Journal of Physics: Conference Series **1569** (2020) 032004 doi:10.1088/1742-6596/1569/3/032004

Analysis of Smartphone Users Movement Using Data Mining Methods and SWOT Analysis in East Surabaya Areas

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Abstract. Smartphones are not only based on main functions such as calling and sending SMS, but the complete features and design are the basis for consumers to buy a smartphone. A consumer will be selective in choosing the type and brand, but does not rule out the possibility that consumers will switch to other brands. Companies need to know the desires and things that consumers need in choosing brands and types of smartphones. Based on the problems that occur, this research was conducted. The research data is sourced from offline questionnaires that are distributed to consumers who have made a move to a smartphone brand. There were 107 questionnaires collected and 105 questionnaires which stated that the filling method was correct. The collected data will be tested for validity and reliability to determine the extent to which the data is considered valid. To solve this problem, data mining methods are used that can determine the percentage of users who move. For smartphone brands that experience a decline in users, a marketing strategy will be created using SWOT analysis. The results of this study turned out that Oppo and Samsung smartphone users had decreased. The marketing strategy for Samsung smartphones is by giving discounts or giving gifts for large party purchases. Then for the Oppo smartphone marketing strategy is to reduce promotional costs and invest more into the RnD so that the product continues to be innovative.

Keywords: 7P, SWOT Analysis, Marketing Mix, Data Mining, Decision Tree

1. Introduction

Technological competition in the industrial world which is increasingly rapid encourages each company to be able to compete by prioritizing products in the form of goods or services offered to consumers. In the last few decades, a large amount of data has been achieved in the process industry, due to the extensive use of distributed control systems. While it is becoming more and more difficult to build first principle models in increasingly complex processes, data-based process modeling, monitoring, prediction and control have received a lot of attention in recent years [1], one of which is by providing information about design [2] product to be produced. The development of smartphones in Indonesia is rapidly increasing, several smartphone manufacturers are able to make cellphones that can meet the needs of the community. Although not yet comprehensive in all parts of Indonesia, advances in smartphone technology have spread to almost all levels of Indonesian society, including in the city of Surabaya. This perspective recognizes the nature of interdisciplinary research in gathering data about the development of this rapidly developing smartphone technology.[3]

To analyze the needs of the community which is quite rapid, the SWOT analysis study that focuses on solving shortcomings separately is needed, so researchers try to offer approaches to identify SWOTs based on customer satisfaction surveys that produce SWOTs according to customers. 4] So to find out the various brands, types and models of smart phones now give consumers many choices, so consumers will be selective in choosing the type and brand of smartphones to meet their wants and needs. Therefore the researchers propose using a methodology that identifies and automatically

classifies information about the needs of the community and a company's business environment correctly and accurately [5] But it does not rule out the possibility that consumers will switch to other brands that they feel have other advantages and can satisfy the desires they. Companies need to know the desires and things needed by consumers who are the target of marketing, especially what are the dominant factors that can influence consumers in choosing the brand and type of smartphone. In the strategy-making effort, over the decades, more and more companies have used SWOT analysis as fundamental.[6]

Based on the competition, each smartphone brand is getting tougher so an optimal strategy is needed. In this study using data mining methods that can determine the percentage of users who move. For smartphone brands that are experiencing a decline in users, a marketing strategy will be created using SWOT analysis. Especially focusing on increasing prediction accuracy are the two most commonly used study methods in this field. [7]

2. Literature Review

A. 7P Marketing Mix

The marketing mix of services involves all variables that can be controlled and provided by organizations to meet market demands and target markets. [8] In real business life, professionals are faced with the need to change and significantly improve traditional management methods and tools. And especially regarding marketing [9] The marketing mix itself is a collection of strategies to combine marketing activities to create the maximum combination and can produce the most satisfying responses desired by the target market. The goal is that the marketing mix of services is to build awareness of marketing that is environmentally friendly, especially in aspects of the product and to increase consumer awareness of the product and its environmental attributes in the hope of bringing about buying behavior. [10] Meanwhile, according to Pertiwi et al, the marketing mix is a set of marketing variables that are controlled by producers to achieve goals in the target market.

B. Data Mining

Data Mining is a process that uses statistical, mathematical, artificial, and machine learning techniques to extract and identify useful information and related knowledge from various databases. [11] In other words, the goal of Data Mining is to be able to produce reliable business intelligence and its impact on society is very high. [12] By proposing non-parametric grouping techniques for processing data mining that has been collected. [13] With data mining, information will be obtained in the form of knowledge in a large number of data sets. The classification algorithm involves finding rules that partition data into separate groups. A set of classification rules is generated by such a classification process, which can be used to classify future data. [14] Big Data Mining focuses on information that provides comprehensive knowledge that can represent predictive, current and historical views that can help in making accurate business decisions. [15] Data mining can be applied to various fields that have a number of data, but because the research area has a long history, and has not passed through the 'adolescence' period, data mining is still being debated. the position of the field of knowledge that has it. So that the classification methods and techniques from various fields that have different data can still be found in Knowledge Discovery in data mining. [16]

C. SWOT Analysis

The SWOT theory originated in the 1960s, and was put forward by E. P. Learned, Harvard University management professor. It has been gradually popularized and widely used in making corporate strategic plans, by systematically evaluating various internal and external environmental factors, so as to facilitate the selection of the best SWOT business strategy [17] means the company's internal strengths (strengths) and weaknesses (opportunities) (opportunities) and threats (threats) to the

external environment they face. The benefits of using SWOT Analysis are as practical methodologies that are sought to build successful strategies by analyzing the strengths, weaknesses, opportunities and Threats of a company. [18] Basically the notion of SWOT analysis is a well-known historical technique in which managers make an overview of the company's strategic situation. Minimum internal and external factors are calculated for aggregation. [19] Thus the study referring above clearly shows the popularity of the current SWOT analysis in the management community. Although there is also much academic research on SWOT, relatively little attention has been given to understanding the social and institutional contexts that have shaped the historical emergence and evolution of SWOT. [20]

3. Research Methods

Identification of Variables and Operational Definitions

a. Bound Variables (Dependent Variable) are variables whose values depend on variations in changes in the independent variable. In this study the dependent variable is a brand that has a decrease in the percentage of smartphone users.
b. Independent Variable is a variable that affects the variation in changes in the value of the dependent variable. In this case the included independent variables are:

Smartphone Brands:

a. Advan
b. Samsung
c. Oppo
d. Vivo
e. Xiaomi

4. Results and Discussion

A. Data Adequacy Test

By pre-questionnaire and disseminate 30 questionnaires in the East Surabaya area, the number of samples obtained is as follows:

Where :

n = 95,75 ≈ responden

B. Matlab Data Output for Data Mining Method

Decision Tree using Matlab software can produce output to show consumer behavior such as gender, age, education, employment, and income. The following coding is inputted in the Matlab software and can be seen in figure 1 :

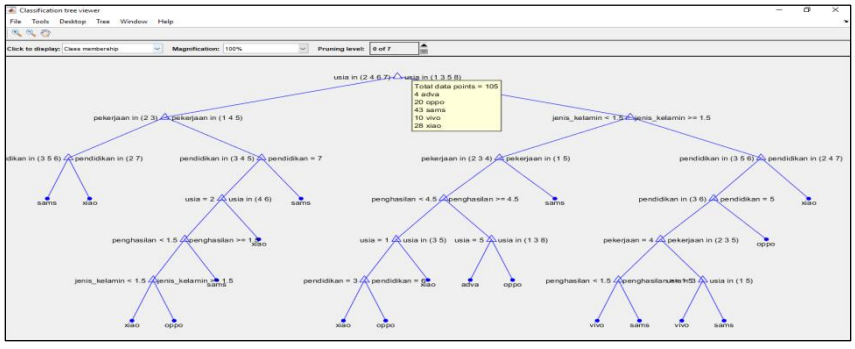

Figure 1. Output decision tree Matlab for Period I with class membership
Source: Researcher

4.1. Interpretation of Results

To differences of the number of smartphone users can be seen on table 1.

Table 1. Differences in the Number of Smartphone Users in Each Brand

Merk Names	1st Period		2rd Period		Explanation
	Quantity	Probability	Quantity	Probability	
Advan	4	3,81%	4	3,81%	Constantly
Oppo	20	19%	18	17,1%	↓ 1,9%
Samsung	43	41%	24	22,9%	↓ 18,1%
Vivo	10	9,52%	18	17,1%	↑ 7,58%
Xiaomi	28	26,7%	41	39%	↑ 12,3%

Source: Primary Data

4.2. Samsung SWOT Matrix

The two tables are then calculated to determine the position of the company in what quadrant, the calculation can be seen on table 2.

Table 2. Samsung SWOT Quadrant Calculation

Pivot	Factors		Results
X	Strength 2,733788396	Weakness 0,311717861	1,211035267
Y	Opportunity 0,812776353	Threat 2,327339903	-0,757281775

This position is obtained from the results of total strength minus total weakness then divided by 2, the result as coordinator factor x and for the factor of coordinator y obtained from the results of total opportunities minus total threats divided by 2, which is (x, y) = which can be seen in the following figure 2 :

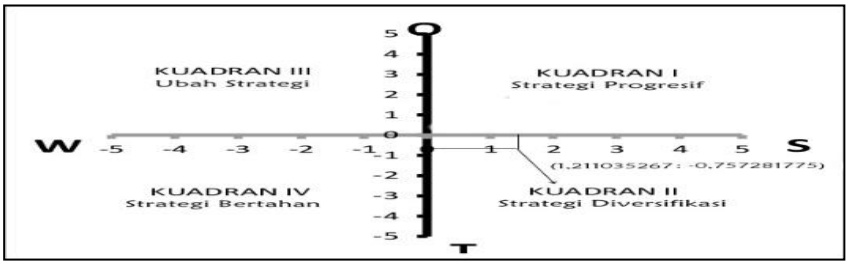

Figure 2. Diagram of Samsung Smartphone SWOT

4.3. Oppo SWOT Matrix

To Quadrant Calculation and Diagram of Oppo SWOT can be seen on table 3 and in figure 3.

Table 3. Oppo SWOT Quadrant calculation

Pivot	Factors		Results
X	Strength 2,247761194	Weakness 0,940298507	1,59402985

Y	Opportunity 1,587912461	Threats 1,31781164	0,929006641

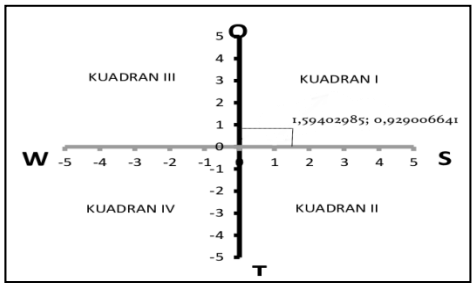

Figure 3. Diagram of Oppo Smartphone SWOT

Based on the data processing that has been done, it can be interpreted that for the first period with class memberships the Advan brand smartphone in the first period there were 4 users with a probability of 0.0381 (3.81%), for Oppo brand smartphones in the first period there were 20 users with a probability of 0.19 (19%), for Samsung brand smartphones in the first period there were 43 users with a probability of 0.41 (41%), for Vivo brand smartphones in the first period there were 10 users with a probability of 0.0952 (9.52%), for brand smartphones Xiaomi in the first period there were 28 users with a probability of 0.267 (26.7%).

For the second period with the class membership smartphone Advan brand in the second period there were 4 users with a probability of 0.0381 (3.81%), for the Oppo brand smartphone in the first period there were 18 users with a probability of 0.171 (17.1%), for Samsung brand smartphones in the first period there were 24 users with a probability of 0.229 (22.9%), for Vivo brand smartphones in the first period there were 18 users with a probability of 0.171 (17.1%), for Xiaomi brand smartphones in the first period there were 41 users with a probability of 0, 39 (39%).

5. Conclusion

Based on data results obtained, conclusions can be drawn as follows:
From 105 respondents studied, in period I, the probability of Advan brand smartphone users was 3.81% and there was no change in period II. In period I, the probability of Oppo brand smartphone users was 19% and in the second period there was a decrease of 1.9%. In period I, the probability of Samsung brand smartphone users was 43% and in period II there was a decrease of 18.1%. In period I, the probability of Vivo brand smartphone users was 9.52% and in period II there was an increase of 7.58%. In period I, the probability of Xiaomi brand smartphone users was 26.7% and in the second period there was an increase of 12.3%.

References

[1] Zhiqiang GE , Zhihuan Song, Steven X. Ding, And Biao Huang, 2017, Data Mining and Analytics in the Process Industry: The Role of Machine Learning, Vol. 5, 2017, p. 2169-3536
[2] Wang John. 2019. International Journal of Data Mining, Modelling and Management. ISSN online 1759-117. ISSN print 1759-1163.
[3] Xiaohua (Tony) Hu. 2019. International Journal of Data Mining and Bio informatics. ISSN online 17-5681. ISSN print 1748-5673.

[4] Boonyarat Phadermroda, b.*, Richard M. Crowdera, Gary B. Willsa. 2016. Importance-Performance Analysis based SWOT Analysis. International Journal of Management. Nakhon Pathom. Thailand.
[5] Yoon-Sung Kim. Hae Chang Rim. Do-Gil Lee. 2019. Business Environmental Analysis for Textual Data Mining and Sentence-Level Classification. Industrial Management & Data Systems. Vol. 119 Issue: 1, pp. 69-88. Emerald Publisihing Limited. Seoul. Korea.
[6] Charis Vlados. On a Correlative and Evolutionary SWOT Analysis. 2019. On a Correlative and Evolutionary SWOT Analysis. Emerald Publisihing Limited. Komotini. Greece.
[7] Xuejun Zhu. Xiaona Jin. Dongdong Jia. Naiwei Sun and Pu Wang. 2019. Application of Data Mining in an Intelligent Early Warning System for Rock Bursts. EISSN 2227-9717. Basel Switzerland.
[8] Samereh Yaghubian, Ghahraman Mahmoudi and Mohammadali Jahani Tiji, 2016, Effect of Marketing Mix (7PS) on Patients' Tendency to University and Social Security Hospitas in Mazandaran, BBRC Print ISSN: 0974-6455. P.776-782.
[9] Elena V. Pogorelova, Irina V. Yakhneeva, Anna N. Agafonova and Alla O. kubovskaya, 2016, Marketing Mix for E- Commerce, Vol. 11, 14., p. 6744-6759.
[10] Abdullah Osmana. Yususf Hj Othmana. Shahrul Nizam Salahudinb*. Muhammad Safizal Abdulah.2016. The Awareness And Implementation of Green Concepts In Marketing Mix: A case of Malaysia. 7th International Economics & Business Management Conference. Procedia Economics and Finance 35 (2016) 428-433 2212-5671. Malaysia
[11] Eka Sugiyarti. Kamarul Azmi Jasmi. Bushrah Basiron. Miftachul Huda. Shankar K. Andino Maseleno. 2018. Decision Support System of Scholarship Grantee Selection Using Data Mining. International of Journal of Pure of Applied Mathematics. 199(150); 2239-2249. ISBN; 1314-3395.
[12] Shoban Babu Sriramoju, 2017, Opportunities and Security Implications of Big Data Mining, Vol. 3, p. ISSN: 2394-8280.
[13] Ashish Dutti. Maizatul Akmar Ismail and Tutut Herawati. 2017. A Systematic Review on Edcational Data Mining. Digital Object Identifier 10.1109/ ACCESS. 2017.2654247. Vol. 5. 2169-3536 IEEE.
[14] V. Rajeswari, K. Arunesh, 2016, Analysing Soil Data Using Data Mining Classification Techniques, Vol. 9 (19), ISSN (Print) : 0974-6846
[15] Shoban Babu. 2017. Opportunities and Security Implications of Big Data. International Journal of Research in Science & Engineering. Vol. 3 p-ISSN : 2394-8280.
[16] Amjad Abu Saa. 2016. Educational Data Mining & Students' Performance Prediction. (IJACSA) International Journal of Advanced Computer Science and Applications. Vol.7, No.5. 212.
[17] Xiaofeng Tang1. Xiancheng Su. Zhuang Chang. Sujun Li. Zhiyong Zhao. Advances in Economics, Business and Management Research -1st International Conference on Business, Economics. Management Science. Vol. 80. Published by Atlantis Press.
[18] Mohamed Abdel-Basset. Mai Mohamed and Florentin Smarandache. 2018. An Extension of Neutrosophic AHP-SWOT Analysis for Strategic Planning and Decision-Making. Symmetry - MDPI. 116.
[19] Mohammad Taghi Taghavi. Hannan Ammozad Mahdiraji. Amir MAssoud Alibakhshi.Edmundas Kazimieras Zavadskas and Romualdas Bausys. 2018. An Extension of

Fuzzy SWOT Analysis: An Application to Information Technology. Information 2018, 9, 46; doi:10.3390/info9030046.

[20] Dag Oivind Madsen. 2016. SWOT Analysis: A Management Fashion Perspective. International Journal of Business Research. Pp. 39-56. ff10.18374/IJBR-16-1.3ff. ffhal-01306102f