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User Persona Clustering to Enhance Digital Marketing Strategy in Bakrie University

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ABSTRACT

Purpose – This report describes the Clustering of User Personas on the Digital Marketing Strategy of Bakrie University. In carrying out the testing of this algorithm, the data used is sample data from Bakrie University students. In this application, the application of clustering using the K-means algorithm is used. In the results of this study, Bakrie University can do effective digital marketing using social media Instagram. The Industrial Revolution 4.0 has transformed technology and education, pushing institutions to adopt innovative marketing strategies. This study focuses on Bakrie University's digital marketing efforts using the K-Means clustering method to analyze student personas. Data from 100 students revealed three distinct clusters based on demographics, social media usage, and preferences.Cluster 1 (younger group) favored Instagram and YouTube, Cluster 2 relied heavily on Instagram, and Cluster 3 (older group) used a mix of Instagram, YouTube, and Facebook. On average, users across all clusters spent 4-8 hours daily on social media, emphasizing its significance in marketing. The study concludes that Instagram is the most effective platform for engaging all clusters, with YouTube serving as a supplementary tool. These insights demonstrate how clustering analysis can help educational institutions develop targeted, data-driven strategies to strengthen their brand, attract students, and enhance their competitiveness in the digital era.

INTRODUCTION

The world has now entered the Industrial Revolution 4.0 phase. The Industrial Revolution 4.0 is the implementation of the automation technology and data exchange industry, which is influenced by the development of technology and the internet, or digitalization in industry. The development of technology in the Industrial Era 4.0 is very rapid and influences people's habits. This is a new challenge for an organization to establish itself as a market leader in every business field it is engaged in. One of them is the education sector, as a developing country entering this era of globalization, Indonesia faces several important challenges in its education system. The basic question is whether the Indonesian education system is ready to face the era of globalization? In fact, it is necessary to review the readiness aspect of the existing education system, one of which is the readiness of educational institutions in carrying out their operational activities which are expected to be able to produce quality human resources for the progress of the nation's future.

The emergence of many educational institutions in Indonesia today on the one hand indicates a positive sign of the high interest of the nation and society in the world of education, but on the other hand, this creates increasingly interesting competition between educational institutions. With this basic idea, marketing is considered to have a very important role for educational institutions. Because education is an interactive and continuous cyclical process, universities and schools as providers of educational services need to learn and prepare marketing initiatives and strategies to increase customer satisfaction in order to win the competition between educational institutions and accelerate the improvement of the quality and expertise of educational institutions. Bakrie University is one of the educational institutions involved in the competition of educational institutions in Indonesia.

Bakrie University is a private university located in South Jakarta which is under the auspices of the Bakrie Education Foundation. Currently, Bakrie University offers educational programs at the undergraduate level with various majors such as management, accounting, communication science, informatics, information systems, international relations, public policy, industrial engineering, civil engineering, environmental engineering, and food science and technology. No less competitive than other well-known universities, Bakrie University also provides a postgraduate program for the management department which is one of its attractions. Another advantage of Bakrie University is the availability of sustainable and diverse scholarship programs. Since its founding in 2006, Bakrie University has provided scholarships to more than hundreds of students who have been selected to take the student screening exam in Indonesia, where most of these students receive full scholarships for four years through rigorous exams. Reported from the official Times Higher Education page, Bakrie University is also listed as the second best private university in Indonesia in 2021, it is said that Bakrie University has a selective admission policy based on entrance exams and academic records and student education history.Bakrie University supports theoretical and practical learning with guest lectures, company visits and internships. With a network of more than 250 companies in various industries including property, telecommunications and media communication businesses, Bakrie University students have the opportunity to do internships in all of these industries. Facilities and services for students are provided by the campus to meet and facilitate daily teaching and learning activities, such as computer labs, libraries, studios, and student lounges. In order to support the balance of intracurricular and extracurricular activities of students, Bakrie University also provides several clubs for student organizational activities that are managed and can be joined by all students according to their interests and talents. The clubs offered include the Bakrie University student choir, nature-loving student families, journalism, Bakrie University badminton student activity units, and so on.

These things that Bakrie University previously had are expected to be added value to support Bakrie University's marketing strategy. To overcome competitor penetration, Bakrie University needs to prepare a digital marketing strategy to face the rapid digital transformation and the phenomenon of internet usage in Indonesia which is so large. In general, the use of the internet to achieve marketing goals (Internet Marketing) is more focused than traditional media, and makes communication more interactive with the aim that information is more easily accepted by the market, and marketing activities can be carried out at any time.The development of information and communication technology and the expansion of infrastructure are in line with the increase in internet users in Indonesia. There are different backgrounds for internet users to take advantage of opportunities to surf the internet, including the use of social media and also access to the desired website. The reasons for choosing various types of applications on the internet include finding information to meet their needs, doing something for entertainment, and eliminating user fatigue.Nowadays, following the rapid movement of information technology, digital marketing strategies can be carried out in several ways such as websites and social media. Implementation on university websites is intended for branding or brand strengthening and

promotion that can influence the decision to choose a college by future students. Not only that, Youtube, Instagram, Tik Tok, Twitter and so on can be alternative digital marketing for universities to reach their target market. Social media can be a consideration in marketing, because of the large number of users who use social media. Social media is now not a private space but a public space for the millennial generation who are able to spend hours using social media, to share pictures, photos, videos, or just look around, and interact by commenting.

Based on data released by Hootsuite, a content management service site that provides online media services that are also connected to various other social networking sites, in 2021, of the total population of 274.9 million in Indonesia, 73.7% were internet users and 61.8% were active social media users. Based on a survey conducted on internet users aged 16-64 years, the total internet usage time in Indonesia is an average of 8 hours 52 minutes a day (Di Tella & MacCulloch, 2006; Hair et al., 2018). On the other hand, based on a survey by the Indonesian Central Statistics Agency (BPS) in 2020, the age range of the population that currently accesses the internet the most is 25 to 49 years old. This means that this age range has the most potential to follow current internet developments.The use of Youtube social media in 2021, found that 93.8% of the total users in Indonesia are Youtube users with an average access time of 25.9 hours per month. The use of Instagram social media in Indonesia is slightly lower at 86.6% with an average user access for 17 hours per month. The social network Facebook ranks below Instagram with 85.5% of the 170 million active social media users. Meanwhile, Twitter takes a portion of 63.3%, and 38.7% of the total social media users also access Tik Tok. In this study, it is necessary to know the clustering of Bakrie University user personas, so that it is known what kind of digital marketing strategy is most effective to implement in running the Bakrie University marketing process.

LITERATURE REVIEW

Data mining is the process of discovering patterns, relationships, and useful information from large datasets. It involves analyzing data from different perspectives and summarizing it into actionable insights. Data mining is commonly used in various industries such as marketing, healthcare, finance, and manufacturing to make data-driven decisions. Windarto (2017) said data mining is a method of data processing to find hidden patterns from the data. The results of data processing with this data mining method can be used to make decisions in the future (Iskamto, 2023; Iskamto & Juariyah, 2023). Data mining is also known as pattern recognition. Data mining is a large-scale data processing method, therefore data mining has an important role in the fields of industry, finance, weather, science and technology. In general, data mining studies discuss methods such as clustering, classification, regression, variable selection, and market basket analysis (Ong, 2013). According to Suyanto (2017), data mining is aimed at extracting knowledge from a set of data so that a structure is obtained that can be understood by humans and includes databases and data management, data pre-processing, model and inference considerations, measures of interest, complexity considerations, post-processing of the structures found, visualization and online updating. Key characteristics of data mining are as follows:

- Exploration of large datasets by extracting meaningful information from vast amounts of data.
- Pattern recognition through trends, correlations, or anomalies identification.
- Predictive Analysis by using patterns to predict future trends or behaviors.
- Automation, it means employing algorithms and machine learning techniques to process data automatically.

According to Han, *et al* (2012) clustering is the process of partitioning a set of data objects (observations) into subsets that can be used to organize search results into groups and present the results in a concise and easily accessible manner. Clustering is widely used in various fields with a variety of very important applications including market research, recommender systems, security systems and search engines. Clustering or classification is a method used to divide a series of data into several groups based on predetermined similarities. A cluster is a group or set of data objects that are similar to each other in the same cluster and dissimilar to objects in different clusters. Objects will be grouped into one or more clusters so that objects in one cluster will have high similarities between each other (Widodo, 2013).Vulandari (2013) argued that K-means is an algorithm that determines cluster values (k) randomly, temporarily the value becomes the center of the cluster which is usually called the centroid.

Then calculate the distance of each existing data to each centroid using the 9las an9n formula until the closest distance of each data to the centroid is found until the centroid value does not change (stable). Suyanto (2017) explained that K-means is a clustering algorithm that has a simple basic idea by minimizing the Sum of Squared Error (SSE) between data objects with a number of k centroids. The K-means algorithm is one of the partitional algorithms, because K-Means is based on determining the initial number of groups by defining the initial centroid value (Madhulatha, 2012). The K-means algorithm uses an iterative process to obtain a cluster database . It takes the desired initial number of clusters as input and produces the final centroid points as output. The K-means method will select k patterns as the starting point of the centroid randomly. The number of iterations to reach the cluster centroid will be influenced by the initial candidate cluster centroid randomly. So that a way is obtained in developing the algorithm by determining the cluster centroid which is seen from the high initial data density in order to get higher performance (Hung *et al*., 2005, Saranya & Punitha Valli, 2011, Altibi & Ashour, 2011).

According to Chaffey and Chadwick (2016), also Purwana (2017), basically digital marketing is a marketing activity that uses digital media using the internet which utilizes media in the form of the web, social media, email, database, mobile or wireless and digital TV to increase consumer targets and to find out the profile, behavior, product value, and loyalty of customers or target consumers to achieve marketing goals. Meanwhile, based on Coviello *et al*. (2001) argument, that digital marketing is the use of the internet and other interactive technologies to create and connect dialogues between companies and identified consumers. They also argue that e-marketing is part of e-commerce. This marketing strategy can be divided into internet marketing and traditional marketing activities (Rafi & Fisher, 2003). The achievement of internet marketing interacts with the brand owned. In addition to being able to provide positive or negative influences, the brand itself can also be the result of internet marketing activities itself. The key components of digital marketing are search engine optimization or commonly known as SEO, content marketing, social media marketing, email marketing, pay-per-click advertising, affiliate marketing, influencer marketing, mobile marketing, video marketing also analytics and reporting.

METHOD

Research methods refer to the systematic processes, techniques, and strategies used to collect, analyze, and interpret data for answering research questions or testing hypotheses. These methods provide a structured approach to ensure the reliability, validity, and credibility of findings. Regarding this research, data collection was obtained from questionnaire distribution data to Bakrie University students. The data was filled in by 100 students. The data that has been obtained will be processed first to be able to be clustered. The method in this study uses the K-Means algorithm, where the K-Means algorithm performs clustering on the data being tested. The stage in grouping uses the K-Means algorithm according to Nur Wakhidah concept (Wakhidah, 2010). Clustering Analysis is the process of dividing data in a set into several groups whose data similarities in a group are greater than the similarity of the data with data in other groups. The potential of clustering is that it can be used to find out the structure in data that can be used further in various applications widely such as classification, image processing, and pattern recognition (Sadewo *et al*, 2017).

RESULT AND DISCUSSION

From the sketch of the existing data processing, the results of data processing using SPSS are as follows: The Final Cluster consists of cluster 1, cluster 2, and cluster 3. Meanwhile, in cluster 1, it is dominated by Male gender 74% and Female 26%. In Cluster 2, it is dominated by female as much as 100%, then for cluster 3, male is 72% and female is 28% as shown on Table 1 below.

Table 1. Final cluster center

	Cluster		
Gender	1	2	3
Male	0,74	-	0,72
Female	0,26	1,00	0,28

Base on Table 1 In the age group, cluster 1 is 19% aged 15-20 and 81% aged 21-25 years, for cluster 2 is 7% aged 15-20 years and 93% aged 21-25 years, in cluster 3 is 45% aged 26-30 years, 3% aged 21-25 years and 52% aged >31 years. Then, in cluster 1, 100% have income <10 million per month, in cluster 2, 93% have income <10 million per month and 7% have income> 10 million - 15 million per month, in cluster 3, 34% have income <10 million per month, 41% have income 10 million - 15 million per month, 7% have income>15 million - 20 million per month and 17% have income of 17%.

Table 2. Age Group

	Cluster		
Age group	1	2	3
15 - 20	0,19	0,07	-
16 - 30	-	-	0,45
21 – 25	0,81	0,93	0,03
>31	-	-	0,52

Base on Table 2 Still with the same analysis method, in the area or domicile for cluster 1, 100% come from the Jabodetabek area, in cluster 2, 93% come from Jabodetabek and 7% come from outside Jabodetabek, in cluster 3, 100% come from Jabodetabek. In the field of work for cluster 1, 2% are civil servants and 98% are students, in cluster 2, 14% are private employees, 3% are civil servants, 76% are students and 7% are entrepreneurs, in cluster 3, 62% are private employees, 7% are civil servants, 21% are students and 10% are entrepreneurs. Based on the study program group for cluster 1, 5% are Master of Management majors, 24% are Management majors, 10% are Industrial Engineering majors, 10% are Environmental Engineering majors, 14% are Food Science and Technology majors, 24% are Informatics Engineering majors and 14% are Information Systems majors, in cluster 2, 10% are Master of Management majors, 14% are Management majors, 7% are Industrial Engineering, 24% are Environmental Engineering, 28% are Food Science and Technology, 3% are Informatics Engineering, 3% are Political Science, 10% are Information Systems, and in cluster 3, 90% are Master of Management majors and 10% are from Bachelor of Management majors.

Table 3. Income Group

	Cluster		
Age group	1	2	3
<10 Million/ month	1	0,93	0,34
>10 to 15 Million/ month	-	0,07	0,41
>15 to 20 Million/ month	-	-	0,07
>20 Million/ month	-	-	0,17

Regarding information in knowing or getting to know Bakrie University in cluster 1, 69% came from relatives, 12% from the Bakrie University website and 19% through 19% social media, in cluster 2, 14% came to know Bakrie University from relatives, 21% from the Bakrie University website, 48% from social media and 17% from campus goes to school, in cluster 3, 59% came to know Bakrie University from relatives, 21% from the Bakrie University website, 14% from social media and 7% from television. Meanwhile, related the willingness or desire to receive email notifications in cluster 1, 90% are willing to receive information from email and 10% are not willing to receive information from email, in cluster 2, 79% are willing to receive information from email and 21% are not willing to receive information from email, in cluster 3, 48% are willing to receive information from email and 52% are not willing to receive information from email.

In terms of time spent using social media in a day in cluster 1, 24% use 2-4 hours, 45% use 4-8 hours and 31% use >8 hours, in cluster 2, 21% use 2-4 hours, 62% use 4-8 hours, 17% use >8 hours, in cluster 3, 3% use <2 hours, 41% use 2-4 hours, 45% use 4-8 hours and 7% use >8 hours. Judging from the type of social media, for cluster 1 36% use Instagram, 17% use Twitter, and 26% use YouTube, in cluster 2 62% use Instagram, 17% use Twitter and 3% use YouTube and in cluster 3 59% use Instagram, 10% use Twitter, 7% use Facebook, and 17% use YouTube.

CONCLUSION

Based on data processing using the K-means method above, the author can put forward several conclusions, including: in the digital marketing strategy of Bakrie University, Clustering User Persona can be used in cluster 1 using Instagram and Youtube, in cluster 2 using Instagram and cluster 3 using Instagram. With an average time usage in clusters 1, 2 and 3 for 4-8 hours. The suggestions put forward in this study are as follows:1). Bakrie University can carry out effective digital marketing using social media Instagram and Youtube.2.) The data used for subsequent research should be data obtained from the latest Bakrie University website so that the information produced is also the latest information.3.) In subsequent research, it is hoped that it can be compared using other clustering methods to produce better research

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