

Strategic analysis using SWOT-AHP: A case study for a Pharmaceutical Industry in Malaysia

By

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ABSTRACT

This study uses SWOT and AHP analysis to assess the strategic landscape of the pharmaceutical industry. It identifies key internal and external factors impacting pharmaceutical companies and develops a strategic approach for improved performance. The analysis highlights strengths such as robust research and development capabilities but also challenges like patent expirations and high drug development costs. Opportunities include personalized medicine and emerging markets, while stringent regulations and generic competition pose significant threats. The findings provide valuable insights for pharmaceutical company executives to develop strategic plans focused on cost efficiency, product innovation, and adaptation to emerging trends in the global market.

Keywords: Pharmaceutical Industry, SWOT Analysis, AHP, Strategic Management, Pharmaceutical Companies.

INTRODUCTION

In the ever-competitive world of pharmaceuticals, success hinges on strategic planning that capitalizes on a company's internal strengths and anticipates external threats (Giacobbe et al., 2020). SWOT analysis, a cornerstone strategic tool, identifies a company's internal capabilities (strengths and weaknesses) and external environment (opportunities and threats) (Hill et al., 2021). However, effectively allocating resources requires prioritizing these factors based on their strategic importance. This study addresses this need by integrating SWOT analysis with the Analytic Hierarchy Process (AHP). AHP, developed by Saaty (1980) provides a structured and quantitative method for weighting factors in complex decision-making scenarios. By combining SWOT and

AHP, this research aims to identify and prioritize key factors impacting performance within the pharmaceutical industry, ultimately leading to informed strategic decision-making.

SWOT AND AHP MODEL

SWOT Analysis

A SWOT analysis helps us look at what's going on inside and outside a company at the same time. It gives us a way to make decisions in a organized way (Kurttila et al., 2000; Kangas et al., 2003; Yuksel et al., 2007). This method puts factors into four groups called SWOT: strengths, weaknesses, opportunities, and threats. Using SWOT analysis to make decisions is to find a strategy that matches the strengths and weaknesses of a company with the opportunities and threats in the market (Kangas et al., 2001). Also, the plan we choose must match the goals of the people making the decision now and in the future (Kajanusa et al., 2004). SWOT analysis means thinking carefully and evaluating all the important things about new products, technologies, management, or planning. Figure 1 shows how SWOT analysis fits with an environmental scan (Kahraman et al., 2008).

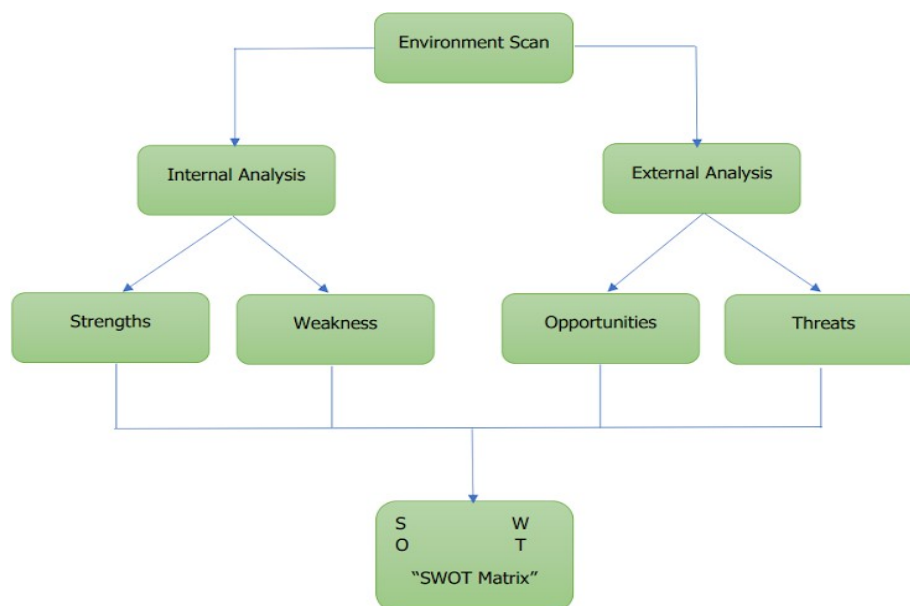


Figure 1: SWOT analysis framework

SWOT Analytic Framework

The Analytic Hierarchy Process (AHP) (Sharmaa et al., 2008) is a way to make decisions when you have many things to consider. It works by dividing a difficult problem into three levels: what you want to achieve, what's important, and what choices you have. AHP compares factors to decide which ones are most important at each level, so you can pick the best option. This method is very helpful when dealing with personal opinions and when the decision factors can be organized in a hierarchy with smaller factors (Tuzmen and Sipahi, 2011).

AHP uses numbers to show how important different criteria are when comparing them in pairs (Saaty and Vargas, 1996). The information is put into tables to figure out how important each factor is (Sharma et al., 2008).

Table 1: Comparing things two at a time. (Yuksel et al., 2007, Saaty, 1996)

Importance	Explanation
1	Two factors are equally important in achieving the goal.
3	Experience and thinking a little bit prefer one over another.
5	Experience and insight strongly suggest that one is better than the other.
7	Criterion is really liked and it's shown to be the best in real life.
9	The importance of one thing over another is very clear and obvious.
2,4,6,8	Used to show a middle ground between the important things listed before.

The Analytic Hierarchy Process (AHP) is based on three main ideas: organizing the decision model, comparing criteria and options, and determining priorities. AHP has been widely used in research to solve many decision-making problems (Lee and Walsh, 2011; Kurttila et al., 2000; Kangas et al., 2001; Kajanusa et al., 2001; Pesonen et al., 2001; Arslan and Tuaran, 2009; Gallego-Ayala and Juizo, 2011; Dincer and Gorener, 2011). The first step is to organize the decision problem in a step-by-step format (Dagdeviren et al., 2009). AHP starts by breaking down a complicated decision problem into smaller parts. These parts include different things to consider and different options to choose from. In AHP, the goals, factors, and choices are organized in a hierarchy like a family tree. A hierarchy usually has at least three levels: the main goal at the top, the criteria that define the options in the middle, and the options themselves at the bottom (Albayrak and Erensal, 2004).

In this study, AHP used to decide which SWOT elements are the most important. Once the study figure out what the problem is and who needs to solve it, this study start to decide which things are most important. At each level, the criteria are compared in pairs based on how much they affect things and how they relate to the criteria in the level above. In AHP, this study compare things using a scale that goes from 1 to 9 (Albayrak and Erensal, 2004).

Think about a group of rules $C = \{C_j \mid j = 1, 2, \dots, n\}$ Comparing n things in pairs, this study can put the results into a table with n rows and n columns. Each number in the table shows how important one thing is compared to another. This comparison is shown by a square and reciprocal matrix in Equation (1).

$$A = (a_{ij})_{n \times n} = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix}$$

In the last step, each group of numbers is made fair to see which ones are more important. These weights come from the right eigenvector, which is represented as $\hat{\lambda}_{\max}$.

$$A_w = \lambda_{\max} \cdot W$$

If the pairwise comparisons all match up, the matrix A will have the highest eigenvalue ($\lambda_{\max}$) equal to the size of the matrix, which is n . In this situation, we can find the weights by making the numbers in each row or column of matrix A (Albayrak and Erensal, 2004; Borajee and Yakchali, 2011; Wang and Yang, 2007) all add up to 1. The accuracy of the results from the Analytic Hierarchy Process (AHP) depends on how consistent the comparisons are. Consistency is about how the numbers in matrix A are connected: when you multiply certain numbers, the result is another specific number. The Consistency Index (CI) can be calculated using the formula given in reference (Saaty, 1980):

$$CI = \frac{\lambda_{\max} - n}{n - 1}$$

The final consistency ratio (CR) shows us if the evaluations are consistent enough. The CR is calculated by dividing the Consistency Index (CI) by the Random Index (RI), as shown in Equation 4 (Borajee and Yakchali, 2011).

$$CR = CI / RI$$

The highest number for the Consistency Ratio (CR) is 0.1. If the final CR is too high, the evaluation process needs to be done again to make sure it's consistent (Borajee and Yakchali, 2011).

Table 2: Random Index (Saaty, 1996; Saaty and Vargas, 1991)

n	1	2	3	4	5	6	7	8	9	10
RI	0,00	0,00	0,58	0,90	1,12	1,24	1,32	1,41	1,45	1,49

SWOT-AHP Model

The Analytic Hierarchy Process (AHP) is a method where factors are compared in pairs to figure out which is most important using math. The regular SWOT analysis doesn't have a way to measure how much each factor affects the strategic choices (Yuksel and

Dagdeviren, 2007). It doesn't give a clear way to compare the importance of different factors or to analyze different choices based on those factors. To fix this problem, the SWOT framework is changed into a step-by-step model and combined with AHP, using its eigenvalue-based method for analysis (Kangas et al., 2001; Kajanusa et al., 2001)

The goal of applying AHP within the SWOT context is to methodically assess and compare the magnitudes of SWOT factors (Wickramasinghe and Takano, 2010). The suggested approach is executed in three phases (Gallego- Ayala and Juizo, 2011):

-SWOT Identification: We begin by identifying and listing key internal (strengths & weaknesses) and external (opportunities & threats) factors impacting your strategic plan (i.e., SWOT analysis).

-Category Weighting: Next, pairwise comparisons determine the relative importance of each SWOT category (Strengths, Weaknesses, etc.). This assigns weights to each category.

-Factor Weighting: Finally, AHP helps us determine the importance of individual factors within each category. Overall factor weight considers both its category weight and its importance within that category, resulting in a final ranking for strategic planning.

Building on the work of Kurttila et al., (2000) who developed a combined SWOT- AHP method to make strategic factors more comparable and strengthen the quantitative foundation of strategic planning (Gao and Peng, 2011), this approach has been widely applied and studied in various disciplines (Lee and Walsh, 2011; Kangas et al, 2003; Wickramasinghe and Takano, 2010; etc). Examples of its use include informing outsourcing decisions in sports marketing (Lee and Walsh, 2011), assessing management strategies for a forest property (Kangas et al, 2003), and evaluating a tourism revival marketing plan in Sri Lanka (Wickramasinghe and Takano, 2010). The integrated SWOT-AHP method has also been used in diverse fields such as natural resource management (Pesonen et al., 2001), examining the global competitiveness of machine tool manufacturers (Shinno, 2006), developing a safe transport strategy for bulk liquid chemicals (Arslan and Er, 2008), defining a business strategy for a textile company [14], outlining a strategy for the Turkish chemical industry (Taskin and Güneri, 2005), investigating marine accidents in the Strait of Istanbul (Arslan, and Tuaran, 2009), guiding shipping registry selection in maritime transportation (Kandakoglu, 2009), and implementing water resource management strategies in Mozambique (Gallego- Ayala and Juizo, 2011).

METHODOLOGY AND APPLICATION

The goal of using the Analytic Hierarchy Process (AHP) in the SWOT analysis is to carefully compare and rank the SWOT factors based on their importance (Kangas et al, 2003). In this study, we used the AHP model, which is made from the SWOT matrix and has three parts: (a) the goal we want to achieve with decision-making, (b) the SWOT categories, and (c) the specific factors within each SWOT category, which are considered sub-criteria. Figure 2 shows the way things are arranged in the SWOT analysis. Rewrite this text in simpler words (Gallego- Ayala and Juizo, 2011).

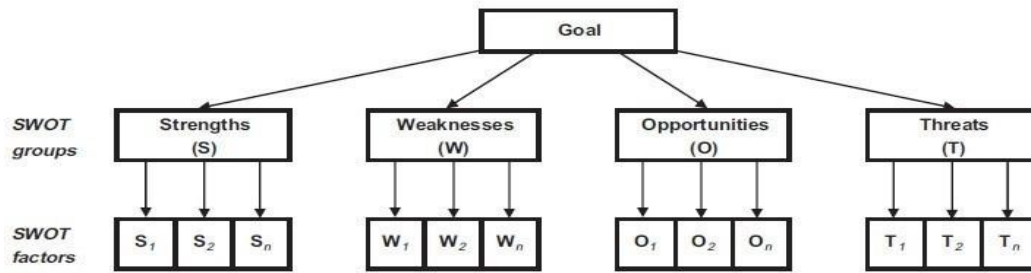


Figure 2: Layered of the SWOT matrix analysis (Gallego- Ayala and Juizo, 2011)

In this case study, we used a better way to look at the company's strengths, weaknesses, opportunities, and threats. We also used a method called the Analytic Hierarchy Process. We looked at a company in Istanbul, Turkey that makes cooker hoods. The company usually sells its products to more than 50 countries around the world. We use a scale from one to nine to compare things and figure out which factors are more important than others. After the SWOT framework is converted into digital form using AHP, the combined matrix helps to figure out which groups and factors are most important.

We created a three-step model to make a strategic management plan. First we set up the plan, then we changed some things, and finally we made a way to evaluate it. (Figure 1).

First, we do a SWOT analysis and make a chart. The important factors from both inside and outside the company are found and included in the SWOT matrix.

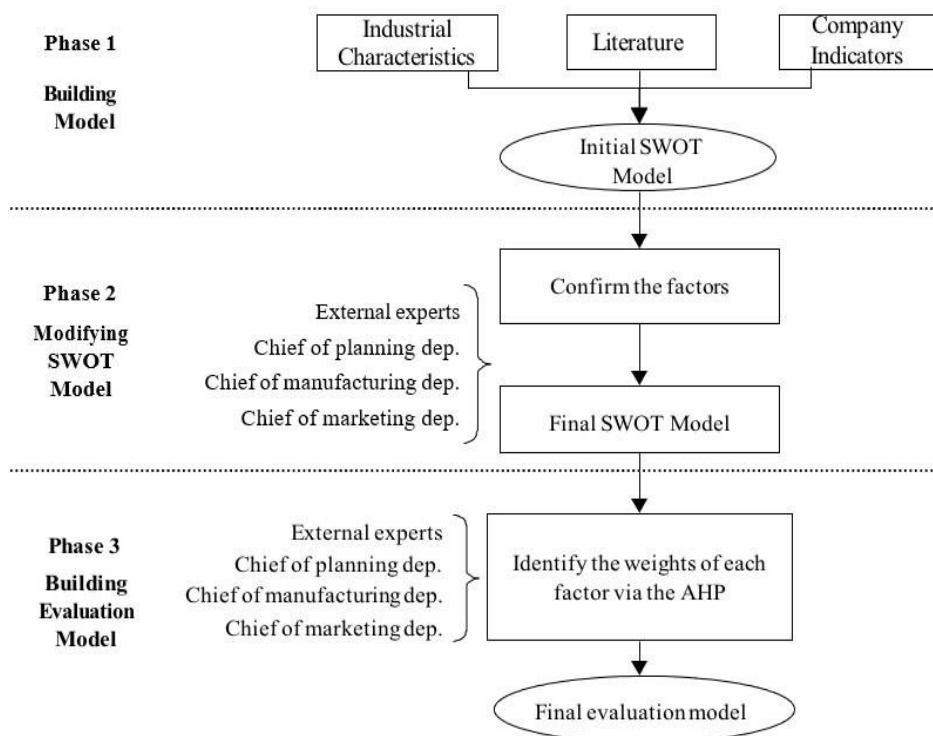


Figure 3: The different phases of proposed method
Table 3: SWOT Matrix

Strengths (S)	Weakness (W)
(S1) Dominant domestic market position (S2) Focus on research and development (S3) Robust logistics and distribution capabilities (S4) Government support and regulatory framework (S5) Skilled workforce	(W1) Reliance on imports (W2) Limited manufacturing capabilities (W3) Regulatory challenges (W4) Shortage of skilled personnel
Opportunities (O)	Threats (T)
(O1) Aging population and rising healthcare demand (O2) Expansion into export markets (O3) Adoption of digital technologies (O4) Collaboration with international partners (O5) Diversification into specialty and niche products	(T1) Intense competition from regional and global players (T2) Pricing pressures and cost containment measures (T3) Regulatory changes and policy uncertainties (T4) Supply chain disruptions (T5) Emergence of new technologies and treatment modalities

The AHP is used for the SWOT matrix. At first, a team of experts, including three managers from the company and the authors of this paper, compares the strengths, weaknesses, opportunities, and threats using a scale from 1 to 9. The findings from these comparisons are shown in Table 4.

Table 4: Pairwise comparisons of SWOT factors

SWOT Groups	S	W	O	T	Importance degrees of SWOT Groups
Strengths (S)	1.00	1.00	1.00	6.00	0.311
Weakness (W)	1.00	1.00	0.50	5.00	0.251
Opportunities (O)	1.00	2.00	1.00	7.00	0.386
Threats (T)	0.17	0.20	0.14	1.00	0.052
CR = 1.5%					

Table 5: Comparison Matrix of Strengths Group

Strengths	S1	S2	S3	S4	S5	Importance Degrees
(S1) Dominant domestic market position	1.00	2.00	1.00	4.00	8.00	0.351
(S2) Focus on research and development	0.50	1.00	1.00	2.00	6.00	0.221
(S3) Robust logistics and distribution capabilities	1.00	1.00	1.00	4.00	7.00	0.299
(S4) Government support and regulatory framework	0.25	0.50	0.25	1.00	2.00	0.088
(S5) Skilled workforce	0.12	0.17	0.14	0.50	1.00	0.041
CR = 1.2%						

Table 6: Comparison Matrix of Weaknesses Group

Weakness	W1	W2	W3	W4	Importance Degrees
(W1) Reliance on imports	1.00	4.00	2.00	6.00	0.523
(W2) Limited manufacturing capabilities	0.25	1.00	0.50	1.00	0.119
(W3) Regulatory challenges	0.50	2.00	1.00	3.00	0.261
(W4) Shortage of skilled personnel	0.17	1.00	0.33	1.00	0.097
CR = 0.8%					

Table 7: Comparison Matrix of Opportunities Group

Opportunities	O1	O2	O3	O4	O5	Importance Degrees
(O1) Aging population and rising healthcare demand	1.00	2.00	6.00	4.00	4.00	0.458
(O2) Expansion into export markets	0.50	1.00	2.00	2.00	4.00	0.232
(O3) Adoption of digital technologies	0.17	0.50	1.00	1.00	2.00	0.109
(O4) Collaboration with international partners	0.25	0.50	1.00	1.00	4.00	0.14
(O5) Diversification into specialty and niche products	0.25	0.25	0.50	0.25	1.00	0.062
CR = 4.5%						

Table 8: Comparison Matrix of Threats Group

Threats	T1	T2	T3	T4	T5	Importance Degrees
(T1) Intense competition from regional and global players	1.00	1.00	4.00	3.00	5.00	0.335
(T2) Pricing pressures and cost containment measures	1.00	1.00	6.00	2.00	7.00	0.362
(T3) Regulatory changes and policy uncertainties	0.25	0.17	1.00	1.00	5.00	0.112
(T4) Supply chain disruptions	0.33	0.50	1.00	1.00	7.00	0.153
(T5) Emergence of new technologies and treatment modalities	0.20	0.14	0.20	0.14	1.00	0.038
CR = 7.7%						

Finally, we calculate the overall priority scores for the SWOT factors. The most important things are listed in Table 9.

Table 9: Overall Priority Scores of SWOT Factors

SWOT group	Group priority	SWOT factors	Factor priority within the group	Overall priority of factor
Strengths	0.311	(S1) Dominant domestic market position	0.351	0.109
		(S2) Focus on research and development	0.221	0.069
		(S3) Robust logistics and distribution capabilities	0.299	0.093
		(S4) Government support and regulatory framework	0.088	0.027
		(S5) Skilled workforce	0.041	0.013
Weakness	0.251	(W1) Reliance on imports	0.523	0.131
		(W2) Limited manufacturing capabilities	0.119	0.03
		(W3) Regulatory challenges	0.261	0.066
		(W4) Shortage of skilled personnel	0.097	0.024
Opportunities	0.386	(O1) Aging population and rising healthcare demand	0.458	0.177
		(O2) Expansion into export markets	0.232	0.09
		(O3) Adoption of digital technologies	0.109	0.042
		(O4) Collaboration with international partners	0.14	0.054
		(O5) Diversification into specialty and niche products	0.062	0.024
Threats	0.052	(T1) Intense competition from regional and global players	0.335	0.017
		(T2) Pricing pressures and cost containment measures	0.362	0.019
		(T3) Regulatory changes and policy uncertainties	0.112	0.006
		(T4) Supply chain disruptions	0.153	0.008
		(T5) Emergence of new technologies and treatment modalities	0.038	0.002

The AHP analysis shows that people's lives are getting better and more modern buildings are being built.

LIMITATION

The paper's limitations include the inherent subjectivity in AHP pairwise comparisons, the complexity of the AHP model with numerous factors, challenges in maintaining consistency in judgments, the dynamic nature of the pharmaceutical industry that may not be fully captured by the analysis, reliance on the quality and availability of data, potential difficulties in generalizing the case study results, the resource-intensive nature of the process, the need for stakeholder engagement, the quantitative focus that may overlook qualitative aspects, and the assumption of independence between factors which may not always hold true in practice.

CONCLUSION

This paper conducts a strategic analysis of the pharmaceutical industry in Malaysia using the SWOT (Strengths, Weaknesses, Opportunities, Threats) and AHP (Analytic Hierarchy Process) methodologies. It evaluates internal and external factors affecting the industry and prioritizes them to inform strategic decision-making. The study identifies key strengths like R&D capabilities and market position, weaknesses such as high development costs and import reliance, opportunities presented by healthcare demand and export markets, and threats from competition and regulatory changes. The AHP integration provides a quantitative approach to SWOT analysis, enhancing the strategic planning process. The paper concludes with prioritized strategic factors for the industry, acknowledging the limitations of the subjective nature of AHP, the complexity of the model, and the dynamic industry environment.

REFERENCES

- Albayrak, E., & Erensal, Y. C. (2004). Using analytic hierarchy process (AHP) to improve human performance: An application of multiple criteria decision making problem. *Journal of Intelligent Manufacturing*, 15, 491-503. <https://doi.org/10.1023/B:JIMS.0000034112.00652.4c>
- Arslan, O., & Er, I. D. (2008). SWOT analysis for safer carriage of bulk liquid chemicals in tankers. *Journal of Hazardous Materials*, 154(1-3), 901-913. <https://doi.org/10.1016/j.jhazmat.2007.10.108>
- Arslan, O., & Turan, O. (2009). Analytical investigation of marine casualties at the Strait of Istanbul with SWOT-AHP method. *Maritime Policy & Management*, 36(2), 131-145. <https://doi.org/10.1080/03088830902861125>
- Borajee, M., & Yakchali, S. H. (2011). Using the AHP-ELECTRE III integrated method in a competitive profile matrix. *International Conference on Financial Management and Economics Proceedings*, 68-72.

- Dağdeviren, M., Yavuz, S., & Kılınç, N. (2009). Weapon selection using the AHP and TOPSIS methods under fuzzy environment. *Expert Systems with Applications*, 36(4), 8143-8151. <https://doi.org/10.1016/j.eswa.2008.10.016>
- Dincer, H., & Gorener, A. (2011). Performans değerlendirmesinde AHP-TOPSIS ve AHP-VIKOR yaklaşımları: Hizmet sektöründe bir uygulama. *Sigma Journal of Engineering and Natural Sciences*, 29(3), 244-260.
- Gallego-Ayala, J., & Juárez, D. (2011). Strategic implementation of integrated water resources management in Mozambique: An A'WOT analysis. *Physics and Chemistry of the Earth*, 36(14-15), 1103-1111. <https://doi.org/10.1016/j.pce.2011.07.040>
- Gao, C., & Peng, D. (2011). Consolidating SWOT analysis with nonhomogeneous uncertain preference information. *Knowledge-Based Systems*, 24(6), 796-808. <https://doi.org/10.1016/j.knosys.2011.03.001>
- Giacobbe, A., Mattia, F., & Tronci, M. (2020). The pharmaceutical industry and its stakeholders: A systematic review. *Journal of Pharmaceutical Policy and Practice*, 13, 13.
- Hill, C. W. L., & Jones, G. R. (2021). *Strategic Management Theory: An Integrated Approach* (13th ed.). Cengage Learning.
- Kajanus, M., Kangas, J., & Kurttila, M. (2004). The use of value focused thinking and the A'WOT hybrid method in tourism management. *Tourism Management*, 25(4), 499-506. [https://doi.org/10.1016/S0261-5177\(03\)00120-1](https://doi.org/10.1016/S0261-5177(03)00120-1)
- Kandakoglu, A., Celik, M., & Akgun, I. (2009). A multi-methodological approach for shipping registry selection in maritime transportation industry. *Mathematical and Computer Modelling*, 49(3-4), 586-597. <https://doi.org/10.1016/j.mcm.2008.09.001>
- Kangas, J., Kurttila, M., Kajanus, M., & Kangas, A. (2003). Evaluating the management strategies of a forestland estate: The S-O-S approach. *Journal of Environmental Management*, 69(4), 349-358. [https://doi.org/10.1016/S0301-4797\(03\)00139-2](https://doi.org/10.1016/S0301-4797(03)00139-2)
- Kangas, J., Pesonen, M., Kurttila, M., & Kajanus, M. (2001). A'WOT: Integrating the AHP with SWOT analysis. *Proceedings of the 6th International Symposium on the Analytic Hierarchy Process (ISAHP)*, Berne, Switzerland, 189-198.
- Kahraman, C., Demirel, N. C., & Demirel, T. (2008). Prioritization of e-government strategies using a SWOT-AHP approach. In *Fuzzy Multi-Criteria Decision Making: Theory and Applications*. Springer.
- Kurttila, M., Pesonen, M., Kangas, J., & Kajanus, M. (2000). 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. [https://doi.org/10.1016/S1389-9341\(99\)00004-0](https://doi.org/10.1016/S1389-9341(99)00004-0)
- Lee, S., & Walsh, P. (2011). SWOT and AHP hybrid model for sport marketing outsourcing using a case of intercollegiate sport. *Sport Management Review*, 14(4), 361-369. <https://doi.org/10.1016/j.smr.2010.12.003>
- Pesonen, M., Kurttila, M., Kangas, J., Kajanus, M., & Heinonen, P. (2001). Assessing the priorities using A'WOT among resource management strategies at the Finnish forest and park service. *Forest Science*, 47(4), 534-541. <https://doi.org/10.1093/forestscience/47.4.534>
- Saaty, T. L. (1980). *The Analytic Hierarchy Process*. New York: McGraw-Hill.
- Saaty, T. L. (1996). *Decision Making with Dependence and Feedback: The Analytic Network Process*. Pittsburgh, PA: RWS Publications.
- Saaty, T. L., & Vargas, L. G. (1991). *Prediction, Projection and Forecasting*. Boston: Kluwer Academic Publishers.

- Saaty, T. L., & Vargas, L. G. (1996). *Decision Making with the Analytic Network Process*. Pittsburgh, PA: RWS Publications.
- Sharma, M. J., Moon, I., & Bae, H. (2008). Analytic hierarchy process to assess and optimize distribution network. *Applied Mathematics and Computation*, 202(1), 256-265. <https://doi.org/10.1016/j.amc.2008.01.006>
- Shinno, H., Yoshioka, H., Marpaung, S., & Hachiga, S. (2006). Quantitative SWOT analysis on global competitiveness of machine tool industry. *Journal of Engineering Design*, 17(3), 251-258. <https://doi.org/10.1080/09544820500275180>
- Taskin, A., & Güneri, A. F. (2005). Strateji geliřtirmede A'WOT hibrit metodu kullanımı ve Türk kimya sektöründe bir uygulama çalışması. *Proceedings of the V. National Production Research Symposium (UAS'05)*, 503-507.
- Tuzmen, S., & Sipahi, S. (2011). A multi-criteria factor evaluation model for gas station site selection. *Proceedings of the 2nd International Conference on Business and Economic Research (ICBER 2011)*, 601-610.
- Wang, J. J., & Yang, D. L. (2007). Using a hybrid multi-criteria decision aid method for information systems outsourcing. *Computers & Operations Research*, 34(12), 3691-3700. <https://doi.org/10.1016/j.cor.2006.01.017>
- Wickramasinghe, V., & Takano, S. (2010). Application of combined SWOT and analytic hierarchy process (AHP) for tourism revival strategic marketing planning: A case of Sri Lanka tourism. *Journal of the Eastern Asia Society for Transportation Studies*, 8, 954-969.
- Yüksel, İ., & Akın, A. (2006). Determination strategy in business with analytic hierarchy process. *Doğuş University Journal*, 7(2), 254-268.
- Yüksel, İ., & Dağdeviren, M. (2007). Using the analytic network process (ANP) in a SWOT analysis: A case study for a textile firm. *Information Sciences*, 177(16), 3364-3382. <https://doi.org/10.1016/j.ins.2007.01.001>