

Mobile Banking Adoption-A Segmentation Analysis

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ABSTRACT

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. M-banking 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, & Pahnla, 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 non-hierarchical 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.

Table 1. Segmentation Studies in the Banking Industry

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

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 Characteristics

Description	Freq (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 Features		
Balance check	61	17.10%
Transfer	178	50.00%
Payment	109	30.60%
Others	8	2.20%

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

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.

Table 4. Number of Members of Two Segments

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

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 m-banking is easy.” In cluster two, the highest PEOU indicator was 4.81 with the statement “Overall m-banking 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 m-banking, 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.

Table 5. Final Cluster Center Value

Indicators	Statements	Segments	
		1	2
PU1	M-banking can be adopted anywhere	4.47	4.74
PU2	M-banking can be adopted anytime	4.21	4.69
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	4.74
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-banking	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 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

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.

Table 6. ANOVA & Homogeneity of Variance Test

Description	Sum of Squares	Df	Mean Square	F	Sig
Between Group	157.216	1	157.216	94.392	0.000
Within Group	589.607	354	1.666		
Total	745.822	355			
Lavene Statistic		Df ₁	Df ₂		
1.329		1	354		0.250

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

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 2,000,000-

Rp 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.

REFERENCES

- Aghaei, M. (2021). Market Segmentation in the Banking Industry Based on Customers' Expected Benefits: A Study of Shahr Bank. *Iranian Journal of Management Studies*, 14(3), 629–648. <https://doi.org/10.22059/IJMS.2021.305952.674132>
- Ahmad, S., & Bhatti, S. (2019). E- Service Quality and Actual Use of E-Banking: Explanation through Technology Acceptance Model. *Information Development*, 36(4), 503–519. <https://doi.org/10.5465/ambpp.2019.14370abstract>
- Ahsina, N., Fatimah, F., & Rachmawati, F. (2022). Analisis Segmentasi Pelanggan Bank Berdasarkan Pengambilan Kredit dengan Menggunakan Metode K-Means Clustering. *Jurnal Ilmiah Teknologi Infomasi Terapan*, 8(3), 393–400. <https://doi.org/10.33197/jitter.vol8.iss3.2022.883>
- Arenas-Gaitán, J., Villarejo Ramos, A. F., & Peral-Peral, B. (2020). A Posteriori Segmentation of Elderly Internet Users: Applying PLS-POS. *Marketing Intelligence and Planning*, 38(3), 340–353. <https://doi.org/10.1108/MIP-01-2019-0057>
- Carranza, R., Díaz, E., Sánchez-Camacho, C., & Martín-Consuegra, D. (2021). e-Banking Adoption: An Opportunity for Customer Value Co-creation. *Frontiers in Psychology*, 11(4003), 421–431. <https://doi.org/10.3389/fpsyg.2020.621248>
- Chawla, D., & Joshi, H. (2017). Consumer Perspectives About Mobile Banking Adoption in India – A Cluster Analysis. *International Journal of Bank Marketing*, 35(4), 616–636. <https://doi.org/10.1108/IJBM-03-2016-0037>
- Chawla, D., & Joshi, H. (2021). Segmenting Mobile Banking Users Based on the Usage of Mobile Banking Services. *Global Business Review*, 22(3), 1–16. <https://doi.org/10.1177/0972150918811257>
- Christy, A. J., Umamakeswari, A., Priyatharsini, L., & Neyaa, A. (2021). RFM Ranking – An Effective Approach to Customer Segmentation. *Journal of King Saud University - Computer and Information Sciences*, 33(10), 1251–1257. <https://doi.org/10.1016/j.jksuci.2018.09.004>
- Ciunova-Shuleska, A., Palamidovska-Sterjadovska, N., & Prodanova, J. (2022). What Drives M-Banking Clients to Continue Using M-Banking Services? *Journal of Business Research*, 139(February), 731–739. <https://doi.org/10.1016/j.jbusres.2021.10.024>
- Cooper, D. R., & Schindler, P. S. (2014). Business Research Methods 12th Edition. In *Business Research Methods* (Twelfth Ed). New York: McGraw-Hill Companies, Inc, NY.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly: Management Information Systems*, 13(3), 319–340. <https://doi.org/10.2307/249008>

- Elhajjar, S., & Ouaida, F. (2020). An Analysis of Factors Affecting Mobile Banking Adoption. *International Journal of Bank Marketing*, 38(2), 352–367. <https://doi.org/10.1108/IJBM-02-2019-0055>
- Fishbein, M., & Ajzen, I. (1975). Belief, Attitude, and Behaviour: An Introduction to Theory and Research. In *Addison-Wesley, Reading, MA*.
- Hair, F. J., Black, C. W., Babin, J. B., & Anderson, E. R. (2019). Multivariate Data Analysis. In *Book* (Eight Edition). North Way: Cengage Learning, EMEA. Retrieved from https://www.google.co.id/books/edition/Multivariate_Data_Analysis/PONXEAA_AQBAJ?hl=en&gbpv=1&printsec=frontcover
- Hair, F. J., Ortinau, J. D., & Harrison, E. Dana. (2021). Essentials of Marketing Research. In *New York : Mc Graw Hill* (5th Edition). New York: McGraw-Hill Education.
- Ho, J. C., Wu, C. G., Lee, C. S., & Pham, T. T. T. (2020). Factors Affecting the Behavioral Intention to Adopt Mobile Banking: An International Comparison. *Technology in Society*, 63(101360), 1–9. <https://doi.org/10.1016/j.techsoc.2020.101360>
- Ju, X., Martín Martín, O., & Chocarro, R. (2022). Determinants of Mobile Social Media Use, Customer Heterogeneity, and International Microsegmentation. *International Journal of Consumer Studies*, 46(4), 1127–1148. <https://doi.org/10.1111/ijcs.12748>
- Karjaluoto, H., Shaikh, A. A., Saarijärvi, H., & Saraniemi, S. (2019). How Perceived Value Drives the Use of Mobile Financial Services Apps. *International Journal of Information Management*, 47(August), 252–261. <https://doi.org/10.1016/j.ijinfomgt.2018.08.014>
- Kementerian Kesehatan Republik Indonesia. Kategori Umur. , Departemen Kesehatan § (2009).
- Kumar, V., Leone, P. R., Aaker, A. D., & Day, S. G. (2018). *Marketing Research* (13th Edition). Hoboken, NJ, USA: John Wiley & Sons, Inc.
- Liu, J., Liao, X., Huang, W., & Liao, X. (2019). Market Segmentation: A Multiple Criteria Approach Combining Preference Analysis and Segmentation Decision. *Omega (United Kingdom)*, 83(March), 1–13. <https://doi.org/10.1016/j.omega.2018.01.008>
- Mäenpää, K. (2006). Clustering the consumers on the basis of their perceptions of the Internet banking services. *Internet Research*, 16(3), 304–322. <https://doi.org/http://dx.doi.org/10.1108/10662240610673718> Downloaded
- McLean, G., Osei-Frimpong, K., Al-Nabhani, K., & Marriott, H. (2020). Examining Consumer Attitudes Towards Retailers’ M-Commerce Mobile Applications – An Initial Adoption vs. Continuous Use Perspective. *Journal of Business Research*, 106, 139–157. <https://doi.org/10.1016/j.jbusres.2019.08.032>
- Mostafa, R. B. (2020). Mobile Banking Service Quality: A New Avenue for Customer Value Co-Creation. *International Journal of Bank Marketing*, 38(5), 1107–1132. <https://doi.org/10.1108/IJBM-11-2019-0421>
- Motiwalla, L., Albashrawi, M., & Kartal, H. B. (2018). Understanding Mobile Banking Success Through User Segmentation. *Proceedings of the Annual Hawaii International Conference on System Sciences (HICSS) 51th, Januari*, 882–891. <https://doi.org/10.24251/hicss.2018.110>
- Motiwalla, L. F., Albashrawi, M., & Kartal, H. B. (2019). Uncovering Unobserved Heterogeneity Bias: Measuring Mobile Banking System Success. *International*

- Journal of Information Management*, 49(December), 439–451. <https://doi.org/10.1016/j.ijinfomgt.2019.07.005>
- Patsiotis, A. G., Hughes, T., & Webber, D. J. (2012). Adopters and Non-Adopters of Internet Banking: A Segmentation Study. *International Journal of Bank Marketing*, 30(1), 20–42. <https://doi.org/10.1108/02652321211195686>
- Pikkarainen, T., Pikkarainen, K., Karjaluoto, H., & Pahnla, S. (2004). Consumer acceptance of online banking: an extension of the technology acceptance model. *Internet Research*, 14(3), 224–235. <https://doi.org/10.1108/10662240410542652>
- Qadadeh, W., & Abdallah, S. (2018). Customers Segmentation in the Insurance Company (TIC) Dataset. *Procedia Computer Science*, 144, 277–290. <https://doi.org/10.1016/j.procs.2018.10.529>
- Rajaobelina, L., Brun, I., & Toufaily, É. (2013). A Relational Classification of Online Banking Customers. *International Journal of Bank Marketing*, 31(3), 187–205. <https://doi.org/10.1108/02652321311315294>
- Sihotang, E. T. (2016). Segmentasi Layanan Internet Banking. *Jurnal Manajemen Dan Kewirausahaan*, 4(2), 12–22. <https://doi.org/10.26905/jmdk.v4i2.644>
- Sundjaja, A. M. (2013). Analysis of Customer Segmentation in Bank XYZ Using Data Mining Technique. *Asian Journal of Information Technology*, 12(1), 39–44. <https://doi.org/10.3923/ajit.2013.1.39>
- Surabaya, P. K. (2023). Sosial Ekonomi. Retrieved December 1, 2023, from <https://surabaya.go.id/id/page/0/8177/sosial-ekonomi> website: <https://surabaya.go.id/id/page/0/8177/sosial-ekonomi>
- Sutarso, Y., Rustiana, E., Hanum, A. R., & K, W. G. (2012). Lifestyle Segmentation: The Comparison of Islamic and Conventional Banking Customers in Indonesia. *Journal of Distribution Science*, 10(8), 25–34. <https://doi.org/10.15722/jds.10.8.201208.25>
- Sutarso, Y., Sekarsari, A. L., Maschudah, I. A., & Marta, S. M. (2023). Understanding Female Segments Based on Benefit of Loyalty Program. *Jurnal Aplikasi Manajemen*, 21(2), 516–533. <https://doi.org/10.21776/ub.jam.2023>
- Usman, H., Projo, N. W. K., Chairy, C., & Haque, M. G. (2022). The Exploration Role of Sharia Compliance in Technology Acceptance Model for E-Banking (Case: Islamic Bank in Indonesia). *Journal of Islamic Marketing*, 13(5), 1089–1110. <https://doi.org/10.1108/JIMA-08-2020-0230>
- Yu, C. S. (2015). Using E-lifestyle to Analyze Mobile Banking Adopters and Non-Adopters. *Journal of Global Information Technology Management*, 18(3), 188–213. <https://doi.org/10.1080/1097198X.2015.1070619>
- Zhang, T., Lu, C., & Kizildag, M. (2018). Banking “On-the-Go”: Examining Consumers’ Adoption of Mobile Banking Services. *International Journal of Quality and Service Sciences*, 10(3), 279–295. <https://doi.org/10.1108/IJQSS-07-2017-0067>