Ekspektra : Jurnal Bisnis dan Manajemen, Volume 8, Nomor 2, Hal. 185-197
ISSN 2549-3604 (Online), ISSN 2549-6972 (Print)
DOI: https://doi.org/10.25139/ekt.v8i2

Markov Chain Analysis to Predict Instant Noodle Brand Switching (Case Study: Indomie and Mi Gaga)

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(Submit : 10th Sept 2024, Revised : 11th Sept 2024, Accepted : 22th Sept 2024)

ABSTRACT

Competition in the use of instant noodle brands in Indonesia makes the instant noodle industry need to conduct market share analysis. One of the market share analyses that can be used is the Markov chain analysis. Markov chain is a mathematical model that describes a system that undergoes a change in status from one state to another stochastically with the aim of seeing the transition of the community in changing the choice of Instant Noodle brands. The Instant Noodle brands used as objects are Indomie, Mi Gaga, and other brands. In this study, the data used is primary data, which is obtained by distributing questionnaires to the people of Pagedangan District as many as 100 respondents were selected using the purposive sampling method. This study aims to determine the prediction results of instant noodle brand switching opportunities and determine the state of market share (market share) of instant noodle brands using Markov Chain. The results of this study indicate the displacement of consumers from the three instant noodle products, namely Indomie, Mi Gaga, and Other Brands, where the probability of Indomie consumer displacement in the next 6 periods will be predicted to increase from 0 by 0.54 or 54%, in Mi Gaga by 0.41 or 41%, while in other brands only 0.05 or 5%. Furthermore, in the Market share of the three instant noodle products, namely Indomie, Mi Gaga, and Other Brands in the next 6 periods, the largest percentage is Indomie, which is 52.62%, while Mi Gaga is 43.11%, and other brands are only 4.28%. This shows that the Indomie sequence is the most in-demand by respondents.

Keywords : Instant Noodles, Brand Switching, Markov Chain

1. INTRODUCTION

In an era of increasingly fierce business competition, understanding consumer behavior is crucial for companies, especially in industries that can create internal and external competition. With more competitors, consumers have many choices that make them smarter in choosing products that meet their expectations (Azim & Nirmala Sari, 2020). Therefore, companies need to design products that meet the needs and desires

of consumers, and communicate more effectively to become the main choice of consumers (Syariah, 2020).

The success of a company depends on the effectiveness and efficiency of production activities. Production management needs to be managed and combined appropriately so as to increase production output or at least be able to meet planned production targets (Edo Erwindo, 2012). It is at this time that the role of the company is required to be able to unite all of that into its corporate institutions engaged in the industrial sector, such as one example, namely instant noodles. Instant noodles have become an integral part of the daily lives of people around the world. This phenomenon is particularly significant in Indonesia, where instant noodles are not just fast food, but also reflect an alluring cultural heritage and culinary variety (Azrianto, 2021).

Initially, instant noodles were considered a necessity, but their convenience has made them increasingly popular, especially among college students who often live away from their parents. In the instant noodle category, the Indomie brand has emerged as the market leader, dominating and influencing consumer preferences. PT Indofood CBP Sukses Makmur Tbk (ICBP) dominates the Indonesian instant noodle market. According to data from (https://databoks.katadata.co.id/), Indomie's product production capacity will account for 72,5% in 2023. Below are the total consumption data of instant noodle brands in Indonesia in 2023.

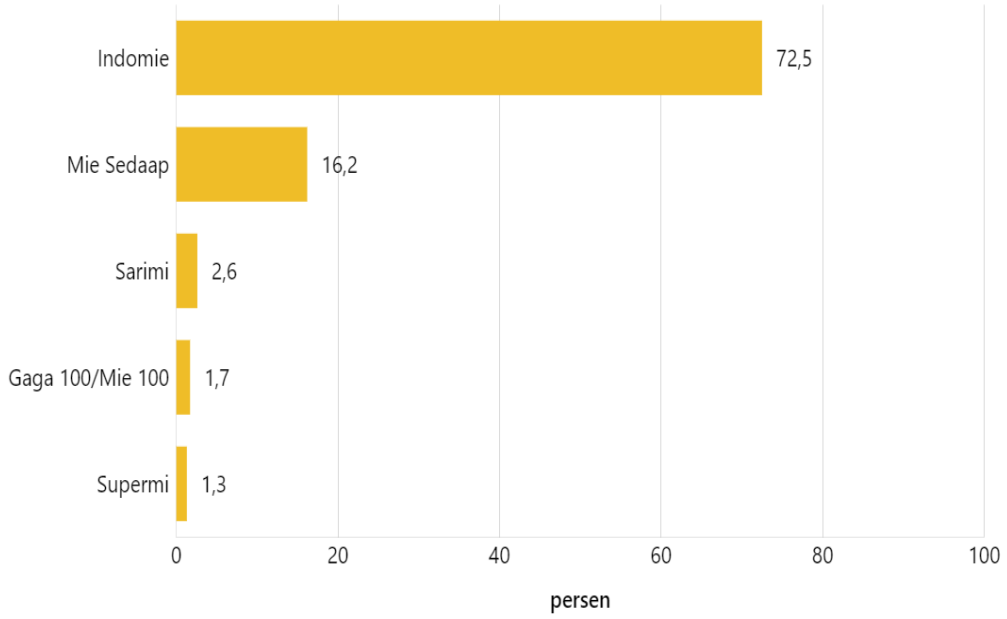

Figure 1: Total Data on Instant Noodle Consumption in Indonesia in 2023
Sources : https://databoks.katadata.co.id/ (in 2023)

Figure 1 shows that 72.5% of the respondents frequently ate Indomie brand instant noodles in the past year. Sedap was next at 16.2%. On the other hand, Sarimi ranked third with 2.6%; Mi Gaga came in fourth with 1.7%, and Supermi came in fifth with 1.3%.

In 2023, the Indonesian instant noodle market experienced an interesting phenomenon due to viral news on social media that revealed a rivalry between two well-known brands, Indomie and Mi Gaga. The Indomie and Mi Gaga timeline started with a video shared by Tiktok account @bigaplhaid on August 20, 2023. As a result,

consumer preferences have changed and many customers who are usually loyal to Indomie may want to try Mi Gaga, which could pose a strategic problem for Indomie. Famous influencers have also tried to review these two instant noodle brand products. One famous influencer, @nanakoot, reviewed two instant noodle products that are trending on social media in a post on the Tiktok application. His upload received 122,700 likes and 1,911 reactions and was shared 1,370 times. In the uploaded video, many people responded that they wanted to try Mi Gaga products or had never tried them. It is clear that brand switching exists and has the potential to affect market share and brand competition.

In this context, there is an opportunity to shift consumer interest in the Indomie and Mi Gaga brands. One approach that can provide a detailed picture is to use Markov chain analysis. Markov chain analysis is a mathematical technique that can present the movement of a system from one state to another with a certain probability (Khoirur et al., 2018). Markov chain analysis is relevant in this context because it can describe the dynamics of consumer switching between instant noodle brands. These brands are considered as 'states' in which consumers can live, and the probability of switching between brands can be calculated by considering various factors such as product quality, price, brand image, and marketing strategy.

Previous studies related to consumer displacement analysis using the Markov chain method have been conducted by several researchers with different case studies, and research conducted by (Masuku et al., 2018)used the Markov chain analysis method to identify airline consumer displacement. The results showed that the number of airlines on the Manado-Jakarta route in 2019 was as follows, namely Batik Air 32%, Garuda 29%, Lion 21% and Citilink 18%, and in 2020, Batik Air 32%, Garuda 29%, Lion 21% and Citilink 18%, with the balance The point has been reached.

According to a study by Tumanggor (2011), the Markov chain analysis method was used to predict brand switching of cooking oil products. The results of this study showed that there was a significant difference in consumers switching between cooking oil brands. A total of 25.0% and 7.7% more consumers switched to Sania and Sanco brands, respectively, compared to those who did not switch. In contrast, 3.8%, 2.0%, 21.2%, and 9.6% of consumers switched from Bimoli, Tropical, Filma, and other brands (Avena, Madima, Kunci Mas, and Curah). The majority of consumers (22.2%) choose the Bimoli brand of cooking oil. The reasons are its popularity, availability in many stores, and family habit. Furthermore, consumers choose Sania, Filma, and other cooking oils (Avena, Madina, Kunchi Mas, and Kula) for economic reasons, with 52.4%, 60%, and 100% of consumers of each brand stating that they choose them because they are more cost-effective. The importance of factors such as popularity (36.4% of Sunco consumers), nutritional information (66.7% of Tropical consumers), and the double filtration process (52.4% of Filma consumers) were also identified as reasons for consumers to choose these brands. Overall, 40.4% of consumers said that they changed cooking oil brands because they wanted to experiment or look for variety. In the market projection, it is estimated that Bimoli, Sania, and Sunco will dominate the market in the coming year with shares of approximately 39.40%, 25.10%, and 20.50% respectively after 2011, followed by other brands with shares of approximately 39.30%, 24.30%, and 22.3%.

Loban & Lalang (2021) study then examined the likelihood of consumers of a shampoo brand switching to another shampoo brand among students of the Faculty of Mathematics and Natural Sciences at Tribhuana University Kalabahi and predicted the

probability of shampoo brand switching. The results showed that shampoo brand switching reached a steady state at step 17: 42.6954% Sunsilk, 26.901% Pantene, 13.906% Dove, 13.521% Clear, and 2.977% other shampoo brands.

There are several significant differences between the above prior studies and related prior studies in the context of instant noodle brand switching. Namely, this study focuses on two major brands competing in the instant noodle market (Indomie and Mi Gaga). Prior studies have not addressed the influence of social media on consumers' brand switching decisions. This is especially important given that brand switching trends can change rapidly with the development of digital platforms and changing consumer preferences influenced by viral content.

Therefore, the problem set for this study was to clarify the prediction results of the future switching opportunities of instant noodle brands using Markov chains and the future market share status of instant noodle brands after the Markov process reaches the equilibrium point. The purpose of this study is to clarify the future forecasting results of instant noodle brand switching opportunities using Markov chains and the future status of instant noodle brand market share after the Markov process reaches the equilibrium point.

2. THEORETICAL FRAMEWORK

Markov Chain

Markov chains are the mathematical science of stochastic processes that describe data based on time series movements of observed variables. Markov chains are used to model various systems in mathematics and business processes in economics. A Markov chain consists of random variables $\{X_n; n = 0,1,2,3, \dots\}$ obtained from a stochastic process (Ross, 2014). These random variables form a chain and satisfy the Markov property. This method is used to estimate future changes based on variables that have changed in the past. Future events can be systematically analyzed using this method (Siswanto, 2007) .

In the Markov property, if there is a past state $X_0, X_1, X_2, \dots, X_{n-1}$, then the future state X_{n+1} is equal to the past state $X_0, X_1, X_2, \dots, X_{n-1}$ and equal to X_{n+1}, which means that it does not depend on the past state and the future state X_{n+1} only depends on the current state X_n. For an observation whose process is up to time n, the distribution of process values from time $n + 1$ depends only on the value of the process at time n. In general, it is written:

$$P(X_{n+1} = i|X_0 = j_0, X_1 = ji, \dots, X_{n+1} = j_{n+1}, X_{n=} j_n) = P(X_{n+1} = i|X_n = j)$$

Description:

P = Probability

X_{n+1} = i (future event)

X_n = j (current event)

In other words, the Markov property is the conditional probability of future events with past events, where the current event $X_n = j$ does not depend on past events, but only on the current state (Heller & Lieberman, 2008).

According to J. Supranto (2009), a matrix is a collection of numbers (elements) arranged in such a way that the rows and columns form a rectangle, with the number of rows and columns determining the length and width. A square matrix is a matrix with the same number of rows and columns $(m = n)$. A square matrix is:

$$A_{m\times n} = \begin{bmatrix} a_{11} & a_{12} & a_{13} & \dots & a_{1n} \\ a_{21} & a_{22} & a_{23} & \dots & a_{2n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & a_{m3} & \dots & a_{mn} \end{bmatrix}$$

Description:
$A_{m\times n}$= matrix A with m rows and n columns
a_{11}= Matrix elements in row 1 column 1
a_{12}= Matrix elements in row 1 column 2
a_{mn}= Matrix elements in row m column n

Transition probability matrix is a matrix whose elements are the probability values of brand switching from one brand to another or to the brand itself (Ross, 2007). These elements will be approximated by using the proportion of possible brand switchings across all observations. The switching from brand i to brand j for period t is defined by :

$$P_{ij} = \frac{n_{ij}(t)}{n_i(t)}$$

Probability refers to the likelihood of a random event occurring. An event is said to be random if its occurrence is unknown in advance. Therefore, probability can be used to measure the occurrence of future events. The minimum probability value is 0, which means that it is certain that the event will not occur. The maximum probability value is 1, which means that the event will occur. In general, the probability value for an event X is $0 \leq P(X) \leq 1$ (Subagyo et al., 1983).

To predict market share in the coming period, it can be obtained by multiplying the transition probability matrix by the market share of the first period, namely with the following formula:

$$MK(t) = MK(t-1)P$$

Description:
$MK(t)$ = Market share of each product in period t
P = Transition probability matrix

And if it continues to be developed, a formulation will be obtained to calculate $MK(t)$ with P which always remains constant at each t until a certain period of time.

If t = 1 $MK(1) = MK(0)P$
If t =2 $MK(2) = MK(1)P = MK(0)P^2$

Equilibrium Condition

Gaining or losing is a common occurrence in brand competition because of brand switching in consumers whenever they want. In the Markov process, conditions like this in the period will get smaller. With conditions like this, it is very vulnerable if a stable condition is reached in the future, where consumer switching no longer occurs (Mulyono, 2007). The state or condition in the Markov chain is written in vector form, namely the state vector. The state vector is an observation in a Markov chain with $X(t)$ state is row x, can be written:

$$x = [x_1, x_2, \dots, x_i]$$

Description:
x_1 is the transition probability in state 1
x_2 is the probability in state 2
x_3 is the probability in state i

If P is the transition matrix of the Markov chain and $x^{(n)}$is the state vector at

the observation then,

$$x^{(n)} = P^n x^0$$

Where x^oo is the event matrix $[x_1, x_2, \dots, x_i]$ (Howard & Rorres, 2005).

Fast Food Products

Fast food is food that has been processed and prepared for immediate consumption without the need for elaborate cooking. The main characteristics of ready-to-eat meals are simplicity and speed of preparation, which makes them a popular choice for people with busy schedules and those who need to respond to food needs quickly. Instant noodles are a fast-food product that can be prepared quickly and easily. Instant noodles have become a very popular fast food around the world, mainly due to their convenience and short cooking time. Some instant noodles are high in salt and fat, so they should be considered as part of a balanced diet. According to estimates by the World Instant Noodle Association (WINA), the average consumption of instant noodles in Indonesia is the second highest at 14,540 million servings in 2023. Increased consumption of instant noodles also means increased consumption of imported food, given that the majority of instant noodle products currently use wheat as the main ingredient. As a result, there has also been a shift in consumption away from foods such as rice, sago, tubers and corn. This type of cheap and practical food needs special attention from BPOM due to the almost unavoidable chemical preservatives and the wide range of consumers who are fond of it today.

Factors that affect consumer behavior

The concept of consumer behavior is continuously developed with various approaches. Consumer behavior is defined as the behavior shown by consumers to find, buy, use, evaluate, and spend products and services that they expect will satisfy their needs (Ujang Sumarwan, 2004). Consumer behavior describes how consumers make purchasing decisions and how they use and manage the purchase of goods or services. These decisions are based on their perceptions which are influenced by various factors. Several stages of buying decisions made by consumers, namely: the need recognition stage, the information search stage, the alternative evaluation stage, the purchase decision and finally the post-purchase behavior stage (Amstrong & kotler, 2015).

Market Share

Market share can be defined as the share of the market controlled by a company, or the ratio of its sales to the total sales of its largest competitors at a given time and place (Sabam & Tumanggor, 2011). If a company with a certain product has a market share of 35%, and the total number of similar products sold in a certain period is 1000, this means that the amount of sales that the company can get through the product is 350. Market share can change at any time due to changes in consumer preferences and shifts in consumer interest from one product to another (Charles Lamb, 2001).

Brand Concepts

The American Marketing Association defines a brand as a name, term, sign, symbol and design or combination to identify goods and services from a seller or group of sellers and differentiate from competitors' products (Rangkuti, 2004). The purpose of branding is to identify products or services offered by competitors is, a brand name, a brand mark such as a coat of arms, letter design or special name, trademark marks and copyrights protected by law, publishing and selling written works, musical works and artistic works. Every consumer has certain expectations of the products and services they use when making a purchase, and satisfaction is the expected outcome. Consumer satisfaction depends on the perceived effectiveness of the product or service in providing value relative to consumer

expectations. Consumers feel satisfied if the performance or achievement of the product /service matches or even exceeds expectations. Conversely, consumer dissatisfaction arises if the results do not meet consumer expectations.

Brand Switching

Brand switching is the activity of users switching brands from one product to another for one reason or another. Brand switching is part of brand loyalty, where loyal users use a particular brand (Durianto & Sugiarto, 2001). Brand loyalty has a meager growth rate, but today's competition is at a very challenging level of market conditions (Peter et al., 1996).

3. RESEARCH METHOD

This type of research is quantitative to provide an overview of the conditions or causes of the variables in the community that are the object of research based on the phenomena that occur. The data used in this study are primary data obtained by distributing questionnaires online via Google form to respondents, namely the community of Pagedangan District, Tangerang Regency.

Population and Sample

The population in this study was the entire community of Pagedangan District in Tangerang Regency. Meanwhile, sampling was carried out using the Purposive Sampling method, which is a sampling technique in which subjects are selected based on certain criteria that have been determined by the researcher (Sugiyono, 2012). The sample selection criteria in this study are: Respondents who have direct experience with the phenomenon being studied, namely people who change instant noodle brands, respondents who are willing and able to provide the information needed by the researcher and data collection was carried out at different times to obtain a more diverse variety of respondents.

To determine the sample size, the Lemeshow formula (Levy & Lemeshow, 2013) is used as follows:

$$n = \frac{Z^2.p.(1-p)}{d^2}$$

Description:

- n = sample size
- Z = Z score for confidence level (usually 1.96 for 95% confidence)
- p = estimated population proportion (if unknown, usually 0.5)
- d = margin of error

For this study, the researcher assumed a 95% confidence level and a 5% margin of error, and the proportion of the population that has certain characteristics is 50% (0.5).

Z=1.96

P=0.5

d=0.01

By entering these values into the formula, the sample size is calculated as follows:

$$n = \frac{1.96^2 .0.5(1-0.5)}{0.1^2}$$

$$n = \frac{0.9604}{0.01}$$

$$n = 96{,}04$$

So, the sample size needed is about 96.04 people. To anticipate non-response and

invalid data, the sample size was increased to 100 people.

Data Analysis Techniques

The analysis method uses data that is arranged and grouped, then analyzed to obtain a picture of the problems faced and to explain the calculation results. Data is obtained from primary data in the form of a list of questions that have been filled out by research respondents. After all data is collected, the design analysis is processed with the Markov Chain, so that the results of market share information, forecasts for the coming period, and other information related to things that influence the acquisition of market share are obtained .

This data processing is done with a first-order Markov Chain, which considers the choice of instant noodle brands for the next period. Data processing with Markov Chain is divided into several steps to get the desired information. These steps are as follows: Calculating the brand switching pattern of each instant noodle brand from the collected data so that the next market share information is also known (after the research is conducted). Then calculate the results of information regarding the possibility or ability of the product to maintain the number of users, the possibility of product users switching to other products, and the possibility of a product getting users from other products. After that, calculate the current market share of each instant noodle brand (when the research was conducted) from the results of questionnaire data collection. Next, calculate the market share forecast of instant noodle brands for the next period consisting of the period after the study and the second period after the study, and finally interpret the results of the Markov Chain analysis (Rambe & Jabbar M, 2005).

4. RESULTS AND DISCUSSION

Analysis of Instant Noodle Brand Switching Patterns

In this study, the data needed to support the analysis using the Markov chain method is data on the number of consumers, consumer switching data, the number of losses, and the number of consumer acquisitions shown in the following table:

Table 1: Current and Past Instant Noodle Consumption Amount

Instant noodles	Consumers past	Additional from other brands	Switching to other brands	Consumers today
Indomie	63	18	27	54
Mi Gaga	30	26	15	41
Other brands	7	3	5	5
Total	100	47	47	100

Sources: data processed in 2023

Table 1 shows that currently, Indomie is the instant noodle brand most chosen for consumption by consumers. Currently consumed by 54 respondents. However, if observed, Indomie experienced a decrease in the number of consumers from 63 to 54, although it managed to attract 18 new consumers from other brands, this decrease was caused by 27 consumers who switched to other brands. The shift of Mi Gaga consumers and other brands moved to Indomie, namely for reasons of price, taste, trying because it went viral on social media and the influence of friends/family. Furthermore, the second most chosen instant noodle brand for consumption is Mi Gaga.

Currently, Mi Gaga is consumed by 41 respondents. Mi Gaga experienced an increase

in the number of consumers from 30 to 41, with the addition of 26 new consumers from other brands. This addition is higher than the number of consumers who switched to other brands 15. In other words, Mi Gaga gained consumers for reasons of price, taste, viral, or the influence of friends/family.

Likewise, other instant noodle brands that previously had 7 consumers now only have 5. Other brands experienced a decrease in the number of consumers with only 3 new consumers entering and 5 consumers switching to other brands due to dissatisfaction with taste, price and also the influence of social media.

Based on the data above, it can be concluded that Indomie remains the most consumed instant noodle brand, despite experiencing a decrease in the number of consumers. Then Mi Gaga showed an increase in the number of consumers, indicating a strong enough attraction to attract consumers from other brands. Finally, other brands experienced a decrease in the number of consumers, indicating that this brand is less able to retain consumers compared to Indomie and Mi Gaga. From these data, it can be seen that there is a pattern of brand switching that occurs and how each brand succeeds in retaining or attracting new consumers.

In more detail, consumers who increased from other brands and consumers who switched to other brands for each instant noodle brand studied are shown in Table 2 and Table 3. By looking at these tables, it can be seen how many consumers switched from one brand to another.

Table 2: Consumers are increasing from other brands

	Indomie	**Mi Gaga**	**Other brands**
Indomie	-	14	4
Mi Gaga	25	-	1
Other brands	2	1	-
Total	**27**	**15**	**5**

Sources: data processed in 2023

Table 2 shows that Indomie gained an additional 18 consumers from Mi Gaga with 14 consumers and other brands with 4 consumers. Meanwhile, Mi Gaga gained an additional 26 consumers from Indomie with 25 consumers and other brands with 1 consumer. And other brands gained an additional 3 consumers Indomie with 2 consumers and Mi Gaga with 1 consumer. In addition to consumers who increased from other brands, the following also presents consumers who switched to other brands on various instant noodle brands in Table 3.

Table 3: Consumers who switch to other brands

	Indomie	**Mi Gaga**	**Other brands**
Indomie	-	25	2
Mi Gaga	14	-	1
Other brands	4	1	-
Total	**18**	**26**	**3**

Sources: data processed in 2023

Table 3 explains instant noodle consumers who switched to other brands. Indomie consumers who switched to other brands numbered 27 consumers, namely 25 people who switched to Mi Gaga and 2 people to other brands. It can be said that 27 Indomie consumers are not loyal.

Furthermore, Mi Gaga consumers who switched to other brands numbered 15 people, namely 14 people to Indomie and 1 person to other brands. The next other brand experienced a change in consumers of 5 people, namely 4 people to Indomie and 1 person to Mi Gaga. Based on Table 2 and Table 3 above, a pattern of instant noodle brand switching (Brand Switching Pattern) can be made by consumers. The brand change pattern can be seen in Table 4.

Ekspektra : Jurnal Bisnis dan Manajemen, Volume 8, Nomor 2, Hal. 185-197
ISSN 2549-3604 (Online), ISSN 2549-6972 (Print)
DOI: https://doi.org/10.25139/ekt.v8i2

Table 4: *Brand Switching Pattern*

	Indomie	**Mi Gaga**	**Other brands**	**Consumers past**
Indomie	36	25	2	63
Mi gaga	14	15	1	30
Other brands	4	1	2	7
Consumers today	54	41	5	100

Sources: data processed in 2023

The table above is a table that shows the pattern of brands switching from one brand to another. Rows (horizontal) are brands consumed in the past and columns (vertical) are brands consumed currently. Indomie consumers currently number 54 people out of 36 loyal consumers, 14 people who switched from Mi Gaga, and 2 people from other brands. While for Mi Gaga consumers currently number 41 people out of 14 loyal consumers the rest come from 25 people who switched from Indomie and 1 person from other brands. And for other brands which currently number 5 people with 2 consumers who remain loyal the rest who switched 2 people Indomie and 1 person Mi Gaga. By looking at the table above it can be seen that each instant noodle brand has loyal consumers. The Indomie brand has 36 loyal consumers, Mi Gaga has 15 people, and the other brands have 2 people.

Analysis of the Current Market Share of Instant Noodles

Based on the results of the questionnaire data processing, information was obtained on the size of the initial market share owned by each instant noodle brand. The initial market share of instant noodle brands is presented in the following table 5.

Table 5: Current instant noodle brand market share

	Consumer 2024	Market share
Indomie	54	54%
Mi Gaga	41	41%
Other brands	5	5%
Total	**100**	**100%**

Sources: data processed in 2023

The table above shows that of the instant noodle brands, Indomie and Mi Gaga are the Market Leaders because they control more than 40% of the market.

Market Share Prediction for Instant Noodles with Markov Chain

To calculate the predicted market share of each instant noodle brand, it is necessary to first know the magnitude of the transition probability of each brand. This transition probability is obtained from the brand-switching pattern in Table 4.

If it is assumed that the shift between instant noodle brands is considered stable/fixed, then the transition probability can be calculated by comparing the number of instant noodle consumers who switch from brand to brand, so that:

$\boldsymbol{P_{ij} = \frac{nij(t)}{ni(t)}}$, or by comparing the number of instant noodle consumers who switched from the Indomie brand to Mi Gaga to the number of instant noodle consumers of the Indomie brand, we get:

$$\boldsymbol{P_{00} = \frac{36}{63} = 0,5714} \text{ , } \boldsymbol{P_{01} = \frac{25}{63} = 0,3968}$$

Likewise, further calculations to obtain transition probabilities as presented in Table 6 below.

Table 6: Results of Transition Probability

	Indomie	Mi Gaga	Other brands
Indomie	0.571	0.398	0.0317
Mi Gaga	0.467	0.5	0.033
Other brands	0.571	0.143	0.286
Market share	**0.54**	**0.41**	**0.05**

Sources: data processed in 2023

The next transition probability is used to calculate the market share in the coming period. The transition probability above is then used as a transition probability matrix which is then symbolized by P while the market share row above is called the initial market share which is symbolized by MK(0).

To calculate the predicted market share in the coming period, you can use the following equation: MK(t) = MK(t-1)P or by multiplying the market share in the first period by the transition probability matrix.

Based on Table 6 it is known that MK(0) and the transition probability matrix P are as follows:

$$\boldsymbol{MK_{(0)} = (0.54 \quad 0.41 \quad 0.05)}$$

and

$$\boldsymbol{P = \begin{bmatrix} 0.571 & 0.398 & 0.031 \\ 0.467 & 0.5 & 0.033 \\ 0.571 & 0.143 & 0.286 \end{bmatrix}}$$

So, to calculate the predicted market share of instant noodle products in the second period, namely the first year after, the following equation is used:

MK(1) = MK(0). $\boldsymbol{P}$

This calculation is done by multiplying each element in the vector MK(0) with the elements in the matrix P and then adding up the results.

Based on the calculation above, the prediction of market share for 10 periods on instant noodle brands consumed by the community in Pagedangan District can be known. The prediction of market share for 10 periods for each instant noodle product can be seen in Table 7.

Table 7: Prediction of market share for the next period

Period	Indomie	Mi Gaga	Other brands
0	54%	41%	5%
1	57,1%	39,8%	3,1%
2	52,96%	43,07%	3,97%
3	52,62%	43,18%	4,2%
4	52,61%	43,13%	4,26%
5	52,61%	43,11%	4,27%
6	52,62%	43,11%	4,28%
7	52,62%	43,11%	4,28%
8	52,62%	43,1%	4,28%
9	52,62%	43,11%	4,28%
10	52,62%	43,11%	4,28%

Sources: data processed in 2023

Based on Table 7, it can be seen that Mi Gaga will experience an increase in market share in the future, while Indomie and other brands will experience a decrease in market share in the future. The Mi Gaga brand experienced an increase of 2.11%

compared to the initial period. The Indomie brand experienced a decrease in market share of 1.38% and other brands experienced a decrease of 0.72% in the coming period.

Equilibrium point

Based on the calculation of Market Share, during the 6th to 10th period, the market share for each brand is the same. This means that the market share has reached a point of equilibrium and there is no more consumer movement between instant noodle brands.

Market share at the time of reaching the equilibrium point is achieved in Table 7 which shows the market share at the equilibrium point achieved and there is no more consumer switching between instant noodle brands.

Table 8: Market Share In The Future Period

Brand	Market share
Indomie	52,62%
Mi Gaga	43,11%
Other brands	4,28%

Sources: data processed in 2023

5. CONCLUSIONS, IMPLICATIONS, SUGGESTIONS AND LIMITATIONS OF THE RESEARCH

Based on the acquisition of questionnaire data from 100 respondents processed using the Markov Chain method, it is known that the probability of customer transition who still chooses Indomie is predicted to be 0.54, or 54%. In Mi Gaga, it is predicted to be 0.41, or 41%. Then in other brands, the transition probability is 0.05 or 5%. This indicates that only a small portion of consumers switch to instant noodle brands other than Indomie and Mi Gaga. In the next 6 periods, Indomie is estimated to have the largest market share of 52.62%. This shows Indomie's dominance in the instant noodle market and high consumer preference for this brand. Mi Gaga is predicted to have a market share of 43.11%, indicating that this brand also has a significant market share even though it is below Indomie. Then other brands are estimated to only have a market share of 4.28%, indicating that these brands are less in demand by consumers compared to Indomie and Mi Gaga.

According to the results of this study, it is limited to only one analysis method. It is expected that in further research, researchers will be able to develop other methods. And in data collection, the author recommends that in making questionnaires that will be distributed to respondents, they should refer more to the target.

Then, for Indomie and Mi Gaga producers, they should improve the quality and variety of products and innovate in flavor variants and packaging. Marketing strategies need to be designed more precisely by utilizing the results of the analysis to identify consumer segments that have a high potential to switch brands and strengthen consumer loyalty programs. Marketing and advertisers must utilize social media effectively and conduct periodic evaluations of marketing strategies.

For researchers and academics, it is recommended to develop Markov Chain analysis methods for other products, encourage collaboration between academics and industry, and conduct further studies on other factors that influence brand switching. Consumers are expected to be more critical and selective in choosing products and more actively participate in surveys and research to produce more representative data. The implementation of these suggestions is expected to improve product quality, marketing strategies, and understanding of consumer behavior, which ultimately supports the

development of the instant noodle industry in Indonesia.

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