are directors with many years of experience working in the packaging industry, and the remaining 10 experts are members of the company, including the director, members of the company's board of members, members of the business department, and members of the production workshop.

3.1.2 Group discussion with experts, giving SO, ST, WO, and WT strategies and hierarchical model

In qualitative research, the author uses the tool of focus group discussion. Focus group discussion is a tool for collecting data from a group of individuals who are deliberately selected rather than from a statistically representative sample of a larger population [30]. Focus group discussion has emerged as a qualitative data collection method and a bridge to scientific research [31]. Focus group discussion is sometimes considered synonymous with interviews, especially semi-structured interviews [32]. (1) Characteristics: The authors will discuss with 2 groups of experts; the first group consists of 10 experts who are directors of packaging manufacturing companies, to learn about the opportunities and threats of the packaging manufacturing and trading industry. The second group consists of 10 internal experts from the company to learn about the company's strengths and weaknesses in packaging manufacturing and trading activities. (2) Purpose of focus group discussion: Identify the company's strengths and weaknesses, as well as opportunities and risks of the packaging printing industry, thereby providing a hierarchical model of prioritizing business strategies. (3) Group discussion results: The results of the SWOT analysis

are presented in Table 1, the list of strategies is presented in Table 2, and the hierarchical model is presented in Figure 1.

In Figure 1, the hierarchical model shows the goal of prioritizing business strategies. In the first-level criteria group, the study considers 4 criteria: strengths, weaknesses, opportunities, and threats. The second-level criteria group

includes sub-criteria of the first-level criteria, including 13 sub-criteria. Finally, the third-level criteria group shows 4 strategies; in each strategy, the study considers the suitability of 13 sub-criteria in each specific strategy to choose the most suitable sub-criteria, which can be called the most optimal alternative according to the comparative scoring of experts.

Table 1. SWOT analysis of a packaging manufacturing company in Vietnam

Strengths (S)	Weaknesses (W)
(S1) A diverse fleet of trucks, including vehicles with a load capacity from 1.5 tons to 10 tons, ensuring the transportation of large quantities of goods and long-distance transportation.	(W1) Ineffective production plan.
(S2) A team of drivers with many years of experience adhering to work discipline and ensuring that goods are always delivered on time.	(W2) There is loss and waste of fuel and materials.
(S3) Abundant capital.	(W3) The sales team is not strong yet.
Opportunities (O)	Threats (T)
(O1) The cashew industry still has a lot of room for export growth, so the demand for packaging for businesses in this industry is still quite large.	(T1) Price competition among businesses in the packaging printing industry.
(O2) Many industrial parks and industrial cluster projects in the Mekong Delta region have been newly formed or expanded, so the demand for packaging has also increased.	(T2) Customers have increasingly high demands on packaging design and quality.
(O3) Agricultural cooperatives producing fruit trees in the Mekong Delta operate stably and always have a need for packaging.	(T3) Printing paper prices on the market increase.
(O4) The human resources in the labor market specializing in sales are abundant and of high quality.	

Table 2. List of the company's business strategies

SO Strategy	Marketing strategy to find new customers.
ST Strategy	Strategy to replace modern machinery and equipment.
WO Strategy	Sales team renewal strategy.
WT Strategy	Complete production planning strategy, focusing on lean manufacturing.

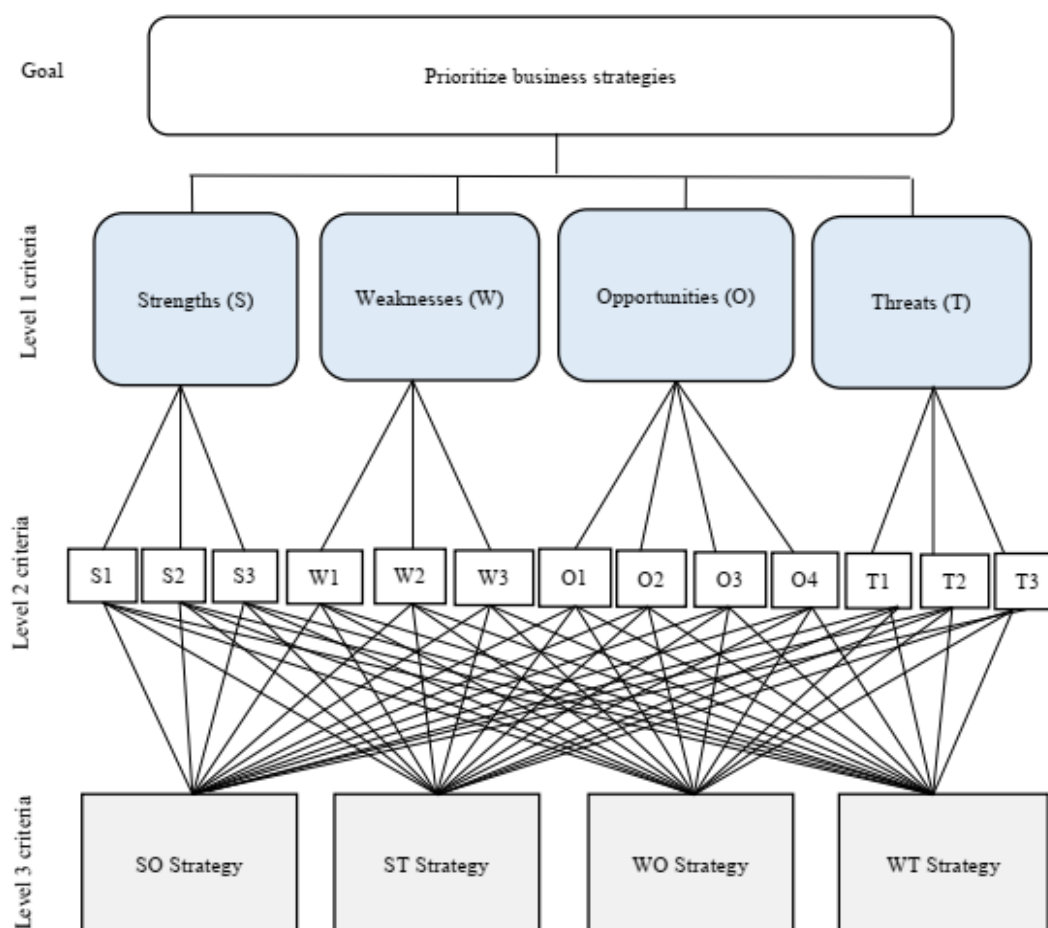


Figure 1. The hierarchical model prioritizes business strategies of a packaging manufacturing company in Vietnam

First, experts must prioritize the criteria based on their feelings and then compare the importance of each pair of criteria. For example, compare the pair of strengths (placed on the left) and weaknesses (placed on the right). If you think the strengths criterion is more important than the weaknesses criterion, assign a weight from (9-1) to the left of number 1. Conversely, if the Weaknesses criterion is more important than the Strengths criterion, assign a weight from (1-9) to the right of number 1. The purpose of collecting scores is to compare the relative importance of each pair of level 1, level 2, and level 3 criteria and then find the priority vector and weight of these criteria using the AHP method.

3.1.3 Build a criteria comparison matrix

After collecting data from interviews with experts to compare each pair of criteria, the author proceeds to process the data to build comparison matrices of the criteria. The principle of data processing is as follows: Take the majority of experts' opinions in determining the more important criteria, thereby determining whether the weighting will be done to the left or right of number 1. At the same time, take the majority of opinions, assigning the same weight when comparing pairs of criteria. The weights of the criteria are taken from Table 3. The construction of comparison matrices follows the following principle: If the value being evaluated-weighted is to the left of number 1, then record that value exactly in the matrix; if the value being evaluated-weighted is to the right of number 1, then record the number equal to the inverse of that evaluation value in the matrix.

Table 3. Pairwise comparison scale with AHP

Definition	Level	Explanation
Equal importance	1	Criteria i and j are equally important
Moderate importance	3	Criterion i is less important than Criterion j
Important	5	Criterion i is more important than Criterion j
Very important	7	Criterion i is much more important than Criterion j, as clearly shown in specific cases
Extremely important	9	Criterion i is definitely more important than Criterion j
Intermediate value	2; 4; 6; 8	

Source: [33]

3.1.4 Calculate and check consistency

Next, the author will proceed to calculate the weight of each criterion. The calculation tool used by the author is Excel software, including 3 steps as follows:

Step 1: Calculate the weight of the criteria at levels 1, 2, and 3 using the AHP method. Each matrix undergoes a calculation to find the vectors by adding the sum of its values by column, dividing each value by the sum of its corresponding column, and then replacing the calculated value with the obtained value. The weight of each criterion (C1, C2, C3,..., Cn) will be equal to the average of the values in each horizontal row. The result is a matrix of 1 column and n rows. The calculated value is only accepted when the consistency ratio $CR \leq 10\%$ (0.1); if the consistency coefficient is greater than 10%, the expert's comparison results must be checked again [33]. With CI, CR is calculated by the following formula:

$$CR \text{ consistency ratio: } CR=CI/RI$$

where, RI is the random consistency index (Table 4); CI is the consistency index $CI=(\lambda \max -n)/n-1$, $\lambda \max$ is the eigenvalue of the matrix, $\lambda \max = \sum_{i=1}^n w_i \times \sum_{j=1}^n a_{ij}$.

Step 2: Calculate the internal weight of group S, internal weight of group W, internal weight of group O, and internal weight of group T for each strategic option.

Step 3: Calculate the overall weight of the strategic options.

For example, the calculation of the weight of the level 1 criterion is done as follows:

First, calculate the vertical sum of the pairwise comparison matrix, shown in Table 5.

Table 4. Random consistency index

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

Source: [20]

Table 5. Pairwise comparison matrix

	S	W	O	T
S	1	3	4	2
W	1/3	1	2	1/2
O	1/4	1/2	1	1/3
T	1/2	2	3	1
Σ	2.08	6.50	10.00	3.83

Next, perform pairwise comparison matrix normalization, shown in Table 6.

Table 6. Normalization matrix

	S	W	O	T
S	0.4808	0.4615	0.4000	0.5222
W	0.1587	0.1538	0.2000	0.1305
O	0.1202	0.0769	0.1000	0.0862
T	0.2404	0.3077	0.3000	0.2611

Finally, calculate the horizontal average to find the priority vector, shown in Table 7.

Table 7. Priority vector

	Priority Vector
S	$(0.4808 + 0.4615 + 0.4000 + 0.5222)/4=0.4661$
W	$(0.1587 + 0.1538 + 0.2000 + 0.1305)/4=0.1608$
O	$(0.1202 + 0.0769 + 0.1000 + 0.0862)/4=0.0958$
T	$(0.2404 + 0.3077 + 0.3000 + 0.2611)/4=0.2773$

$\lambda \max$ is calculated by taking the sum of the columns of the pairwise mapping matrix and multiplying it by the corresponding values of the priority vector: $\lambda \max = (0.4661 \times 2.08 + 0.1608 \times 6.50 + 0.0958 \times 10.00 + 0.2773 \times 3.83) = 4.034721$. The CI and CR values are calculated using the formula given in Step 1. The calculation of the weights of the remaining criteria is done similarly.

4. RESULTS AND DISCUSSION

4.1 Expert characteristics

Typically, qualitative studies conduct interviews with 5 to 50 participants; many qualitative studies conduct interviews with 20 people, and journals do not want to rigidly quantify sample sizes in qualitative studies [34]. In this study, the

author used a purposive sampling method with 20 experts. To obtain realistic assessments of the company's strengths and weaknesses, along with the opportunities and challenges of the packaging printing industry, relevant experts with 5 years or more of working experience (director, member of the company's Board of Members, head of the sales department, member of the sales department, factory manager) of the company were selected as participants. All participants have high educational qualifications and knowledge related to the research field. The most important thing is that the experts participating in this research all have a lot of experience and knowledge in the field of packaging printing production. Working at the company for many years, they clearly understand the strengths and weaknesses of the company as well as the opportunities and risks of the packaging printing production industry. This shows that their assessment accurately reflects the actual operating situation of the company.

4.2 Priority vector results for level 1 criteria

Priority vectors of level 1 criteria are shown in Table 8.

Table 8. Priority vectors of level 1 criteria

	S	W	O	T	Priority Vector
S	1	3	4	2	0.4661
W	1/3	1	2	1/2	0.1608
O	1/4	1/2	1	1/3	0.0958
T	1/2	2	3	1	0.2773

$n=4$; $\lambda_{\max}=4.034721$; $CI=\frac{\lambda_{\max}-n}{n-1}=\frac{4.034721-4}{4-1}=0.011574$;
 $CR=\frac{CI}{RI}=\frac{0.011574}{0.9}=0.01286$. With value $CR=0.01286 < 0.1$, there is consistency in decision-making.

4.3 Priority vector results for level 2 criteria

The results of the priority vectors of level 2 criteria are shown in Tables 9 to 12.

Table 9. Priority vector of level 2 criteria group S

	S1	S2	S3	Priority Vector
S1	1	2	1/2	0.2857
S2	1/2	1	1/4	0.1429
S3	2	4	1	0.5714

$n=3$; $\lambda_{\max}=3$; $CI=\frac{\lambda_{\max}-n}{n-1}=\frac{3-3}{3-1}=0$; $CR=\frac{CI}{RI}=\frac{0}{0.58}=0$

With CR value $=0 < 0.10$, there is consistency in decision-making. The priority vector results of group S (Strengths) show that the level 2 criteria in group S are prioritized in the following order: (S3) Abundant capital; (S1) A diverse truck fleet, including trucks with a load capacity from 1.5 tons to 10 tons, ensuring the transportation of large quantities of goods and long-distance transportation; (S2) A team of experienced drivers, adhering to work discipline and ensuring that goods transportation is always on time when delivered.

Table 10. Priority vector of level 2 criteria of group W

	W1	W2	W3	Priority Vector
W1	1	1/2	3	0.3093
W2	2	1	5	0.5815
W3	1/3	1/5	1	0.1093

$n=3$; $\lambda_{\max}=3.001864$; $CI=\frac{\lambda_{\max}-n}{n-1}=\frac{3.001864-3}{3-1}=0.000932$;
 $CR=\frac{CI}{RI}=\frac{0.000932}{0.58}=0.001607$. With the value of $CR=0.001607 < 0.10$, there is consistency in decision-making. The priority vector results of group W (weaknesses) show that the level 2 criteria in group S are prioritized in the following order: (W2) There is loss and waste of fuel and materials; (W1) Ineffective production plan; (W3) The sales team is not strong yet.

Table 11. Priority vector of level 2 criteria group O

	O1	O2	O3	O4	Priority Vector
O1	1	3	5	7	0.5797
O2	1/3	1	2	4	0.2323
O3	1/5	1/2	1	2	0.1214
O4	1/7	1/4	1/2	1	0.0667

$n=4$; $\lambda_{\max}=4.036628$; $CI=\frac{\lambda_{\max}-n}{n-1}=\frac{4.036628-4}{4-1}=0.012209$;
 $CR=\frac{CI}{RI}=\frac{0.012209}{0.9}=0.013566$. With the value of $CR=0.013566 < 0.1$, there is consistency in decision-making. The priority vector results of group O (opportunity) show that the level 2 criteria in group S are prioritized in the following order: (O1) The cashew industry still has a lot of room for export growth, so the demand for packaging for businesses in this industry is still quite large; (O2) Many industrial park and industrial cluster projects in the Mekong Delta region are newly formed or expanded, so the demand for packaging also increases; (O3) Agricultural cooperatives producing fruit trees in the Mekong Delta operate stably, always having a demand for packaging; (O4) The human resources in the labor market specializing in sales are abundant and high quality.

Table 12. Priority vector of level 2 criteria of group T

	T1	T2	T3	Priority Vector
T1	1	3	2	0.5393
T2	1/3	1	1/2	0.1633
T3	1/2	2	1	0.2974

$n=3$; $\lambda_{\max}=3.007592$; $CI=\frac{\lambda_{\max}-n}{n-1}=\frac{3.007592-3}{3-1}=0.003796$;
 $CR=\frac{CI}{RI}=\frac{0.003796}{0.58}=0.006545$. With the value of $CR=0.006545 < 0.10$, there is consistency in decision-making. The results of the priority vector of group T (risk) show that the level 2 criteria in group S are prioritized in the following order: (T1) Price competition between enterprises in the packaging printing industry; (T3) Increasing prices of printing paper on the market; (T2) Customers increasingly demand higher design and quality of packaging.

4.4 Priority vector results for level 3 criteria

The results of the priority vectors of level 3 criteria are shown in Tables 13 to 25.

Table 13. Priority vectors of S1 criteria for strategic options

	S1	SO	ST	WO	WT	Priority Vector
SO	1	3	1	4		0.3946
ST	1/3	1	1/2	3		0.1838
WO	1	2	1	3		0.3324
WT	1/4	1/3	1/3	1		0.0891

$n=4$; $\lambda_{\max}=4.102972$; $CI=\frac{\lambda_{\max}-n}{n-1}=\frac{4.102972-4}{4-1}=0.034324$;

$CR = \frac{CI}{RI} = \frac{0.034324}{0.9} = 0.038138$. With CR value=0.038138 < 0.1, there is consistency in decision-making.

Table 14. Priority vectors of S2 criteria for strategic options

S2	SO	ST	WO	WT	Priority Vector
SO	1	3	4	2	0.4661
ST	1/3	1	2	1/2	0.1608
WO	1/4	1/2	1	1/3	0.0958
WT	1/2	2	3	1	0.2773

$n=4$; $\lambda_{\max}=4.034721$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.034721-4}{4-1} = 0.011574$;
 $CR = \frac{CI}{RI} = \frac{0.011574}{0.9} = 0.01286$. With CR value=0.01286 < 0.1, so there is consistency in decision-making.

Table 15. Priority vector of S3 criteria for strategic options

S3	SO	ST	WO	WT	Priority Vector
SO	1	1/5	1/4	2	0.1011
ST	5	1	3	7	0.5540
WO	4	1/3	1	5	0.2842
WT	1/2	1/7	1/5	1	0.0608

$n=4$; $\lambda_{\max}=4.162907$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.162907-4}{4-1} = 0.054302$;
 $CR = \frac{CI}{RI} = \frac{0.054302}{0.9} = 0.060336$. With CR value=0.060336 < 0.1, there is consistency in decision-making.

Table 16. Criterion priority vector W1 for strategic options

W1	SO	ST	WO	WT	Priority Vector
SO	1	1/4	1/2	1/7	0.0642
ST	4	1	3	1/4	0.2345
WO	2	1/3	1	1/5	0.1083
WT	7	4	5	1	0.5930

$n=4$; $\lambda_{\max}=4.179026$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.179026-4}{4-1} = 0.059675$;
 $CR = \frac{CI}{RI} = \frac{0.059675}{0.9} = 0.066306$. With CR value=0.066306 < 0.1, there is consistency in decision-making.

Table 17. Priority vector of W2 criteria for strategic options

W2	SO	ST	WO	WT	Priority Vector
SO	1	1/3	2	1/7	0.0948
ST	3	1	5	1/4	0.2398
WO	1/2	1/5	1	1/6	0.0650
WT	7	4	6	1	0.6004

$n=4$; $\lambda_{\max}=4.263046$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.263046-4}{4-1} = 0.087682$;
 $CR = \frac{CI}{RI} = \frac{0.087682}{0.9} = 0.097425$. With CR value=0.097425 < 0.1, so there is consistency in decision-making.

Table 18. Priority vector of W3 criteria for strategic options

W3	SO	ST	WO	WT	Priority Vector
SO	1	2	1/2	3	0.2679
ST	1/2	1	1/3	4	0.1956
WO	2	3	1	4	0.4541
WT	1/3	1/4	1/4	1	0.0824

$n=4$; $\lambda_{\max}=4.182191$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.182191-4}{4-1} = 0.06073$;
 $CR = \frac{CI}{RI} = \frac{0.06073}{0.9} = 0.067478$. With CR value=0.067478 < 0.1,

there is consistency in decision-making.

Table 19. Priority vector of O1 criteria for strategic options

O1	SO	ST	WO	WT	Priority Vector
SO	1	3	2	5	0.4760
ST	1/3	1	1/2	2	0.1541
WO	1/2	2	1	4	0.2885
WT	1/5	1/2	1/4	1	0.0814

$n=4$; $\lambda_{\max}=4.026227$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.026227-4}{4-1} = 0.008742$;
 $CR = \frac{CI}{RI} = \frac{0.008742}{0.9} = 0.009714$. With CR value=0.009714 < 0.1, there is consistency in decision-making.

Table 20. Priority vector of O2 criteria for strategic options

O2	SO	ST	WO	WT	Priority Vector
SO	1	4	2	5	0.4897
ST	1/4	1	1/3	2	0.1262
WO	1/2	3	1	4	0.3055
WT	1/5	1/2	1/4	1	0.0786

$n=4$; $\lambda_{\max}=4.064729$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.064729-4}{4-1} = 0.021576$;
 $CR = \frac{CI}{RI} = \frac{0.021576}{0.9} = 0.023974$. With CR value=0.023974 < 0.1, there is consistency in decision-making.

Table 21. Prioritization vector of O3 criteria for strategic options

O3	SO	ST	WO	WT	Priority Vector
SO	1	4	3	5	0.5260
ST	1/4	1	1/3	2	0.1242
WO	1/3	3	1	4	0.2725
WT	1/5	12	1/4	1	0.0773

$n=4$; $\lambda_{\max}=4.167411$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.167411-4}{4-1} = 0.055804$;
 $CR = \frac{CI}{RI} = \frac{0.055804}{0.9} = 0.062004$. With CR value=0.062004 < 0.1, there is consistency in decision-making.

Table 22. Priority vector of O4 criteria for strategic options

O4	SO	ST	WO	WT	Priority Vector
SO	1	2	1/2	3	0.2637
ST	1/2	1	1/3	5	0.2088
WO	2	3	1	4	0.4486
WT	1/3	1/5	1/4	1	0.0789

$n=4$; $\lambda_{\max}=4.263061$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.263061-4}{4-1} = 0.087687$;
 $CR = \frac{CI}{RI} = \frac{0.087687}{0.9} = 0.09743$. With CR value=0.09743 < 0.1, there is consistency in decision-making.

Table 23. Priority vector of criteria T1 for strategic options

T1	SO	ST	WO	WT	Priority Vector
SO	1	1/9	1/2	1/5	0.0527
ST	9	1	6	4	0.6097
WO	2	1/6	1	1/4	0.0904
WT	5	1/4	4	1	0.2472

$n=4$; $\lambda_{\max}=4.21594$; $CI = \frac{\lambda_{\max}-n}{n-1} = \frac{4.21594-4}{4-1} = 0.07198$;

$CR = \frac{CI}{RI} = \frac{0.07198}{0.9} = 0.079978$. With CR value=0.079978 < 0.1, there is consistency in decision-making.

Table 24. Priority vector of T2 criteria for strategic options

T2	SO	ST	WO	WT	Priority Vector
SO	1	1/9	1/3	1/5	0.0499
ST	9	1	5	3	0.5670
WO	3	1/5	1	1/4	0.1104
WT	5	1/3	4	1	0.2727

$n=4$; $\lambda_{max}=4.181797$; $CI = \frac{\lambda_{max}-n}{n-1} = \frac{4.181797-4}{4-1} = 0.060599$;
 $CR = \frac{CI}{RI} = \frac{0.060599}{0.9} = 0.067332$. With CR value=0.067332 < 0.1, there is consistency in decision-making.

Table 25. Prioritization vector of T3 criteria for strategic options

T3	SO	ST	WO	WT	Priority Vector
SO	1	1/9	1/3	1/5	0.0495
ST	9	1	6	3	0.5812
WO	3	1/6	1	1/4	0.1042
WT	5	1/3	4	1	0.2651

$n=4$; $\lambda_{max}=4.186633$; $CI = \frac{\lambda_{max}-n}{n-1} = \frac{4.186633-4}{4-1} = 0.062211$;
 $CR = \frac{CI}{RI} = \frac{0.062211}{0.9} = 0.069123$. With CR value=0.069123 < 0.1, there is consistency in decision-making.

4.5 Overall weight results and priority ranking of strategic options

Looking at the overall weight results and priority ranking of the strategic options in Table 26 and the visual chart showing the overall weight values in Figure 2, it can be seen that the priority ranking results of the strategic options are as follows:

Rank-1: ST Strategy: Strategy to replace modern machinery and equipment.

Rank-2: WT Strategy: Strategy to complete the production plan, focusing on lean production.

Rank-3: WO Strategy: Strategy to renew the sales team.

Rank-4: SO Strategy: Marketing strategy to find new customers.

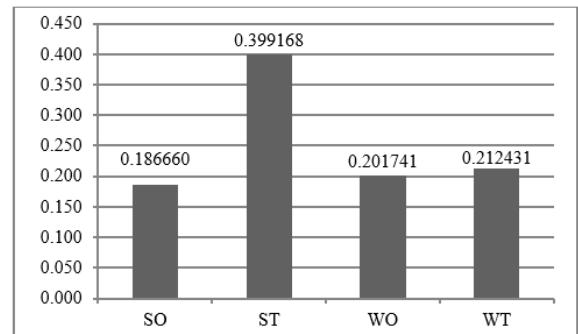


Figure 2. Overall weight of strategic options

Table 26. Overall weight results and priority ranking of strategic options

Criteria	Weight	SO	ST	WO	WT
Strengths	0.4661				
Criteria S1	0.2857	0.3946	0.1838	0.3324	0.0891
Criteria S2	0.1429	0.4661	0.1608	0.0958	0.2773
Criteria S3	0.5714	0.1011	0.5540	0.2842	0.0608
Local weight -S group for strategies		0.23712	0.392032	0.271035	0.099804
Weaknesses	0.1608				
Criteria W1	0.3093	0.0642	0.2345	0.1083	0.5930
Criteria W2	0.5815	0.0948	0.2398	0.0650	0.6004
Criteria W3	0.1093	0.2679	0.1956	0.4541	0.0824
Local weight -W group for strategies		0.104264	0.233316	0.120906	0.54151
Opportunities	0.0958				
Criteria O1	0.5797	0.4760	0.1541	0.2885	0.0814
Criteria O2	0.2323	0.4897	0.1262	0.3055	0.0786
Criteria O3	0.1214	0.5260	0.1242	0.2725	0.0773
Criteria O4	0.0667	0.2637	0.2088	0.4486	0.0789
Local weight -O group for strategies		0.471116	0.147631	0.301185	0.08006
Threats	0.2773				
Criteria T1	0.5393	0.0527	0.6097	0.0904	0.2472
Criteria T2	0.1633	0.0499	0.5670	0.1104	0.2727
Criteria T3	0.2974	0.0495	0.5812	0.1042	0.2651
Local weight -T group for strategies		0.051297	0.594237	0.097761	0.25670
Overall weight of strategic options		0.18666	0.399168	0.201741	0.212431
Priority ranking of strategic options		4	1	3	2

ST Strategy: Modern equipment replacement strategy: With the strength of abundant capital, at the same time with the challenge of increasing competition between enterprises in the packaging printing industry, especially in terms of packaging product prices. Replacing modern equipment will help the company reduce labor, production time, and production costs, thereby adjusting packaging prices to compete with competitors in the same industry.

WT Strategy: Strategy to complete production plan, focus on lean production: With the current situation of ineffective

production plans of enterprises, there is a situation of loss and waste of fuel and materials. Completing the production plan, focusing on lean production, and eliminating waste is extremely necessary, helping the company reduce production costs. Flexible and effective production plans also help the enterprise be ready to meet new orders in the future.

WO Strategy: Sales team renewal strategy: With the current situation that the company's sales team is not strong, at the same time the labor market specializing in sales is still very abundant. Replacing the sales team helps the company

approach new orders, compete with competitors in the same industry, and improve business performance.

SO Strategy: Marketing strategy to find new customers: With the opportunity of still having many new customers in the Mekong Delta region, as well as the provinces in the Southeast region. A marketing strategy to find new customers will help the company gain more orders. At the same time, with the strength of a diverse fleet of trucks, transporting large quantities of goods, and long-distance transportation by experienced drivers, the company can fully meet the needs of customers with large quantities of goods and over long distances.

5. CONCLUSIONS

This study uses a combination of SWOT analysis and the AHP method to prioritize the business strategy of a packaging manufacturing company in Vietnam. Through group discussions with experts, the study identified the strengths and weaknesses of the company, along with the opportunities and challenges of the packaging printing industry. SWOT analysis was conducted, from which the study proposed the SO, ST, WO, and WT strategies. Then, the AHP method was used to prioritize the strategies. The first priority result is the ST strategy—the strategy of replacing modern machinery and equipment to reduce production costs and labor costs, with an overall weighted result of 0.399168. The second priority is the WT strategy—the strategy of completing the production plan, focusing on lean production, and eliminating waste—with an overall weighted result of 0.212431. The 3rd priority is the WO strategy—sales team renewal strategy—with an overall weighted result of 0.20174. And finally, in the 4th position is the SO strategy—marketing strategy to find new customers—with an overall weighted result of 0.18666. The above research results are the basis for the company's leaders to make decisions on the company's business strategy in the coming time.

Future studies can expand the scope of research from a business to a broader industry or field such as agriculture, electricity. The assessment perspective of experts is personal, so this is a limitation of this study.

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