Prioritization of Urea Fertilizer 4Ps Marketing Mix: A Case Study

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***Abstract*—Marketing strategy has its own important roles in increasing sales. By formulating the right marketing strategy, a company can increase its sales significantly. 4Ps marketing mix is a tool, consist of Product, Price, Promotion, and Place, that widely used to formulate marketing strategy. It will be beneficial for a company if they know which P is the most important, so they can formulate specific marketing strategies and allocate their resources effectively. This study aims to find the important weight of each P in the 4Ps marketing mix used in the retail sales of urea fertilizer by PT. X using the Analytic Hierarchy Process. AHP is a method used by many decision-makers to solve Multi-Criteria Decision Making (MCDM) problems. Because of its simplicity and flexibility, AHP is frequently used to solve other problems. The General Manager and Manager of Marketing of the company are asked to give their judgment on the pairwise comparisons between each P of the 4Ps marketing mix, considering their impacts on sales. The result shows that Place has the highest important weight. Price is more important than Product, and Promotion is the least important. The study suggested the company to broaden its network, by adding more kiosks.**

***Keywords*—Analytic Hierarchy Process, 4Ps Marketing Mix.**

I. INTRODUCTION

HAVE to market their products in order to make their products accessible by its consumer. Marketing can be arketing is a role standing between production and consumption, that manages their connection [1]. Companies described as the process of defining, anticipating, creating, and fulfilling customers' needs and wants for products and services [2]. One of the shortest good definition of marketing is "meeting needs profitably" [3]. American Marketing Association defined marketing as the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large [4].

As a role, marketing has its very own impact on a company's business growth. It has the ability to affect sales performance. Marketing can identify new buyers and influencers, increase the number of opportunities, improve buyer's perceptions of sales coverage and enable the sales force with the right value proposition at the right time to win the deal [5]. It is essential for a company to make the right marketing strategies, as that should allow the company to increase its sales.

Marketing mix is a common tool used in marketing. It is not a scientific theory, but merely a conceptual framework that identifies the principal decision making manager makes in configuring their offerings to suit consumer's needs [6], such as what product to market, how they price them, how to distribute them, what is their marketing communications strategy, etc. Some studies have proved that marketing mix has a positive impact on sales, simultaneously or partially [7] [8] [9].

There are many versions of marketing mix, but McCarty's, often referred to as the 4Ps marketing mix is the most common marketing mix used. It consists of Product, Price, Promotion, and Place. Product is anything a company offered to the market for the exchange of consumption [10]. It has to provide value to a customer [11]. Price is an economic sacrifice the consumer has to make in order to have the product, therefore, it produces revenues for the company while other Ps in the marketing mix produce cost. Promotion is any activity aims to deliver information about the product being marketed. Place in marketing mix refers to the point where consumers have to go to buy the products and how the product gets to that point. Knowing the priority of each P is beneficial for the company as it allows them to know which P they should put their focus on [12]. It enables the company to make specific marketing strategies and allocate its resources effectively.

Analytic Hierarchy Process is a method developed by Saaty that originally used to solve Multi-Criteria Decision Making (MCDM) problems. But because of its simplicity and flexibility, it is frequently used to solve other problems. It is able to provide importance weight that allows us to know the priority of each criterion by using pairwise comparisons and track the inconsistencies [13] [14]. Pairwise comparison is an assessment where each criterion being assessed is compared with one another on their importance. The AHP involves decomposing a complex and unstructured problem into a set of variables that are organized into a hierarchy [15]. A Hierarchy is a type of system, which is based on the assumption that the entities which have been identified, can be grouped into disjoint sets, with the entities of one group influencing the entities of only one other group, and being influenced by the entities of only one other group. The element of each group of the hierarchy is assumed to be independent [16]. PT. X is a company who's doing their business on the fertilizer, petrochemical, agrochemical, agroindustry, and other chemicals field. Headquartered in Palembang, South Sumatera, the company has been established since 1959 and is the first Indonesian company to produce urea fertilizer. The 2019 sales report shows that the overall Non-Public Service Obligation (Non-PSO) sales of urea fertilizer have gone 15% or 134,571.99 ton lower than 2018. Non-PSO sales consist of two types of sales, commercial sales which have decreased 6% or 47,780.73 ton lower, and retail sales which have decreased 64.5% or 86.791,27 ton lower.

This study proposed an application of AHP to prioritize the 4Ps marketing mix specifically used by PT. X on their retail

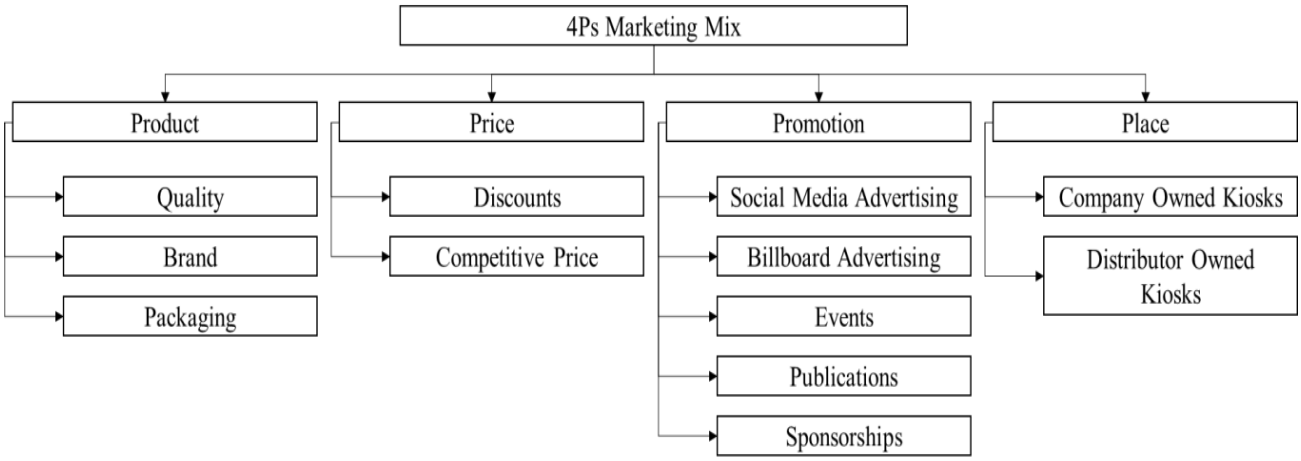

Figure 1. Hierarchy Structure.

Table 1.
Random Index

Matrix Size	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

sales of urea fertilizer. The objective of this study is to help the company formulate the right marketing strategies, so they can increase their retail sales of urea fertilizer by answering these following questions:

a. What is the importance weight of each P in the 4Ps marketing mix used by PT. X on their retail sales of urea fertilizer?
b. Which P has the highest importance weight in the 4Ps marketing mix used by PT. X on their retail sales of urea fertilizer?

II. METHOD

A. Hierarchy Structure

The pairwise comparisons are made based on a three levels hierarchy structure. In the second level, the pairwise comparisons are between the 4Ps marketing mix elements used by PT. X on their retail sales of urea fertilizer, which are Product, Price, Promotion, and Place. While in the third level, the pairwise comparisons are between each component under the same P. These components are identified from the business processes carried out by PT. X in their retail sales of urea fertilizer.

Product consist of quality, brand, and packaging of the urea fertilizer retailed by PT. X. The components of Price are competitive price and discounts. Promotion consists of the activity PT. X does to deliver information about the company and the product, such as social media advertising, billboard advertising, events, publications, and sponsorships. The components of Place are company-owned kiosks and distributor owned kiosks as the point where consumers have to go to buy the product. The hierarchy structure used in this study shown in Figure 1.

B. Data Collection

The data needed in this study is quantitative primary data, which are the judgments on the pairwise comparisons between each P of the 4Ps marketing mix specifically used by PT. X on their retail sales of urea fertilizer, and also the components under them. The judgments are taken directly by conducting interviews with the executives in charge of marketing in PT. X, as the parties responsible for increasing sales and customer value. They are the General Manager of Distribution and Marketing, and the Marketing Planning and Control Manager.

The interviewees have work for the company for more than 15 years. With those work experiences, the interviewees have good knowledge of the business processes, overall, or the one specifically carried out by PT. X in their retail sales of urea fertilizer.

The interviewees are asked to consider the impact of each P on retail sales of urea fertilizer before giving their judgments.

The Saaty scale [16] is used to represent the judgments. It consists of numbers from 1-9 as representations of the importance. They are as follows:

a. 1, if A and B are equally important
b. 3, if A is weakly more important than B
c. 5, if A is strongly more important than B
d. 7, if A is very strongly more important than B
e. 9, if A is absolutely more important than B
f. The numbers 2, 4, 6, 8 are used to facilitate compromise between slightly differing judgments.

These numbers are inserted in the position (A,B) on the pairwise comparison matrix where the row of A meets the column of B. An element is equally important when compared with itself, so in the position (A,A) on the pairwise comparison matrix insert 1. Insert the appropriate reciprocal 1, 1/3, 1/5, 1/7, or 1/9 when the column of A meets the row of B, position (B,A) on the pairwise comparison matrix for the reverse comparison of B and A. An example of pairwise comparison matrix is shown in Figure 2.

C. Data Analysis

After the individual pairwise comparison matrix of the judgment of each interviewee is formed, we calculate the

	A	B	Row Geometric Mean	Eigenvector	Eigenvalue
A	x_{aa}	x_{ab}	RGM A	Eigenvector A	Eigenvalue A
B	x_{ba}	x_{bb}	RGM B	Eigenvector B	Eigenvalue B

Figure 2. Example of Pairwise Comparison Matrix.

Consistency Index (CI) of the pairwise comparison matrix by using Equation (1).

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

Where:
CI = Consistency Index
λ_{max} = Matrix Eigenvalue
n = Matrix Size

The eigenvalue of the row is calculated by summing the multiplication between each element of the row with each eigenvector and then dividing it with the eigenvector from the row. For example, to calculate the eigenvalue of A, we calculate [(x_{aa}*eigenvector A) + (x_{ab}*eigenvector B)]/eigenvector A. Eigenvector of the row is calculated by dividing the geometric mean of the row with the sum of the row geometric mean.

After CI is calculated, we then calculate the Consistency Ratio (CR) by using Equation (2). The Random Index (RI) depends on the size of the matrix, as shown in Table 1.

$$CR = \frac{CI}{RI} \quad (2)$$

Where:
CR = Consistency Ratio
RI = Random Index

The value of CR has to be less than 0.10 for the pairwise comparison matrix to be consistent. If the value of CR is more than 0.10, the pairwise comparison matrix needs to be processed as follows [17]:

Calculate Equation (3) for all elements of the pairwise comparison matrix.

$$|x_{ab} - {}^{w_a}/_{w_b}| \quad (3)$$

Where:
x_{ab} = Element in the row of A and the column of B
w_a = The row of A eigenvector
w_b = The row of B eigenvector

The element that has the biggest absolute difference need to be changed with the new element that can be calculated by using Equation (4).

$$|x_{ab}new = {}^{w_a}/_{w_b} \quad (4)$$

To make the combined pairwise comparison matrix, we first calculate the geometric mean of each consistent individual pairwise comparison matrix element and then put the geometric mean in the same position as before on the combined pairwise comparison matrix. For example, put the geometric mean of (A,B) in the position of (A,B) on the combined pairwise comparison matrix. The next step is to calculate the eigenvector of the combined pairwise comparison matrix to get the normal weight. The global weight or the final weight is calculated by multiplying the normal weight of the second level with the normal weight of the third level.

Table 2.
Importance Judgment Level 2

Interviewe	A vs. B					
	1	2	3	4	5	6
General Manager of Distribution and Marketing	1/7	1/5	1/3	3	3	1/3
Marketing Planning and Control Manager	5	5	3	1/3	1/3	1/3

III. RESULTS AND DISCUSSION

The judgments from the interviewees are shown in Table 2 and Table 3. Table 2 is showing the judgments for the second level pairwise comparisons, which consist of the 4Ps marketing mix elements. Table 3 is showing the judgments for the third level pairwise comparisons, which consist of the components of each P.

The judgments represent the interviewees' opinion on the ability of each P in the 4Ps marketing mix and their components in increasing the retail sales of urea fertilizer by PT. X. The natural number (x_{ab}) means the interviewees consider that item A is dominant compared to item B. in contrast, the fraction ($1/x_{ab}$) means the interviewees consider that item B is dominant compared to item A. For example, in Question 1, where the interviewees are asked to compare Product as item A and Price as item B. The General Manager considers Price is very strongly more important than Product. Meanwhile, the Manager considers Product is strongly more important than Price.

The General Manager considers Price, Promotion, and Place as the dominating P compared to Product. The product specification of urea fertilizer is the same among Indonesian fertilizer producers where the composition is mostly nitrogen (46%). Whereas the Manager considers the opposite. Product is dominant compared to the other Ps. According to the Manager, urea fertilizer products are not daily consumption goods and the transaction per consumer in retail sales is not much, so consumers are likely to consider the product. The judgments above are then processed using AHP as described before in Method. The results obtained are summarized in Table 4.

From the results, we can conclude that Place has the highest importance weight compared to the other Ps. Place in the retail sales of urea fertilizer by PT. X describes the point where the consumers go to buy the urea fertilizer, The more points the consumers can go to, the easier the consumers can get the urea fertilizer. In other words, the ease in getting urea fertilizer is considered to be the most important, hence influential in increasing retail sales of urea fertilizer.

As told before, the product specification of urea fertilizer is the same among Indonesian fertilizer producers. That's because, in Indonesia, urea fertilizer producers are operating under the same holding company. So, from the Product point

Table 3.
Importance Judgment Level 3

Interview	A vs. B														
	Product			Price			Promotion								Place
	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
General Manager of Distribution and Marketing	3	1/7	7	1/5	1/3	1/5	3	1/3	1/3	1/5	1/5	1/3	5	3	1/5
Marketing Planning and Control Manager	1/3	5	5	1/3	1/3	5	1/3	1/3	1/5	1/3	1/3	5	5	5	1/5

Table 4.
Global Weight

Level 2		Level 3		*Global Weight*	Ranking
Product	0.25	Quality	0.33	0.0839	4
		Brand	0.50	0.1267	3
		Packaging	0.16	0.0414	9
Price	0.25	Discount	0.21	0.0522	8
		Competitive Price	0.79	0.2023	2
Promotion	0.17	Social Media Adv.	0.05	0.0078	12
		Billboard Adv.	0.10	0.0166	11
		Events	0.39	0.0668	5
		Publications	0.30	0.0524	7
		Sponsorships	0.17	0.0286	10
Place	0.32	Company Owned Kiosks	0.17	0.0535	6
		Distributor Owned Kiosks	0.83	0.2677	1

of view, notably on quality, Indonesian produced urea fertilizer has similarities. In addition, urea fertilizer is a basic fertilizer. The consumer, in this case, are farmers, use the product for their agricultural activity all the time, to help with plant growth and health. It is important for them to always maintain the product's availability on their hands. It means, the consumers need to be able to buy urea fertilizer easily, anytime they need. Those things support the results obtained from the calculation of priority of the 4Ps marketing mix for retail sales of urea fertilizer by PT. X by using AHP in this study.

Whereas in the components of each P, the distributor owned kiosks have the highest importance weight compared to the other components. In the second position is competitive price, and in the third position is brand.

IV. CONCLUSION

From the results and discussion described in the previous chapter, the following matters can be concluded: (1) The results obtained from the calculation of priority of the 4Ps marketing mix for retail sales of urea fertilizer by PT. X by using AHP shows that Place has an importance weight of 0.32, while Price has an importance weight of 0.255, Product has an importance weight of 0.252, and Promotion has an importance weight of 0.17. (2) Place has the highest importance weight compared to other Ps of the 4P marketing mix for retail sales of urea fertilizer by PT. X. The distributor kiosks have higher importance than the company-owned kiosks, as well as the other components.

Based on the results, we suggest PT. X to broaden its network, by adding more cooperation with distributors to retail urea fertilizer produced by PT. X. This can help the company to increase its urea fertilizer retail sales, besides distributor owned kiosk is an economical choice to add more sales points without having to build their own kiosks. Along with this, PT. X must ensure that the supply of urea fertilizer for retail sales is always maintained and the distribution is smooth. PT. X should maintain the retailing price of urea fertilizer competitive. The other suggestion is that company should build stronger positive images of the company and the product, accompanied by promotions for example by organizing an agricultural event.

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