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Application of the Analytic Hierarchy Process in determining the marketing mix strategy of rice elevator machines

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ABSTRACT: *UD. X is a company that produces rice processing machines that has been established since 1996. In the last two years the company experienced a decline in sales volume where this decline occurred due to several factors such as the increasing number of competitors, the occurrence of a pandemic, lack of sales force. The decrease in sales volume can be seen from the sales data of the rice elevator machine, where the rice elevator machine is the product most frequently purchased by customers. The purpose of this study is to determine the criteria and sub-criteria that become a priority in formulating a marketing mix strategy to increase the sales volume of rice elevator machines. The method used in this research is descriptive quantitative and analyzes data with the Analytical Hierarchy Process (AHP), this AHP method is used to determine the weights and determine priorities for each criterion and sub-criteria which are elements in the preparation of marketing mix strategy at UD. X in increasing the sales volume of rice elevator machines. The criteria used are 4P (product, price, place, promotion). The results of the study indicate that the marketing mix criteria are the main priority in formulating the rice elevator machine marketing strategy at UD. X in a row are promotions = 0,63, prices = 0.20, products = 0.12, and places = 0,06. The main priority in the marketing mix strategy is the Sales Force where the sales force is a sub-criteria that becomes the main priority in the Promotion criteria where promotion is a priority criterion in the marketing mix strategy*

Keywords - *AHP, marketing mix, promotion, sales*

I.　　INTRODUCTION

　　In the era of globalization and also rapid technological advances, competition in the business world is unavoidable. With increasingly tough competition, companies are required to be creative and innovative in facing the market competition. The emergence of new companies is certainly a challenge for companies that have been around for a long time. So that the old company can worry about the competition. Incumbent companies will fear that their market share will be taken by emerging competitors. With increasingly fierce competition, companies compete with each other in providing improvements to the products produced to service to consumers. This is done to maintain the existence of their business. Besides that, companies are also required to be able to understand consumer desires and consumer needs so that consumers want to buy products offered by the company. One of the company's efforts to increase sales of the products they have is by implementing a marketing mix . According to Basu a & Irawan (2005) in general the marketing mix consists of 4Ps, namely products, prices, promotions, and places.

　　UD. X is a company that produces rice processing machines that has been established since 1996, where this company has a fairly wide market where the market from The UD. X ranged from South Sulawesi to outside the province of South Sulawesi. The products produced by this company are APC/Grain Cleaner, Elevator, Skin Breaker Body, Inflatable and Suction Blower, Cyclone, Groat Sieve, Conveyor. Of these products, the most frequently ordered product by customers is the Elevator. In the last 2 years the company recorded a decline in sales of the rice elevator, this problem occurred due to several factors such as the increasing number of competitors, the increasing number of competitors, the occurrence of a pandemic, lack of sales force. The decrease in sales volume of rice elevators can be seen in Table 1.1 below:

Table 1. Data on sales, production and target of rice elevator machines

Years	Rice Elevator Size (Unit)				Total Sales (Unit)	Target (Unit)	Total production (Unit)
	6"	8"	10"	12"			
2019	3	19	12	10	44	38	48
2020	0	4	0	1	5	40	26
2021	0	8	7	3	18	40	40

The data it can be seen that there was a decline in sales of rice elevator products. From Table 1.1 above, we can see sales of rice elevator machines at UD. X which decreased from the previous two years, therefore action is needed from the company to overcome the decline in sales of one of its products, namely rice elevators. The way to overcome the decline in sales volume is by developing marketing carried out by the company which aims to increase sales volume.

Based on the problems above, the researchers used the Analytical Hierarchy Process (AHP) method. According to Armstrong & Taylor (2014), Analytical Hierarchy Process (AHP) is a method for assessing decision alternatives and choosing the best one with several criteria. AHP develops a numerical value to rank each decision alternative, based on the extent to which each alternative meets the decision maker's criteria. This method is used so that companies can use it as a priority scale (Sjahruddin & Akbar, 2020), As a one of the criteria of the 4P marketing mix strategy so that it is expected that marketing from the company can increase the sales volume of rice elevator products.

II. RESEARCH PROBLEM

Based on the background above, the writer takes the formulation of the problem is How to determine the priority of the marketing mix strategy using the AHP method and ranking the priorities of the 4P marketing mix criteria?

III. OBJECTIVES OF THE STUDY

The purpose of this study is to determine the priorities of the marketing mix strategy using the AHP method and to determine the main priorities of the marketing mix strategy.

IV. METHODS

The data obtained are then observed and processed to obtain the desired results, and the stages of data processing analysis are:
   a) Determination of variables in the form of criteria and sub-criteria to be processed using the Analytic Hierarchy Process (AHP) method.
   b) Collecting data on a comparative scale of 4P marketing mix strategy and 4Ps sub-criteria from company leaders using a questionnaire based on the criteria and sub-criteria variables above.
   c) Using the Analytic Hierarchy Process (AHP) method where this method is used to determine the weight of each criterion and sub-criteria which is an element of preparing the marketing mix strategy.
   d) Choose the criteria and sub-criteria that have the highest weight to be improved in the hope of increasing sales of rice elevators

V. RESULTS

A. Determination of the Scale of Criteria and Sub-criteria

This study uses the AHP method and is intended to assist in making decisions to determine the marketing mix strategy that will be selected in the criteria and sub-criteria. In the determination there are four criteria, namely product, price, place, promotion. The determination of the scale in the 4Ps of the company's leadership based on the results of the questionnaire provides the following scale：

Table 2. Determination

The 4Ps	Product	Price	Place of	Promotion

Product	1	1/3	3	1/5
Price	3	1	3	1/5
Place	1/3	1/3	1	1/9
Promotion	5	5	9	1
Total	9.33	6.67	16.00	1.51

The determination of the scale of the company's leadership on the sub-criteria for each criterion is as follows:

1) Determination of the sub-criteria, scale on the product criteria

Table 3. Determining the scale of sub-criteria for product

Measurement	Quality	Brand Name	Strength Product	Characteristics
Quality	1	5	1/3	5
Brand Name	1/5	1	1/7	3
Product Strength	3	7	1	9
Characteristics	1/5	1/3	1/9	1
Total	4.40	13.33	1.59	18.00

2) Determination of the Sub-criteria, scale on the prices criteria

Table 4. Determining the scale of sub-criteria for price

Measurement	Costs Operational	Prices based on Product Type	Cash Discount	Discounts
Based on Operating Costs	1	1/5	1/9	1/5
Prices by Product Type	5	1	1/5	1/3
Discounts	9	5	1	3
Discounts	5	3	1/3	1
Quantity	20.00	9.20	1.64	4.53

3) Determination of the Sub-criteria, scale on the places criteria

Table 5. Determining the scale of sub-criteria for places

Measurement	Marketing	Location
Coverage	1	5
Locations	5	1
Total	6.00	6.00

4) Determination of the Sub-criteria, scale on the promotions criteria

Table 6. Determining the scale of sub-criteria for Promotion

Sub-criteria of	Advertising	Direct Marketing	Public Relations	Sales Force
Advertising	1	1/3	5	1/5
Direct Marketing	3	1	7	1/3
Public Relations	1/5	1/7	1	1/9
Sales Force	5	3	9	1
Total	9.20	4.48	22.00	1.64

B. Normalization result of comparison matrix

The normalized matrix values obtained are derived from the results of the elements in each column divided by the total number in the column concerned, which will obtain a normalized relative weight. The number in each column of normalization must be worth 1.00 if the number is more or less then there is an error in normalizing the existing data on the comparison scale. The results of the normalization of the matrix on the criteria are as follows:

Table 7. Normalization of comparison matrix

Criteria	Product	Price	Place of	Promotion
Product	0.11	0.05	0.19	0.13
Price	0.32	0.15	0.19	0.13
Place	0.04	0.05	0.06	0.07
Promotion	0.54	0.75	0.56	0.66
Total	1.00	1.00	1.00	1.00

The results of the normalization of the matrix on the sub-criteria for each criterion are as follows:

1) Normalization of comparison matrix on product

Table 8. Comparison Matrix on Products

Criteria	Quality	Brand Name	Strength Product	Traits
Quality	0.23	0.38	0.21	0.28
Brand Name	0.05	0.08	0.09	0.17
Product Strength	0.68	0.53	0.63	0.50
Characteristics	0.05	0.03	0.07	0.06
Total	1.00	1.00	1.00	1.00

2) Normalization of comparison matrix on prices

Table 9. Comparison matrix on prices

Measurement	Operational cost	Product type	Cash Discounts	Discounts
Based on Operational Costs	0.05	0.02	0.07	0.04
Prices by Product Type	0.25	0.11	0.12	0.07
Cash Discounts	0.45	0.54	0.61	0.66
Discounts	0.25	0.33	0.20	0.22
Total	1.00	1.00	1.00	1.00

3) Normalization of comparison matrix on places

Table 10. Comparison matrix on places

Measurement	Coverage Marketing	Location
Coverage	0.17	0.83
Location	0.83	0.17
Total	1.00	1.00

4) Normalization of comparison matrix on promotions

Table 11. Comparison matrix on promotions

Measurement	Advertising	Marketing Direct	Relations Public	Force Sales
Advertising	0.11	0.07	0.23	0.12
Direct Marketing	0.33	0.22	0.32	0.20
Public Relations	0.02	0.03	0.05	0.07
Sales Force	0.54	0.67	0.41	0.61
Total	1.00	1.00	1.00	1.00

C. Weighting results and Inconsistency Ratio

The weighting results are obtained from the average number of rows for each element. The results of the Inconsistency Ratio (CR) were obtained from the first two stages, namely looking for the consistency index (CI), after getting the consistency index (CI) then looking for the Inconsistency Ratio (CR) by dividing the consistency index (CI) with the Random Index (RI). If the pairwise comparison matrix with a CR value of less than 0.10, the inconsistency of the opinion of the decision maker is still acceptable and if not, the assessment needs to be repeated.

1) Analysis of marketing mix strategy criteria

Table 12. Processing Results of Marketing Mix Elements

Attributes	Weight	Inconsistency Ratio
Product	0.12	
Price	0.20	0.09

Place	0.06	
Promotion	0.63	

2)   Analysis of The product (sub-criteria analysis)

Product is everything that can be offered to customers for consumption in meeting consumer needs. UD. X in terms of marketing its products emphasizes several criteria and the results of the priority analysis of the product sub-criteria can be seen in Table 13. below:

Table 13. Processing Results of the product

Attributes	Weight	Inconsistency Ratio
Quality	0.27	
Brand Name	0.09	
Product Strength	0.58	0.098
Characteristics	0.05	

3)   Analysis of The prices (sub-criteria analysis)

Price is a criterion that is able to generate profits or losses for the company while the priority results of Price Sub-criteria can be seen as follows:

Table 14. Processing results of prices

Attribute	Weight	Inconsistency Ratio
Based on Product Type	0.05	
Prices Based on Operating Costs	0.14	
Cash discounts	0.57	0.094
Discounts	0.25	

4)   Analysis of The places (sub-criteria analysis)
Place is an element in the preparation of company marketing mix strategy. The results of the priority analysis of the place sub-criteria can be seen as follows:

Table 15. Processing Results of the places

Attribute	Weight	Inconsistency Ratio
Marketing Coverage	0.50	
Location	0.50	0.00

5)   Analysis of The promotions (sub-criteria analysis)
Promotion is one of the determining criteria for the success of marketing programs where through promotional activities, companies try to disseminate product information to the public. The results of the priority analysis of the promotion sub-criteria can be seen as follows:

Table 16. Processing Results of Promotion

Attribute	Weight	Inconsistency Ratio
Advertising	0.13	
Direct Marketing	0.27	
Public Relations	0.04	0.09
Sales Force	0.56	

VI.   DISCUSSION

The results of data processing that has been carried out by researchers, the hierarchy of the marketing mix strategy can be described as follows:
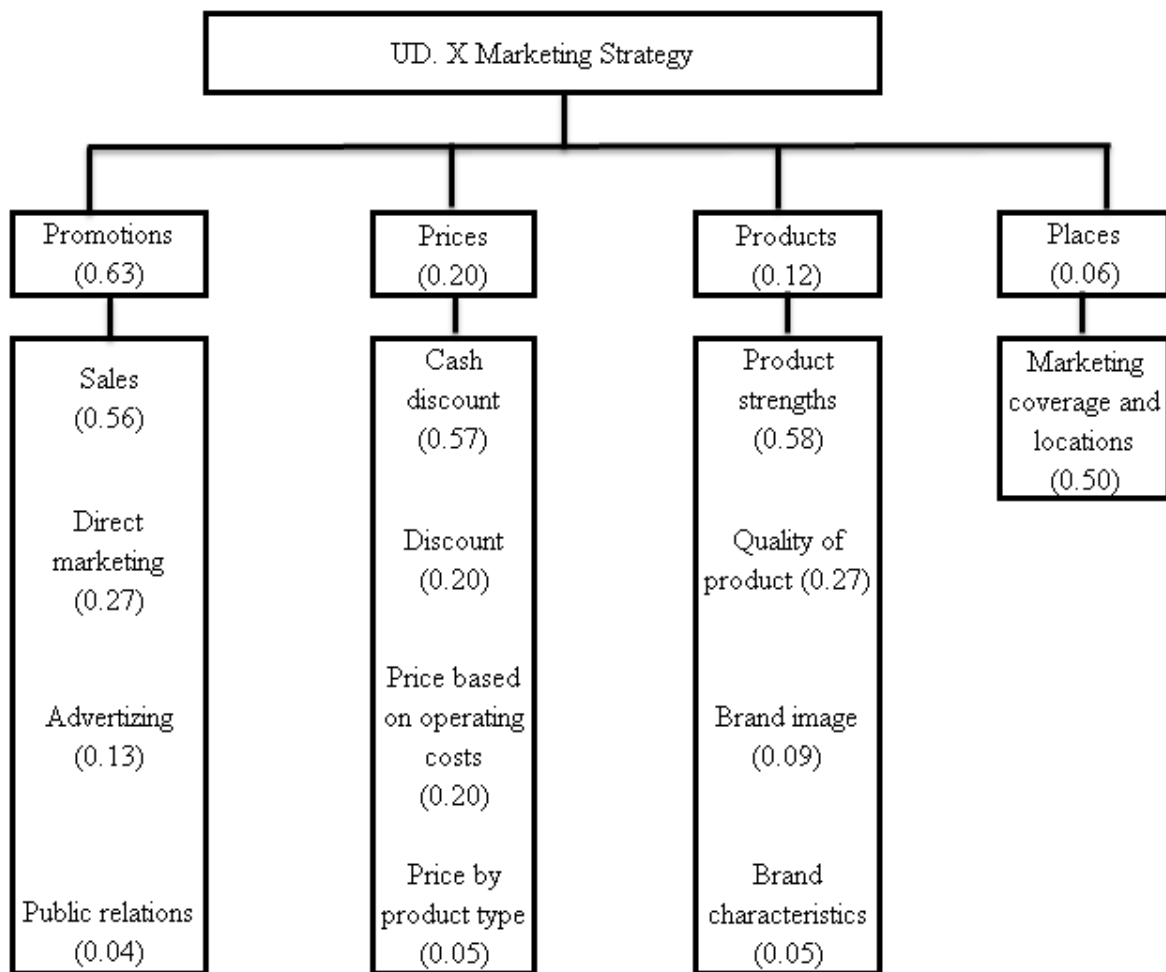

Figure 1. Marketing Mix Strategy Hierarchy

Based on data processing can be seen in figure 1. from the hierarchy above, it can be explained that promotion (Tjiptono, 2008; Fuad et al., 2006; Kismono, 2001) is the first priority in marketing mix strategy criteria with a weight of 0.63 this is based on the lack of promotion by the company so that the company needs to improve this promotion criteria where the order of sub-criteria contained in the promotion criteria is sales force (0.56), direct marketing (0.27), advertising (0.13) and the last one is public relations (0.04). the criterion with the second priority is price with a weight of 0.20 where this criterion is also important in terms of marketing mix strategy where the results of the analysis of the sub-criteria price sequentially are cash discounts (0.57), discounts (0.25), prices based on operating costs (0.14) and those the last is price based on product type (0.05).

Product criteria become the third priority in the marketing mix strategy (Kotler, & Keller, 2007) with a weight of 0.12 while the results of the sub-criteria analysis of the product criteria in order are product strength (0.58), quality (0.27), brand (0.09) and the last is characteristic (0.05). the place criteria is the last priority with a weight of 0.06. this is based on the fact that the company is located in a strategic location and the results of the analysis of the places sub-criteria, where the place criteria have 2 (two) sub-criteria and have the same weight, which is 0.5.

VII. CONCLUSION

Based on the AHP method, it is found that the Marketing Mix Criteria are the Priority in preparing the Marketing Mix Strategy for Rice Elevator Machines at UD. X are promotion (0.63), price (0.20), product (0.12), place (0.06). and the marketing mix strategy that is a priority for the company is to add Sales Forces because salespeople play a very important role in the company's sales volume. This is based on the lack of sales force owned by the company with a total of 1 person. The company should conduct training for self-development rather than sales force and also add sales force members so that the sales force is more optimal so that sales volume is expected to increase through the sales force self-development training. Making attractive offers and doing after sales service so that consumers become loyal to the company so that customers continue to choose the company to be their top priority.

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