



## Application Of Game Theory In Determining Optimum Marketing Strategy In Marketplace

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**Abstract.** *The trend of shopping in society is getting shifted, marked by the presence of the growing marketplaces and e-commerce. There are so many choices of marketplaces that can be easily accessed by the society. By the marketplaces vary, there would be many things to prepare by every marketplace to win the competition and always maintain the existence. Therefore, they must think and use the effective marketing strategy. The game theory is one of the ways that can be used to analyze the marketing strategy. The game theory is a mathematics model used in a conflict or competition among various interests that meet each other as competitors. Basically, the theory is a study of strategy interaction among the players to determine the best strategy and the obtained score. One of basic elements of the game theory is solving every case of the game theory where the pay-off matrix is shown in a game matrix table. The data of game between Shopee and Tokopedia obtained the optimum score which was 2.4443. Shopee and Bukalapak obtained the optimum score which was 6. Meanwhile, Tokopedia and Bukalapak obtained the optimum score which was 8.9925. In the Shopee, Tokopedia, and Bukalapak competition, the Nash equilibrium point is located at the point  $(X_4, Y_2, W_3)$  with a pay off value  $(64, 56, 43)$ , Shopee with a discount voucher strategy  $(X_4)$ , Tokopedia with a Product strategy  $(Y_2)$ , and Bukalapak with a promotion strategy  $(W_3)$  which is the optimal strategy for each player.*

**Keywords:** *Game Theory, Linear Program, Marketplace, Marketing Strategy, Nash Equilibrium, POM QM 5.0*

### INTRODUCTION

Nowadays, it is very common to find many competitive activities that cause competition. This competition can occur between two people (two parties) or a number of people (groups). Games are a form of competition between two people (two parties) or two groups that face each other.

The rapid development of digital information and communication technology, especially the internet. With various benefits, for some people the internet has become a basic need. The high development of the internet in Indonesia is characterized by an

increase in internet users every year. This certainly has an impact on the development of e-commerce in Indonesia, especially on online buying and selling forums (Wahyuni, Saeful, & Gunawan, 2018). It is undeniable that online shopping is the choice of many consumers to get the desired item without using a lot of time and energy, there is convenience in making transactions with competitive prices and good quality goods. People's shopping style has shifted marked by the e-commerce marketplace that has experienced growth. Very many marketplace choices that can be accessed easily by the public. Some of the most popular marketplaces in Indonesia are Shopee, Tokopedia, Lazada, Blibli, and Bukalapak (Putri & Zakaria, 2020). With so many marketplaces, there are many things that must be prepared by each marketplace to win the competition and always maintain its existence. Thus, every marketplace must think about and use effective marketing strategies.

Marketing strategy is a set of goals and objectives, policies and rules that guide the company's marketing efforts over time, at all levels, facilities and allocations, especially the company's response to environmental changes and competitive conditions. Marketing strategy is needed by a company to find out what are the strengths and weaknesses for the company in order to decide several things related to the company. Company in order to decide several things related to the company. Studying and estimating the steps taken by the opposing party is one way to estimate the best marketing strategy. Game theory is one way that can be used to analyze these marketing strategies. According to Aminudin (2005), analyzing the decision-making process in various competitive conditions with two or more interests is the reason this theory was developed.

Based on this description, the authors are interested in conducting further research entitled "Application of Game Theory in Determining Optimum Marketing Strategy in Marketplace".

## **THEORETICAL STUDY**

### **Marketing**

#### **Definition of Marketing**

According to Kotler and Armstrong (2012), the series of processes carried out to create value for customers by companies by creating, providing, and communicating superior value to customers is commonly called marketing.

The process of planning the activities of managing these goods and services through promotion and distribution, all to meet demand and from the marketing process obtained profits is marketing (Swastha and Handoko, 2000). Based on this understanding of marketing, it is based on the following concepts:

- a. A state of feeling that requires fulfillment of something such as food, clothing, shelter, security, and self-esteem is called a need,
- b. Needs that are formed due to one's culture and personality are called wants,
- c. A person's desire or need that is supported by purchasing power is called demand.

### **Marketing Strategy**

Marketing strategy is a set of goals and objectives, policies and rules that guide a company's marketing efforts over time at all levels, facilities and distribution, especially the company's response to changing environmental and competitive conditions.

To determine the best marketing strategy, the company must embrace several facts to consider. (a) The strategy should consistently use product objectives; (b) Problems and opportunities with respect to customer needs, market size and profitability should be resolved according to the situation analysis (Joseph P Gultinan and Gordon W. Paul, 1987).

### **RESEARCH METHODS**

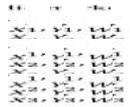
In this study, the authors used two types of data, namely qualitative data and quantitative data. Qualitative data is the result of direct interviews with a number of USU students using the Shopee, Tokopedia and Bukalapak marketplaces. The results of interviews with USU students focus on factors related to the market that users are interested in, marketplace criteria why someone uses the marketplace. These criteria are strategies that will be used as input data in the questionnaire.

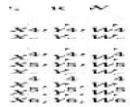
The location used to conduct research is the University of North Sumatra. The research was conducted from January to July 2021. Population is a generalization area consisting of objects or subjects with certain numbers and characteristics set by researchers to study and draw conclusions (Sugiyono, 2016). Homogeneous is the nature of the population in this study, namely a population whose elements have the same nature or condition, so that when sampling there is no need to question the number with an unlimited type of population, in particular. It can be a population whose number is not

known with certainty, for example, the number of users of online transportation applications or services throughout the University of North Sumatra is numerically uncertain because the number is always changing, so the population for this study consists of all students who have used the Shopee, Tokopedia and Bukalapak marketplaces.

To determine the sample size, various statistical formulas can be used so that the sample taken from the population actually meets the requirements of an acceptable level of confidence and an acceptable level of sampling errors. The sample for this study was selected randomly. The number of samples in this study was limited to 100 samples which were considered sufficient to represent the population. The data collection techniques used by the authors in this research are Literature Study, Interview and Field Research.

Based on interviews with Shopee, Tokopedia, and Bukalapak marketplace users, it can be seen that the important things in the marketing strategy of each marketplace are price, product, promotion, ease of transaction, discount coupons, and product reviews. Where the variables studied are, X is the Shopee marketplace strategy variable, Y is the Tokopedia marketplace strategy variable, and W is the Bukalapak marketplace strategy variable.


 = Price  
 = Product  
 = Promotion


 = Discount Vocher  
 = Ease of Transaction  
 = Product Review

## RESULT AND DISCUSSION

### *Data Validity and Reliability Test*

#### *Data Validity Test*

The data validity test is used to determine whether the research strategies are valid or not. Checking the validity of the data from this study using SPSS 25 software, where the decision-making criteria if  $r_{hitung}$  greater than  $r_{tabel}$  then the question item is declared valid (Ghozali, 2005).

Validity test in the preliminary questionnaire with  $n = 100$ , degrees of freedom ( $df$ ) =  $n - 2 = 98$  and significant level = 5 % then  $r_{tabel} = 0,195$  where is the r table with a significant level of 5%. For example, to find the value of  $r_{hitung}$  The pricing strategy at the necessity level is:

$$r_{hitung} = \frac{n(\sum X_1 Y) - (\sum X_1)(\sum Y)}{\sqrt{\{(n \sum X_1^2) - (\sum X_1)^2\} \{(n \sum Y^2) - (\sum Y)^2\}}}$$

$$r_{hitung} = \frac{100(11.209) - (409)(2688)}{\sqrt{\{(100 \times 1763) - 167.281\} \{(100 \times 73.124) - 7.225.344\}}}$$

$$r_{hitung} = \frac{21.508}{28.020,6721}$$

$$r_{hitung} = 0,768$$

Furthermore, the overall test was carried out with the help of SPSS 25 software. The results of the preliminary questionnaire data validity test in full are shown in table 1.:

**Table 1. Validity Test Results of Questionnaire Data**

No	Strategy	Validity of Questionnaire		Questionnaire Data		Description
		$r_{hitung}$	$r_{tabel}$	$r_{tabel}$	Desc	
1	Price	0,768		0,195		Valid
2	Product	0,727		0,195		Valid
3	Promotion	0,461		0,195		Valid
4	Discount Vouchers	0,698		0,195		Valid
5	Ease of Transaction	0,702		0,195		Valid
6	Product Review	0,629		0,195		Valid

### Data Reliability Test

Data reliability test is carried out to determine the level of confidence in the measurement results. If a person's answer to a question is consistent from time to time on a questionnaire, it is said to be reliable or trustworthy. The value of a questionnaire is considered reliable if it provides  $\alpha > 0,60$  (Ghozali, 2001).

From the results of the preliminary questionnaire reliability test using SPSS 25 software, the value  $\alpha = 0,743$  was obtained. In this case, each item or strategy, namely price, product, promotion, discount voucher, ease of transaction and product review, is declared reliable because the obtained value of  $\alpha = 0,743 > 0,60$ .

The results of the questionnaire data reliability test using the SPSS 25 software application are shown in table 2:

**Table 2. Data Reliability Test Results**

No	Strategies	Cronbach's Alpha	Description
1	Price	0,682	Reliable
2	Product	0,681	Reliable
3	Promotion	0,766	Reliable
4	Discount Vouchers	0,696	Reliable
5	Ease of Transaction	0,688	Reliable
6	Product Review	0,716	Reliable

## CONCLUSION

From the discussion that has been described, it can be obtained that the game data between Shopee and Tokopedia obtained an optimal game value of 2.4443. The game was won by Shopee by using a mixed strategy, namely a discount voucher strategy with a probability of 0.1111 and a product review strategy with a probability of 0.8888. Meanwhile, to minimize its defeat Tokopedia uses a discount voucher strategy with a probability of 0.7777 and a transaction convenience strategy with a probability of 0.2222.

Between Shopee and Bukalapak obtained an optimal game value of 6. The game was won by Shopee by using a pure strategy, namely the product strategy. Meanwhile, to minimize its defeat Bukalapak uses a discount voucher strategy.

Between Tokopedia and Bukalapak obtained an optimal game value of 8.9925. The game was won by Tokopedia by using a mixed strategy, namely the price strategy and discount vouchers with each probability of 0.49925. Meanwhile, to minimize its defeat Bukalapak uses a promotion strategy and discount vouchers with a probability of 0.49925 each.

In the competition between Shopee, Tokopedia, and Bukalapak, the Nash equilibrium point is located at point (X<sub>4</sub>, Y<sub>2</sub>, W<sub>3</sub>) with a pay off value of (64,56,43), namely Shopee with a discount voucher strategy (X<sub>4</sub>), Tokopedia with a Product strategy (Y<sub>2</sub>), and Bukalapak with a promotion strategy (W<sub>3</sub>) which is the optimal strategy of each player.

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