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# Mobile Banking Adoption-A Segmentation Analysis

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## **Article Info**

## ABSTRACT

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### **Keywords:**

M-banking, segments, segmentation TAM Market segmentation has an important role in determining marketing strategy and can improve marketing effectiveness, specifically in mobile banking (m-banking) services. The aim of this study is to measure customer perceptions of m-banking adoption through segmentation analysis based on their behavior with the TAM construct. This study generates two segments, which are moderate and active adopters. Moderate adopters are members who already have m-banking but have not actively used it. M-banking is considered as a practical, easy-to-operate, and they will adopt m-banking in the coming months. Active adopters perceive m-banking as a service which can complete banking transactions quickly, and overall, m-banking is easy to use. Mbanking is important to fulfil banking needs, and will continue to adopt m-banking in the future. Moderate and Active adopters trust in the bank is positive and majority young-aged. Age has a significant relationship with both clusters, so the young aged group is the right target for m-banking marketing.

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## INTRODUCTION

The rapid development of mobile and wireless service-market specifically in Asian countries including Indonesia (Ho, Wu, Lee, & Pham, 2020) boost the banking industry to various innovations in electronic banking (e-banking) services, such as mobile banking (m-banking). The service is application of mobile commerce (m-commerce) that support mobile technology and devices, so it allows customers to interact with banking services through their own mobile devices, including smartphones, tablets, smartwatches, and other smart technology (Ciunova-Shuleska, Palamidovska-Sterjadovska, & Prodanova, 2022; Karjaluoto, Shaikh, Saarijärvi, & Saraniemi, 2019; Mostafa, 2020; Zhang, Lu, & Kizildag, 2018).

M-banking has evolved into a bank service delivery channel to be reckoned with (McLean, Osei-Frimpong, Al-Nabhani, & Marriott, 2020), because it provides flexible access, personal, saves time and costs and provide convenience for customers (Chawla & Joshi, 2021). These advantages provide opportunities for a number of banks to increase transaction volumes, add customers and reduce operating costs while at the same time causing intense competition between banks because each bank presents almost the same m-banking services with a variety of needs and wants.

The concept of segmentation can help bank management to know more about customer perception and needs and tailor different policies to targeted segments in order to improve customer satisfaction and bank performance (Aghaei, 2021; Christy, Umamakeswari, Priyatharsini, & Neyaa, 2021; Liu, Liao, Huang, & Liao, 2019; Qadadeh & Abdallah, 2018). However, unfortunately, previous studies have focused more on measuring adoption behavior (Elhajjar & Ouaida, 2020). Meanwhile, studied related to the segmentation concept in the banking industry specifically in Indonesia are still relatively minimal. Some of them are comparative studies of Conventional and Islamic banks in Indonesia with lifestyle segmentation (Sutarso, Rustiana, Hanum, & K, 2012). Segmentation of XYZ bank customers in Indonesia with data mining techniques (Sundjaja, 2013), segmentation of internet banking services based on usage behavior (Sihotang, 2016). Bank customers segmentation analysis based on credit taking (Ahsina, Fatimah, & Rachmawati, 2022) and segmentation based on the benefits of bank loyalty programs in the female gender (Sutarso, Sekarsari, Maschudah, & Marta, 2023). Some of these studies are not enough to provide a picture of bank customer behavior in order to shoot target market specifically related e-banking services.

Based on several studies related to segmentation e-banking services and the concept of customer value creation in order to meet the customer needs and wants, the purpose of this study is to analyze customer perceptions of m-banking adoption through segmentation analysis. According to this objective, the problem formulation in this study are: (1) what is the demographic profile of customers who adopt m-banking; (2) what are the characteristics of customer perceptions of m-banking adoption based on their behavior; (3) what m-banking service are mostly owned by customers and (4) the types of transactions that are mostly frequently accessed through m-banking.

# LITERATURE REVIEW

Measuring customer behavior towards the adoption of m-banking as an e-banking service generally uses the concept of the Technology Acceptance Model/TAM (Davis, 1989) as development of the Theory of Reasoned Action/TRA (Fishbein & Ajzen, 1975). TAM explain the influence of perceived useful and perceive ease of use comparable construct influencing attitudes and behavior intention on actual technology adoption behavior (Elhajjar & Ouaida, 2020). Attitude reflects individual's assessment of whether a particular behavior is beneficial or not, meaning that attitude is a belief in an individual's evaluations (Carranza, Díaz, Sánchez-Camacho, & Martín-Consuegra, 2021). In the TAM concept, a positive attitude towards technological innovation is an antecedent of intention to adopt it and has been evaluated in various studies, especially in banking technology studies (Ahmad & Bhatti, 2019). In addition, the TAM concept is easy to understand and has proven to be quite powerful in testing the adoption behavior of banking technology (Usman, Projo, Chairy, & Haque, 2022). The TAM concept has also proven to be implemented in several studies, including the concept of behavior-based

market clustering (Chawla & Joshi, 2017, 2021; Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila, 2004). Based on the results of previous studies, this study also refers to the TAM model as a basic construct to divide customers into homogenous groups, because perceptions, attitude, and behavior intention as a part of the behavior that can underline the concept of market segmentation.

There are two market segmentation techniques, a priori and post hoc. The a priori is a traditional segmentation technique. The measurement focuses on demographic elements to meet customer needs and wants, while post hoc is a modern segmentation based on statistical data, processed and analyzed. The measurement uses behavior, attitude and benefit element combined with demographic or geographic elements (Arenas-Gaitán, Villarejo Ramos, & Peral-Peral, 2020; Chawla & Joshi, 2021; Ju, Martín Martín, & Chocarro, 2022; L. Motiwalla, Albashrawi, & Kartal, 2018).

Segmentation can use clustering analysis methods which consist of hierarchical methods and non-hierarchical methods. The hierarchical method is started with all objects in one cluster then it is divided and sub-divided until all objects form several groups. The approach can be done with top-down, which is decision making based on overall data from the closest cluster to the top and the smaller the more homogenous. The second approach is bottom-up which is started from a single cluster object and will join with a number of other respondents systematically. As the cluster widens, the homogeneity of the cluster decreases. The non-hierarchical method allows each object which leaves a cluster to rejoin in order to improve the level of cluster homogeneity. The number of clusters is determined first before conducting cluster analysis (Kumar, Leone, Aaker, & Day, 2018).

Segmentation of m-banking adoption based on TAM construct which was integrated with perceived trust, perceived efficiency, and lifestyle generated three main segments: active users, traditional followers and laggard (Chawla & Joshi, 2021) with hierarchical method. Segmentation of m-banking adoption based on customer perceptions based on TAM concept with a non-hierarchical method generated three main segments as well: Technology Adoption Leaders (TAL), Technology Adoption Followers (TAF) and Technology Adoption Laggards (TAG) (Chawla & Joshi, 2017). Market segmentation on benefit and TAM construct on a number of Shahr bank customers which used a nonhierarchical method generated four main segments, benefit-oriented; peace-oriented; interest-oriented and moderate (Aghaei, 2021). The adoption measurement of m-banking system through be three main segments, which were light users, moderate users and heavy users (L. F. Motiwalla, Albashrawi, & Kartal, 2019). Segment analysis which was conducted by Chawla and Joshi (2017) based on customer perspective on m-banking adoption with hierarchical methods generated three segments, which were Technology Adoption (TA) Leaders, TA Followers, and TA Laggards. A summary and some other segmentation studies which related to the e-banking services are listed briefly in Table 1.

| NI. | No. Studios Contant Docad Someonte |                                       |           |                     |  |  |  |  |
|-----|------------------------------------|---------------------------------------|-----------|---------------------|--|--|--|--|
| NO  | Studies                            | Context                               | Based     | Segments            |  |  |  |  |
| 1   | Mäenpää (2006)                     | Exploration of Internet Banking (IB)  | Benefit   | Suspicious,         |  |  |  |  |
|     |                                    | services towards customers who use it |           | Eager,              |  |  |  |  |
|     |                                    |                                       |           | Reluctant,          |  |  |  |  |
|     |                                    |                                       |           | Practical           |  |  |  |  |
| 2   | Patsiotis et al.,                  | Adopter and non-adopter               | Behavior  | Advanced users,     |  |  |  |  |
|     | (2012)                             | segmentation of IB in Greece          |           | Concerned majority, |  |  |  |  |
|     |                                    |                                       |           | Unconcerned         |  |  |  |  |
|     |                                    |                                       |           | majority            |  |  |  |  |
| 3   | Rajaobelina et al.,                | Adoption segmentation of online       | Behavior  | Wisemen,            |  |  |  |  |
|     | (2013)                             | banking                               |           | Connected           |  |  |  |  |
|     |                                    |                                       |           | calculators,        |  |  |  |  |
|     |                                    |                                       |           | Emotionally         |  |  |  |  |
|     |                                    |                                       |           | committed,          |  |  |  |  |
|     |                                    |                                       |           | Skill seekers,      |  |  |  |  |
|     |                                    |                                       |           | Potential           |  |  |  |  |
|     |                                    |                                       |           | calculators,        |  |  |  |  |
|     |                                    |                                       |           | Detached gen X      |  |  |  |  |
| 4   | Yu (2015)                          | Adopter and non-adopter               | Lifestyle | Digital laggards    |  |  |  |  |
|     |                                    | segmentation of m-banking             |           | Traditional banking |  |  |  |  |
|     |                                    |                                       |           | likers              |  |  |  |  |
|     |                                    |                                       |           | Digital followers,  |  |  |  |  |
|     |                                    |                                       |           | Digital careers,    |  |  |  |  |
|     |                                    |                                       |           | Digital seekers     |  |  |  |  |
| 5   | Sihotang (2016)                    | Segmentation of IB services           | Benefit   | Four segments       |  |  |  |  |
|     |                                    |                                       |           | (Segments 1-4)      |  |  |  |  |
| 6   | Chawla & Joshi,                    | Customer segmentation towards m-      | Behavior  | TAL, TAF, TAG       |  |  |  |  |
|     | (2017)                             | banking adoption in India             |           |                     |  |  |  |  |
| 7   | Motiwalla et al.,                  | Segmentation of m-banking users       | Behavior  | Light users,        |  |  |  |  |
|     | (2019)                             |                                       |           | Moderate users,     |  |  |  |  |
|     |                                    |                                       |           | Heavy users         |  |  |  |  |
| 8   | Aghaei (2021)                      | Customer segmentation of Shahr        | Behavior  | Benefit oriented,   |  |  |  |  |
|     |                                    | Bank in Iran                          |           | Peace oriented,     |  |  |  |  |
|     |                                    |                                       |           | Interest oriented,  |  |  |  |  |
|     |                                    |                                       |           | Moderate            |  |  |  |  |
| 9   | Chawla & Joshi                     | Segmentation of m-banking adopters    | Behavior  | Active users,       |  |  |  |  |
|     | (2021)                             |                                       |           | Traditional users,  |  |  |  |  |
|     |                                    |                                       |           | Follower users.     |  |  |  |  |
| 10  | Sutarso et al.,                    | Bank loyalty program                  | Benefit   | Apathetic,          |  |  |  |  |
|     | (2023)                             | segmentation on women                 |           | Active,             |  |  |  |  |
|     |                                    | -                                     |           | Passive             |  |  |  |  |

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# **RESEARCH METHODS**

The design of this study was exploratory with quantitative and used several variables, which were called multivariate interdependence. The analysis technique was cluster analysis and did not estimate several variables empirically (Hair, Ortinau, & Harrison, 2021).

This study was geographically limited to Surabaya and Sidoarjo because Surabaya is one of the business cities in Indonesia with Sidoarjo district as its economic buffer. This-conditions causes 61 banks to operate in the city which consists of six Regional Development Banks, 42 National Private Commercial Banks and 11 International Banks (Surabaya, 2023). The existence of many bank institutions also made it easy to obtain a number of respondents who have m-banking

The data in this study were primary data which were collected through a prepared instrument by using Google Form. The instrument in this study used a Likert scale at intervals of 1-5, strongly disagree (1) to strongly agree (5). The instrument was distributed electronically by WhatsApp.

The segmentation analysis of m-banking adoption was based on behavioral and demographic variables, demographic variables use elements of age, education level and income level, while behavioral variables refer to the basic construct of TAM with modification of perceived trust variables. The sampling technique in this study used judgment sampling, where the sample was adjusted according to certain criteria (Cooper & Schindler, 2014). The sample criteria in this study are the respondents had at least one m-banking and were individual customers of funding and/or loan products. Respondents live in Surabaya and/or Sidoarjo. The total sample in this study was 356 respondents. Based on the large enough sample size, the segmentation method in this study used non-hierarchical clustering with k-means algorithm (Hair, Black, Babin, & Anderson, 2019). K-means is a method which helps the clustering process, so that it generates data visualization with significant results (Ahsina et al., 2022).

The first stage of clustering analysis in this study was instrument validity by using Confirmatory Factor Analysis (CFA) and the instrument reliability test by using Cronbach's Alpha. The second stage was continued with the process of grouping 356 respondents based on behavior with perceived usefulness, perceived ease of use, perceived trust, attitude and behavioral intention as behavior dimensions. The third stage was cluster analysis with k-means, which was followed by a one-way ANOVA test. The fourth stage was cross tabulation of elements of demographic variables towards dimensions of behavioral variables.

# **RESULTS AND DISCUSSION**

# **Respondents Characteristic**

The majority of respondents in this study were aged in the range of 26-35 years old, totalling 131 people (36.80%). The age range of 17-25 years old were in second place, totalling 1190 people (33.40%), thus the respondents in this study were in the late adolescence to early adulthood category (Kementerian Kesehatan Republik Indonesia, 2009). The level of the educational background of the majority of respondents was undergraduate, totalling 152 people (42.70%). The second place was high school/vocational school, totalling 102 people (28.70%). The income level of majority respondents was in the range of Rp 2,000,000 up to Rp 4,999,999 totaling 172 people (48.30%).

Respondents in this study majority had m-banking from Bank Mandiri, totaling 105 people (29.50%). Most of respondents in this study only had one m-banking, which were 241 people (67.70%). The most frequently accessed m-banking feature was transfers, which were 178 people (50.00%). Second feature was the payment feature, which was 109 people (30.60%). The details of respondent characteristics are listed in Table 2, as follows

| Table 2. Respondent Chara             | acteristics      |            |  |
|---------------------------------------|------------------|------------|--|
| Description                           | Freq<br>(people) | Percentage |  |
| Demographics                          |                  |            |  |
| Age                                   |                  |            |  |
| 17-25 years old                       | 119              | 33.40%     |  |
| 26-35 years old                       | 131              | 36.80%     |  |
| 36-45 years old                       | 70               | 19.70%     |  |
| 46-55 years old                       | 32               | 9.00%      |  |
| >56 years old                         | 4                | 1.10%      |  |
| Education                             |                  |            |  |
| High/Vocational School                | 102              | 28.70%     |  |
| Diploma/Academy                       | 22               | 6.20%      |  |
| Bachelor                              | 152              | 42.70%     |  |
| Post-graduate                         | 80               | 22.50%     |  |
| Income                                |                  |            |  |
| Rp 2,000,000 – Rp 4,499,999           | 172              | 48.30%     |  |
| Rp 4,500,000 – Rp 8,999,999           | 141              | 39.60%     |  |
| More than Rp 9,000,000                | 43               | 12.10%     |  |
| Bank types                            |                  |            |  |
| Mandiri                               | 105              | 29.50%     |  |
| BNI                                   | 56               | 15.70%     |  |
| BCA                                   | 83               | 23.30%     |  |
| BRI                                   | 54               | 15.20%     |  |
| CIMB-Niaga                            | 13               | 3.70%      |  |
| Others                                | 45               | 12.60%     |  |
| Number M-banking                      |                  |            |  |
| One                                   | 241              | 67.70%     |  |
| Two                                   | 73               | 20.50%     |  |
| Three                                 | 30               | 8.40%      |  |
| Four                                  | 9                | 2.50%      |  |
| Five                                  | 3                | 0.80%      |  |
| Frequently Accessed M-banking Feature | res              |            |  |
| Balance check                         | 61               | 17.10%     |  |
| Transfer                              | 178              | 50.00%     |  |
| Payment                               | 109              | 30.60%     |  |
| Others                                | 8                | 2.20%      |  |

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## **Confirmatory Factor Analysis (CFA)**

The initial stage in CFA is paying attention to the fulfillment of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) value and Barlett's Test of Sphericity Approx Chi Square value. The KMO-MSA value on five dimensions of behavior variable was 0.937 with Barlett's Test of Sphericity Approx Chi-Square value of 6356.996 significant at 0.00, thus it could be proceeded to CFA.

CFA analysis pays attention to fulfillment of a minimum loading factor value of 0.30, which refers to SOLO Power Analysis BMDP Statistical Software, Inc. 1993 for a sample size of 350 (Hair et al., 2019). The results of CFA after rotation formed grouped

components factor, while ungrouped components with loading factor < 0.30 were invalid variable indicators. Factor one was occupied by indicators of the perceived trust dimensions (TR1-TR8). The perceived usefulness dimensions occupied factor two (PU1-PU6). The perceived ease of use dimensions occupied factor three (PEOU1-PEOU6). Factor four was occupied by the dimensions of the attitude variable (AT1-AT7), and factor five was occupied by five dimensions of the behavioral intention variable (BI1-BI5-BI7). Total valid indicators dimension AT6 and BI6 were invalid because they did not meet the minimum loading factor value. The next stage was conducting reliability with fulfillment of Cronbach's Alpha value greater than the value range 0.60-0.70 (Hair et al., 2019). The five dimensions of behavioral variables in this study have met the reliability value. The results of validity and reliability tests on the five dimensions of behavioral variables are listed in Table 3.

| Variable     |                              |              |                  |       |         |
|--------------|------------------------------|--------------|------------------|-------|---------|
| Dimensions   |                              |              |                  |       | 0.005   |
|              | KMO-MSA<br>Bartlett's Test o | f Sphericity |                  |       | 0.937   |
| PU, PEOU, TR | Approx Chi-Sau               | are          |                  |       | 0550.77 |
| AT, BI       | Df                           |              |                  |       | 496     |
|              | Sig                          |              |                  |       | 0.00    |
|              |                              |              | Factor           |       |         |
|              | 1                            | 2            | 3                | 4     | 5       |
| PU1          |                              | 0.714        |                  |       |         |
| PU2          |                              | 0.667        |                  |       |         |
| PU3          |                              | 0.673        |                  |       |         |
| PU4          |                              | 0.526        |                  |       |         |
| PU5          |                              | 0.671        |                  |       |         |
| PUO          |                              | 0.670        | 0.750            |       |         |
| PEOU2        |                              |              | 0.755            |       |         |
| PEOU3        |                              |              | 0.705            |       |         |
| PEOU4        |                              |              | 0.727            |       |         |
| PEOU5        |                              |              | 0.671            |       |         |
| PEOU6        |                              |              | 0.624            |       |         |
| TR1          | 0.774                        |              |                  |       |         |
| TR2          | 0.844                        |              |                  |       |         |
| TR3          | 0.831                        |              |                  |       |         |
| TR4          | 0.818                        |              |                  |       |         |
| TR5          | 0.791                        |              |                  |       |         |
| TR6          | 0.735                        |              |                  |       |         |
| TR7          | 0.758                        |              |                  |       |         |
| TR8          | 0.747                        |              |                  | 0.774 |         |
| AT1          |                              |              |                  | 0.554 |         |
| AT2          |                              |              |                  | 0.562 |         |
| A13          |                              |              |                  | 0.513 |         |
| A14<br>AT5   |                              |              |                  | 0.692 |         |
| AT7          |                              |              |                  | 0.508 |         |
| RI1          |                              |              |                  | 0.581 | 1       |
| BI2          |                              |              |                  | 0.55  | 7<br>7  |
| BI3          |                              |              |                  | 0.50  | 3       |
| BI4          |                              |              |                  | 0.69  | 2       |
| BI5          |                              |              |                  | 0.56  | 58      |
| BI7          |                              |              |                  | 0.58  | 51      |
|              |                              |              | Cronbach's Alpha |       | К-      |
| PU           |                              |              | 0.829            |       |         |
| PEOU         |                              |              | 0.870            |       |         |
| TR           |                              |              | 0.932            |       |         |
| AT           |                              |              | 0.813            |       |         |
| BI           |                              |              | 0.852            |       |         |

Table 3. Validity & Reliability Test

# Means Clustering of 356 Respondents

Through division of 356 respondents by using k-means cluster analysis, it was obtained two optimal segments where the distribution of members did not overlap. The segmentation results are listed in Table 4.

| Segments | Number of Members |  |
|----------|-------------------|--|
| 1        | 133,000           |  |
| 2        | 223,000           |  |
| Valid    | 356,000           |  |
| Missing  | ,000              |  |

Table 4. Number of Members of Two Segments

The two segments were then evaluated with a one-tailed test of difference with a significance level of F-value of less than 0.05. The F-value which was getting bigger from each cluster-forming indicator explained that those two segments were getting different. The ANOVA test results for the two segments generated F-value with significance level less than 0.05. The next step is analyzing the final cluster center from each indicator which formed each dimension of the behavior variable.

The perceived usefulness (PU) dimension in cluster one had the highest cluster center average, which was 4.47 with the statement "M-banking can be adopted anywhere (PU1)." In the second cluster, the highest cluster center value was the statement "Using m-banking will allow completing banking transactions quickly (PU5) which was 4.85. Based on those cluster center values, segment one was more oriented towards practical m-banking services because it could be adopted anywhere, while segment two was more oriented towards the speed of m-banking to complete banking transactions.

The perceived ease of use (PEOU) dimension in cluster one had the highest cluster center value which was 4.31. The indicator was PEOU1 with the statement "Operating mbanking is easy." In cluster two, the highest PEOU indicator was 4.81 with the statement "Overall mbanking is easy to adopt (PEOU6)." Based on the cluster center value on the ease-of-use dimension, members in segment one prioritized the ease of operating mbanking, while segment two more focused on the overall ease of adoption of m-banking.

The trust (TR) dimension in cluster one had a cluster center value of 3.43 as the highest value, while the second highest cluster center value was 4.57. Both segments had the same highest cluster center value in indicator TR8 with the statement "I believe banks protected their privacy by adopting m-banking.

The cluster center assessment in segment one based on attitude dimension had the highest value of 4.18 with the statement "M-banking services are useful (A3)". In segment two the highest attitude cluster center value was 4.82 in the A3 indicator statement as well. Both segments had the same attitude based on perceived usefulness and perceived ease of use which resulted in a positive decision that m-banking services were useful.

Segment one and two could be differentiated based on behavioral intentions to understand behavioral patterns toward m-banking adoption. Behavioral intention of segment one as a decision of attitude was to adopt m-banking for the coming months. However, the behavioral intention of some members in segment two was to continue adopting m-banking in the future. The details of final center values of the two segments are listed in Table 5.

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|--------------|--------------|----------------|---------------|------------------|------------|
|--------------|--------------|----------------|---------------|------------------|------------|

|            | <b>a</b>   | Segments |      |  |
|------------|--|----------|------|--|
| Indicators | Statements -   | 1        | 2    |  |
| PU1        | M-banking can be adopted anywhere                                      | 4.47     | 4.74 |  |
| DUO        | M hanking oon he adopted environ                                       | 4 21     | 1 60 |  |
| PU2        | M-banking can be adopted anytime                                       | 4.21     | 4.09 |  |
| PU3        | Adoption of m-banking enables making payments on the go                | 4.29     | 4.80 |  |
| PU4        | Adoption m-banking will improve my daily work                          | 4.04     | 4./4 |  |
| PU5        | Adoption m-banking will enable quick completion of banking transaction | 4.29     | 4.85 |  |
| PU6        | In general m-banking adoption is beneficial                            | 4.29     | 4.80 |  |
| PEOU1      | Operating m-banking is easy  | 4.31     | 4.75 |  |
| PEOU2      | M-banking is easy to operate   | 4.24     | 4.72 |  |
| PEOU3      | M-banking is easy for banking transactions                             | 4.13     | 4.77 |  |
| PEOU4      | M-banking features are easy to operate                                 | 4.23     | 4.72 |  |
| PEOU5      | Instructions for using m-banking are easy to follow                    | 4.14     | 4.75 |  |
| PEOU6      | Overall m-banking is easy to use                                       | 4.20     | 4.81 |  |
| TR1        | I consider m-banking protects my privacy                               | 3.33     | 4.41 |  |
| TR2        | I trust m-banking protects my privacy                                  | 3.23     | 4.48 |  |
| TR3        | I am confident in the security of m-banking                            | 3.16     | 4.39 |  |
| TR4        | I believe transactions through m-banking are save                      | 3.33     | 4.53 |  |
| TR5        | I believe my privacy is protected when doing transaction through m-    | 3.23     | 4.50 |  |
| TR6        | I believe m-banking has strict security controls                       | 3.38     | 4.51 |  |
| TR7        | I believe the information about my transaction is not known by         | 0.00     |      |  |
| 11()       | others   | 3.32     | 4.46 |  |
| TR8        | I trust the bank protects my privacy                                   | 3.43     | 4.57 |  |
| AT1        | M-banking services are good  | 3.98     | 4.65 |  |
| AT2        | M-banking services are relevant  | 3.91     | 4.61 |  |
| AT3        | M-banking services are useful  | 4.18     | 4.82 |  |
| AT4        | M-banking services are valuable  | 4.02     | 4.62 |  |
| AT5        | M-banking services are profitable                                      | 3.95     | 4.67 |  |
| AT7        | M-banking services are affordable                                      | 3.92     | 4.66 |  |
| BI1        | I intend to adopt m-banking in the coming months                       | 4.16     | 4.67 |  |
| BI2        | I intend to adopt m-banking with assumptions I have access to it       | 3.92     | 4.53 |  |
| BI3        | I may adopt m-banking in the future                                    | 4.03     | 4.72 |  |
| BI4        | I plan to adopt m-banking regularly in the future                      | 4.05     | 4.68 |  |
| BI5        | I hope the adoption of m-banking will continue in the future           | 4.14     | 4.77 |  |
| BI7        | M-banking is essential to fulfill my banking needs                     | 4.06     | 4.77 |  |

Table 5. Final Cluster Center Value

Based on those final cluster values, segment one had the lowest value, so that it could be called as moderate adopters (L. F. Motiwalla et al., 2019). Members in segment one already had m-banking, but not actively utilized the service. However, the segment had the potential to use m-banking in coming months based on their behavioral intention (Chawla & Joshi, 2021). In contrast, segment two had higher cluster center value than segment one, so that it could be treated as a segment with extreme behavior (Chawla & Joshi, 2017) and named as active adopters. Members in segment two had actively adopted m-banking, so that their behavior intention was to continue adopting m-banking until in the future (Chawla & Joshi, 2021).

# **One-Way ANOVA**

Based on the one-way ANOVA test towards distance between cluster centers, it generated a value of F = 94.392 with a significance value of 0.000 which was smaller than 0.05. Based on these results, the distance between centers in the two segments was significantly

different. The next test was the variance homogeneity test in the two segments with Lavene statistics. The Lavene statistical value in this study was 1.392 significant at 0.250. That value was above 0.05, so that the variants in the two segments were not different. The results of segment difference test and variance homogeneity test are listed in Table 6.

| <br>Description   | Sum of Squares | Ι      | Df              | Mean<br>Square | F      | Sig   |
|-------------------|----------------|--------|-----------------|----------------|--------|-------|
| <br>Between Group | 157.216        |        | 1               | 157.216        | 94.392 | 0.000 |
| Within Group      | 589.607        | 3      | 54              | 1.666          |        |       |
| Total             | 745.822        | 3      | 55              |                |        |       |
| Lavene Statistic  |                | $Df_1$ | $\mathrm{Df}_2$ |                |        |       |
| <br>1.329         |                | 1      | 354             |                |        | 0.250 |

Table 6. ANOVA & Homogeneity of Variance Test

# **Cross Tabulation**

The next step was to crosstab the demographic elements towards two segments by using the chi-square test. In this study, age had a relationship with both segments with a Chi-Square value of 21.982 at a significance level of 0.000. The educational level had a Chi-Square value of 6.783 with a significance value of 0.079, so that it did not have a relationship in both segments. These results were in line with a study which had been conducted by Chawla and Joshi (2017).

# **Behavioral Characteristic & Demographics**

Moderate adopters consisted of 133 respondents (38.36%). The majority were 26-36 years old with an undergraduate education background. Respondents perceived mbanking as a practical service, easy to operate, and banks could maintain privacy, so that they felt m-banking as a useful service. Behavioral intention as their decisions were intending to adopt m-banking in coming months.

Active adopters had 223 members (62.64%). The majority were in the younger age range compared to segment one, which were 17-25 years old (25.00%). The highest education level which had been taken was also undergraduate. Respondents' perception of mbanking services was as a bank service which could complete banking transactions quickly and overall was easy to use. The attitude of members in this segment towards mbanking services was they felt m-banking as a useful service, so that their decisions to use m-banking services were important to fulfill banking needs and will continue to adopt m-banking in the future. The Chi-Square values in the cross tabulation, demographic, and behavioral characteristics of the two segments are listed in Table 7.

| Table 7. Characteristic of Two Segments & Chi Square Values |  |  |               |       |                          |  |  |
|---|--|--|---------------|-------|--------------------------|--|--|
| Elements  | Moderate<br>Adopters   | Active<br>Adopters   | Chi<br>Square | Sig   | Description              |  |  |
| Demographics  |  |  |               |       |                          |  |  |
| Age   | 26-36 years old  | 17-25 years old  | 21.982        | 0.000 | There is                 |  |  |
| Education   | Bachelor   | Bachelor   | 6.783         | 0.079 | There is no relationship |  |  |
| Income /Months  | Rp 4,500,000 –<br>Rp 8,999,999   | Rp 2,000,000 -<br>Rp 4,999,999   | 7.779         | 0.020 | There is relationship    |  |  |
| Behavior  | M-banking as a<br>practical service, easy<br>to operate anywhere<br>and trust the bank<br>protects privacy, so that<br>m-banking is perceived<br>as a useful service and<br>will adopt m-banking in<br>the coming months | M-banking is a bank<br>service which can<br>complete banking<br>transactions quickly<br>and overall is easy to<br>use. Trust in the bank<br>is positive because it<br>can protect privacy,<br>so the attitude<br>towards m-banking<br>is perceived as a<br>useful service. Their<br>decisions are to use<br>m-banking as an<br>important service<br>and will continue to<br>adopt m-banking in<br>the future |               |       |                          |  |  |
| Frequently<br>access feature                                | Transfer   | Transfer   | 3.206         | 0.361 | There is no relationship |  |  |
| Number of   | 133 people   | 223 people   |               |       | 1                        |  |  |
| members   | (37.36%)   | (62.64%)   |               |       |                          |  |  |

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# **CONCLUSION**

These segmentation analysis study on m-banking adoption generated two optimal segments, which were moderate adopters and active adopters. Moderate adopters were a potential target market for adopting m-banking specifically in Surabaya and Sidoarjo, because their decision behavior-were to adopt m-banking in the coming months. It was suggested for bank management to follow up on this segment through direct and digital marketing communications through social media, and aggressively advertised the benefits of m-banking with security guarantees from the bank.

Members in the active-adopters segment associated m-banking as a service which was overall easy to use, both easy-to-follow instructions and operation which was easy to learn. They considered m-banking as an efficient banking channel. Members in this segment should be retained by implementing cross-selling strategies toward a number of bank products which could be accessed through m-banking. Bank management also needs to improve the security of m-banking, so that it increases customers' trust and they consider m-banking as an important service and it would still be needed in the future. This segment required special services and responsiveness from the management in order to retain them.

Adoption of m-banking services in Surabaya and Sidoarjo by demographic was mostly done by people in the age range of 17-36 years with income levels from Rp 2,000,000Rp 8,999,999. Based on these demographic elements, the m-banking target market in Surabaya and Sidoarjo were customers in the young age range with a minimum income level in the range Rp 2,000,000-Rp 9,000,000.

In this study, educational background did not have a relationship with the two segments, so that it would be better for the further studies to include other demographic elements, such as gender and occupation. The members in two segments frequently accessed the transfer feature, but based on Chi-Square value, it did not have a relationship with the two segments.

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