Sulistiyani Sulistiyani

User Experience of Mobile Banking Application in Indonesia: New Technology of Banking

Quick Submit

Quick Submit

Universitas 17 Agustus 1945 Semarang

Document Details

Submission ID
trn:oid:::1:3036056263

Submission Date
Oct 9, 2024, 4:50 PM GMT+7

Download Date
Oct 9, 2024, 5:28 PM GMT+7

File Name
User_Experience_of_Mobile_Banking_Application_in_Indonesia.pdf

File Size
913.0 KB

15 Pages

7,302 Words

41,894 Characters

9% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Filtered from the Report

- Bibliography
- Quoted Text
- Cited Text
- Small Matches (less than 8 words)

Exclusions

- 2 Excluded Matches

Match Groups

48 Not Cited or Quoted 9%
Matches with neither in-text citation nor quotation marks

0 Missing Quotations 0%
Matches that are still very similar to source material

0 Missing Citation 0%
Matches that have quotation marks, but no in-text citation

0 Cited and Quoted 0%
Matches with in-text citation present, but no quotation marks

Top Sources

9% Internet sources
4% Publications
3% Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

No suspicious text manipulations found.

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

Match Groups

- **48** Not Cited or Quoted 9%
  Matches with neither in-text citation nor quotation marks
- **0** Missing Quotations 0%
  Matches that are still very similar to source material
- **0** Missing Citation 0%
  Matches that have quotation marks, but no in-text citation
- **0** Cited and Quoted 0%
  Matches with in-text citation present, but no quotation marks

Top Sources

9% Internet sources
4% Publications
3% Submitted works (Student Papers)

Top Sources

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	Internet	erepository.uwks.ac.id 1%
2	Internet	www.gbfrjournal.org 1%
3	Student papers	UNICAF 1%
4	Student papers	Politeknik Pariwisata Bali 1%
5	Internet	scholar.kyobobook.co.kr 1%
6	Internet	www.researchgate.net 1%
7	Internet	stmlportal.net 1%
8	Internet	www.mdpi.com 1%
9	Internet	www.frontiersin.org 0%
10	Internet	aber.apacsci.com 0%

11 Internet
iklanblitz.com 0%

12 Publication
Mengyao Zhu, Kotaro Tanaka, Tomonari Akamatsu. "Visualizing the annual transi... 0%

13 Internet
eprints.utar.edu.my 0%

14 Internet
knepublishing.com 0%

15 Publication
Heinz D. Kurz, Marlies Schütz, Rita Strohmaier, Stella S. Zilian. "The Routledge Ha... 0%

16 Student papers
Ravensbourne 0%

17 Internet
ojs.whioce.com 0%

18 Student papers
Sim University 0%

19 Internet
ir.canterbury.ac.nz 0%

20 Internet
www.igi-global.com 0%

21 Internet
www.researchsquare.com 0%

22 Internet
fbf.utar.edu.my 0%

23 Internet
so02.tci-thaijo.org 0%

24 Internet
www.econstor.eu 0%

GLOBAL BUSINESS & FINANCE REVIEW, Volume. 29 Issue. 2 (MARCH 2024), 127-141
pISSN 1088-6931 / eISSN 2384-1648 | Https://doi.org/10.17549/gbfr.2024.29.2.127

GLOBAL BUSINESS & FINANCE REVIEW

www.gbfrjournal.org

User Experience of Mobile Banking Application in Indonesia: New Technology of Banking

Sulistiyani[a†], Nurchayati[b], Nurchayati[a], Narariya Dita Handani[c,d]

[a]Faculty of Economics and Business, Department of Management, Universitas 17 Agustus 1945, Semarang 50235, Indonesia
[b]Faculty of Economics and Business, Department of Accounting, Universitas 17 Agustus 1945, Semarang 50235, Indonesia
[c]Global College, Department of Global Studies, Kyungsung University, Busan 48434, South Korea
[d]Department of Management, Faculty of Economics and Business, Universitas Wijaya Kusuma Surabaya, Surabaya 60225, Indonesia

A B S T R A C T

Purpose: This research delves into the user experiences associated with ten mobile banking applications in Indonesia. The study aims to highlight the technological innovations that drive user satisfaction, pinpoint areas requiring enhancement, and offer foresight into the evolving landscape of mobile banking in the region.
Design/methodology/approach: Utilizing the KH-coder software, the data underwent rigorous quantitative text mining. Techniques such as frequency analysis, co-occurrence network analysis, and topic modeling were employed to discern pivotal themes within mobile banking applications. Further, statistical analyses rooted in co-occurrence words were conducted.
Findings: The study scrutinized 5,720 online reviews, highlighting the pivotal role of online feedback in influencing consumer behavior, from product choices to app installations. The overall average rating was 3.76 out of 5, indicating a moderate level of user satisfaction. Reviews often raised concerns, with terms such as 'bug,' 'slow,' 'issue,' and 'problem' being prevalent. Conversely, reviews with a positive tone frequently included words like 'transfer,' 'previous,' 'number,' 'easy,' 'friendly,' 'user,' and 'feature,' suggesting greater user satisfaction. Through statistical analysis, ten distinct factors were identified, encompassing 26 words derived from co-occurrence patterns.
Research limitations/implications: The study is geographically centered on Indonesia, potentially limiting its applicability to other regions. Relying on user reviews may not encompass the entirety of user experiences, given the potential bias towards extreme sentiments. The findings highlight the importance of technological advancements and user feedback in mobile banking's future, urging stakeholders to address areas of concern identified by users to enhance satisfaction and engagement.
Originality/value: By harnessing a multi-dimensional analytical paradigm, encompassing term frequency, co-occurrence analysis, Latent Dirichlet Allocation (LDA), Exploratory Factor Analysis, and regression analysis, this study crafts a holistic blueprint for enhancing digital banking experiences, offering invaluable insights for stakeholders in the mobile banking domain.

Keywords: user experience, user satisfaction, mobile banking application, technology, online review

I. Introduction

The digitalization of financial services has been growing rapidly in recent years. In an era defined

Received: Oct. 30, 2023; Revised: Nov. 16, 2023; Accepted: Dec. 4, 2024
† Corresponding author: Sulistiyani
E-mail: sulistyani@untagsmg.ac.id

by the convergence of finance and technology, banking has transcended the traditional confines of brick-and-mortar establishments. Based on data from Populix (2022) shows that mobile banking and e-wallet are the two most used financial application among popular in Indonesia. This transformation is particularly evident in Indonesia, an archipelago nation characterized by its vast geography and a burgeoning digital economy. As the world's fourth most populous country, Indonesia's unique demographic and geographic backdrop offers a fertile ground for the proliferation of mobile banking applications (apps), revolutionizing the financial interactions of millions (Ciptarianto & Anggoro, 2022).

Indonesia's vast archipelago, comprising over 17,000 islands, inherently challenges the traditional banking infrastructure. However, the rise of smartphones offers a solution, bridging geographical divides and democratizing access to financial services. By the end of 2021, Indonesia witnessed a surge in smartphone users, reaching approximately 100 million, catalysing the digital banking revolution (Ciptarianto & Anggoro, 2022).

Mobile banking apps in Indonesia symbolize more than mere technological adaptation. They represent the nation's socio-economic aspirations, driven by rapid urbanization, an expanding middle class, and increased internet penetration (Tavera-Mesias et al., 2022). This digital shift has fostered an environment conducive to financial solutions, with traditional banks and fintech startups vying for a share of this expansive market (Goswami et al., 2022). The evolving landscape of Indonesian banking is marked by innovation, fierce competition, and shifting user expectations.

Meanwhile, online reviews have become a critical factor in shaping user perceptions and decisions, especially in the context of mobile banking apps. These reviews serve as a rich source of data for understanding user satisfaction and pinpointing areas for improvement (Handani, et al., 2022; Hwang, 2022). The launch of mobile channels significantly influences online customer or user reviews, thereby affecting the overall reputation of the banking service (Kim et al., 2021). This highlights the importance of continuously monitoring and analyzing online reviews to adapt to customer needs and preferences effectively.

The technological landscape underpinning mobile banking applications is in a constant state of evolution, adapting to meet the dynamic needs and expectations of users. Advanced features such as biometric authentication, real-time transaction notifications, and QR code-based payments have become ubiquitous, serving to augment both the security and user experience of these platforms. This necessity for accessibility and functionality has been further amplified in the context of global crises, such as the COVID-19 pandemic. The pandemic has catalyzed a paradigm shift towards contactless transactions, driven by heightened public awareness of physical contact risks and viral transmission. Consequently, mobile banking applications have emerged as indispensable instruments for facilitating secure, contactless financial interactions (Naeem et al., 2022). As technological innovation persists, it is imperative for mobile banking platforms to continually evolve, offering increasingly sophisticated features that not only streamline financial transactions but also ensure a secure and reliable user experience.

This research aims to delve deep into the user experience of mobile banking apps in Indonesia. It seeks to illuminate the technological innovations driving user satisfaction, identify potential areas for enhancement, and provide insights into the future trajectory of mobile banking in the region, considering the broader implications for the fusion of technology and finance in Southeast Asia.

II. Literature Review

A. User Experience and Financial Performance in Mobile Banking

The digital era has ushered in significant transformations in the banking sector, with mobile banking

apps becoming a primary touchpoint between banks and their user. The experience these apps offer plays a pivotal role in shaping user satisfaction, loyalty, and overall engagement with financial institutions (Tran & Vu, 2019).

Sailaja (2020) study delved into the evolution of the Indian banking sector, emphasizing the transformative role of technology in enhancing user experiences. The research highlighted the transition from traditional banking methods to the widespread adoption of net banking and mobile payment apps.

In a study by Febrian, et al. (2021), the researchers investigated the influence of the benefits provided by mobile banking apps and the overall user experience on users' intention to reuse the service. Their findings revealed a significant correlation between the benefits offered, the user experience, and satisfaction levels. This satisfaction, in turn, influenced trust and the intention to continue using the mobile banking service (Xin & Choi, 2020).

Lastly, a study by Oh & Kim, (2021) employed a text mining approach to discern factors that enhance user satisfaction in mobile banking apps. By analysing reviews for four major U.S. banks, they identified key quality dimensions, such as ease of use, convenience, security, and customer support. Notably, their research pinpointed security as the most influential factor in determining user satisfaction within mobile financial services (Oh & Kim, 2021).

B. Adoption of Technology in Mobile Banking Applications

In the digital age, the banking landscape has been profoundly transformed by technological innovations. At the heart of this transformation are mobile banking applications, which have become indispensable tools for modern financial transactions. With the ubiquity of smartphones, these applications not only offer unparalleled convenience but also a suite of functionalities that enable users to effortlessly transfer money, pay bills, open deposit accounts, and more, all from the comfort of their devices (Kamal et al., 2023).

A significant technological advancement in mobile banking is the integration of QR (Quick Response) codes for payments. In a study by Ruslan, et al. (2019), the researchers delved into the convenience and security of QR Code payments in Indonesia. Their research presented a prototype for QR Code Payment on OCBC NISP Mobile Banking, emphasizing its applicability for both merchant payments and person-to-person transactions. Beyond QR codes, the expansive functionalities of mobile banking apps, such as easy fund transfers, bill payments, and account management, have been pivotal in their widespread adoption.

Kouraogo, et al. (2017) highlighted the security concerns associated with mobile banking applications, emphasizing the need for robust countermeasures to protect user data and ensure secure transactions. In summary, the adoption of technology in mobile banking applications reflects the industry's commitment to offering users a seamless, secure, and efficient banking experience, catering to a wide range of financial needs.

C. Online Reviews of Mobile Banking Applications

In the digital age, online reviews have become a crucial determinant of consumer behavior, influencing decisions ranging from product purchases to app downloads. Mobile banking applications, as a subset of this digital ecosystem, are no exception. The feedback and reviews they garner online play a pivotal role in shaping their adoption and continued use (Oh & Kim, 2021).

Yusop, et al. (2015) conducted a systematic literature review to identify security requirements for mobile applications, emphasizing the importance of user confidence in performing online transactions, such as banking. Their study highlighted the attributes of security requirements relevant for mobile apps, such as authentication and confidentiality. Given that security concerns are often a recurring theme in online

GLOBAL BUSINESS & FINANCE REVIEW, Volume. 29 Issue. 2 (MARCH 2024), 127-141

reviews, this study underscores the importance of addressing these requirements to foster trust among users.

Lee & Lee (2020) discussed the shift in consumers' purchasing behaviors from traditional retailing to online and mobile channels, emphasizing the role of advanced digital technologies. Their study introduced the concept of "untact" service, which facilitates customer encounters without face-to-face contact. The research indicated that untact services, such as mobile banking apps, are becoming widespread, underscoring the importance of online reviews in shaping perceptions and adoption of these services.

III. Research Methodology

In this research, quantitative text mining was employed as a crucial tool to analyze and interpret the extensive feedback collected. Utilizing advanced algorithms, this approach enabled us to convert raw textual data into structured insights (Handani, et al., 2022; Noerhartati et al., 2023).

For the purpose of this study, data were collected from Google Play Store reviews, focusing on mobile banking applications from 2015 to 2023. We developed a bespoke web scraping algorithm to gather these reviews, each of which was analyzed through quantitative text mining. This process involved examining the textual content and review ratings, resulting in a comprehensive dataset of over ten thousand reviews.

Following the data collection phase, a filtration process was executed to eliminate reviews devoid of substantive content or relevant information. This yielded a refined dataset of 5,720 reviews suitable for rigorous analysis. The resulting data were subjected to quantitative text mining via KH Coder software. This software facilitated the construction of a co-occurrence network, elucidating patterns of word co-occurrence within the review corpus (Budiharseno et al., 2023; Higuchi, 2016; Noerhartati et al., 2023).

The initial analytical phase of quantitative text mining entailed the generation of a co-occurrence network to explicate the interrelationships among the terms employed in the reviews. In addition to the co-occurrence network, the study employed topic modeling techniques, specifically using Latent Dirichlet Allocation (LDA). LDA is a generative statistical model that allows sets of observations to be explained by unobserved groups, in this case, topics that explain why some parts of the data are similar (Jian et al., 2018).

Following the topic modeling, this study implemented exploratory factor analysis (EFA) to identify significant factors based on the co-occurrence of words. EFA aimed to reduce the large number of variables (individual terms or phrases in reviews) to a smaller number of factors, each representing

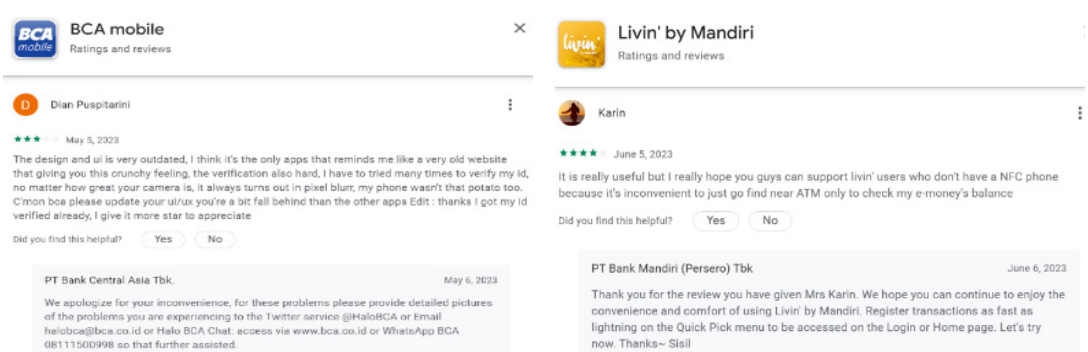

Figure 1. Screenshot of mobile banking apps online review

a prevalent theme or concept. This was crucial in determining if the clusters identified in the co-occurrence analysis corresponded to significant factors in user reviews (Handani, et al., 2022).

Finally, linear regression was applied to understand the relationship between these identified factors and user satisfaction. This method quantified the impact of each factor on user ratings, providing insights into elements that significantly affect customer satisfaction. Thus, Figure 2 in the manuscript offers a detailed depiction of the research methodology, illustrating the interconnectedness and necessity of each method employed in this study (Noerhartati et al., 2023).

IV. Result

A. Quantitative Text Mining

Table 1 presents overall average rating for these ten mobile banking apps which was 3.76 out of 5, suggesting a medium level of user satisfaction also the room of improvement. A deeper examination of Table 1 reveals that BRIMO by Bank Rakyat Indonesia (BRI) received the highest rating of 4.3, indicative of extremely positive user feedback. Conversely, Permata Mobile X by Permata Bank received the lowest rating among the apps surveyed. Thus, negative reviews can significantly impact user satisfaction and, by extension, the reputation of a mobile banking application (Oh & Kim, 2021; Trivedi et al., 2022).

In Table 2, the study identifies and categorizes the 60 most frequent terms found in the online reviews.

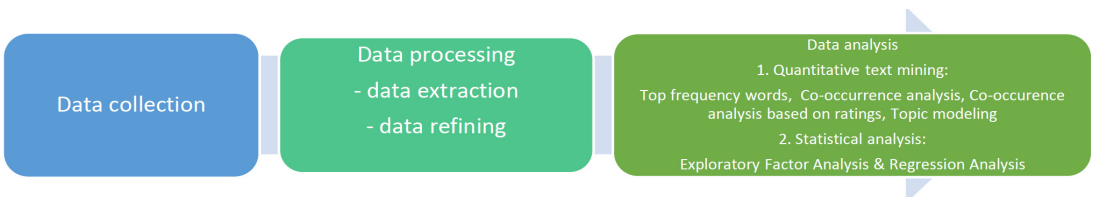

Figure 2. Research methodology flow

Table 1. Mobile banking applications review included in the study

No	Apps name	Bank provider	No. of Review	Average satisfaction
1	BCA mobile	Bank Central Asia (BCA)	700	4.2
2	BRIMO	Bank Rakyat Indonesia (BRI)	700	4.3
3	Livin Mandiri	Bank Mandiri	700	3.8
4	BNI mobile banking	Bank Negara Indonesia (BNI)	700	3.9
5	BSI mobile	Bank Syariah Indonesia (BSI)	700	4.1
6	OCTO mobile	CIMB Niaga	700	3.8
7	Permata mobile X	Permata bank	700	2.6
8	BTN mobile banking	Bank Tabunngan Negara (BTN)	120	4.2
9	Digi by bank BJB	Bank Jabar Banten (BJB)	350	3.7
10	D-Mobile	Bank Danamon	350	3
		Total review	5720	
		Total average satisfaction		3.76

GLOBAL BUSINESS & FINANCE REVIEW, Volume. 29 Issue. 2 (MARCH 2024), 127-141

The term 'app' emerged as the most frequent, appearing 5,213 times, which aligns with the study's focus on mobile banking applications. This is consistent with prior research that emphasizes the role of specific keywords in shaping user perceptions of service quality (Rozie et al., 2023). Following 'app', the terms 'time' and 'login' were the second and third most frequent, with 1,412 and 935 occurrences, respectively. Interestingly, negative terms such as 'error', 'bad', 'bug', 'slow', and 'useless' also made it into the top 60, suggesting a level of user dissatisfaction.

According to the Figure 3 of Co-Occurrence analysis result it showed that centre node is 'app' which indicated that 'app' is related to the other words in this research. While 'app' is related to same-color nodes which are 'time,' 'banking,' 'transaction,' 'mobile,' 'login,' 'problem,' and 'long,' these tosca nodes indicate that these terms are frequently mentioned together in the context of mobile banking applications. Some comments tend in a good review from the reviewers: "Easy to use, functional, and safe. Unlike the other mobile banking apps that use biometric login, I prefer this app's old way, the 2 steps to do transactions. So much safer, please keep it that way."

Specifically, the presence of terms like 'time,' 'transaction,' and 'login' alongside 'problem' and 'long' may imply that users are concerned with the efficiency and reliability of these features. Meanwhile, the blue nodes, which contain 'bank,' 'account,' 'transfer,' and 'money,' indicate that these terms are often inter-connected in discussions related to the financial aspects of using mobile banking apps. As shown based on the user review: "It's a good apps, it's make easier to transfer or checking my account balance. But unfortunately in the newly update, there is problem with adding new account number to transfer."

The green nodes, which mention 'card,' 'number,' and 'phone,' indicate that these terms frequently co-occurrence in discussions related to personal identification and authentication within mobile banking apps. The gray nodes indicated internet connection, yellow nodes indicated easiness feature of mobile banking apps, the purple nodes indicated about customer service, orange nodes indicated of bad experience, other nodes indicated some error message and version of mobile banking apps.

According to the Figure 4 it showed some nodes which related to satisfaction rating (4-5) and

Table 2. Frequency of top keyword

No	Words	Frequency	No	Words	Frequency	No	Words	Frequency	No	Words	Frequency
1	app	5213	16	connection	527	31	android	277	46	process	209
2	time	1412	17	easy	514	32	slow	277	47	pin	206
3	login	935	18	bad	490	33	BCA	268	48	system	188
4	account	893	19	feature	413	34	install	266	49	BNI	186
5	bank	869	20	OTP	406	35	money	265	50	wrong	184
6	transaction	855	21	change	397	36	access	263	51	interface	174
7	mobile	854	22	number	385	37	bug	254	52	screen	175
8	problem	779	23	internet	382	38	register	249	53	BSI	171
9	version	736	24	card	375	39	previous	246	54	payment	166
10	banking	730	25	issue	361	40	uninstall	228	55	fast	155
11	phone	656	26	customer	346	41	balance	226	56	useless	154
12	application	640	27	password	329	42	code	224	57	credit	153
13	error	562	28	service	311	43	reinstall	224	58	ID	153
14	transfer	543	29	verification	287	44	help	221	59	wait	152
15	user	539	30	experience	281	45	device	220	60	review	150

dissatisfaction rating (1-3). Certainly, ratings of 1, 2, and 3 feature terms that are predominantly associated with user dissatisfaction, such as 'bad,' 'error,' 'connection,' 'time,' 'phone,' 'account,' 'version,' 'login,' and 'problem.' The frequent appearance of these terms within lower-rated reviews suggests that they are key factors contributing to negative user experiences. Conversely, terms such as 'transfer,' 'previous,' 'number,' 'easy,' 'friendly,' 'user,' and 'feature' are predominantly found in reviews with higher

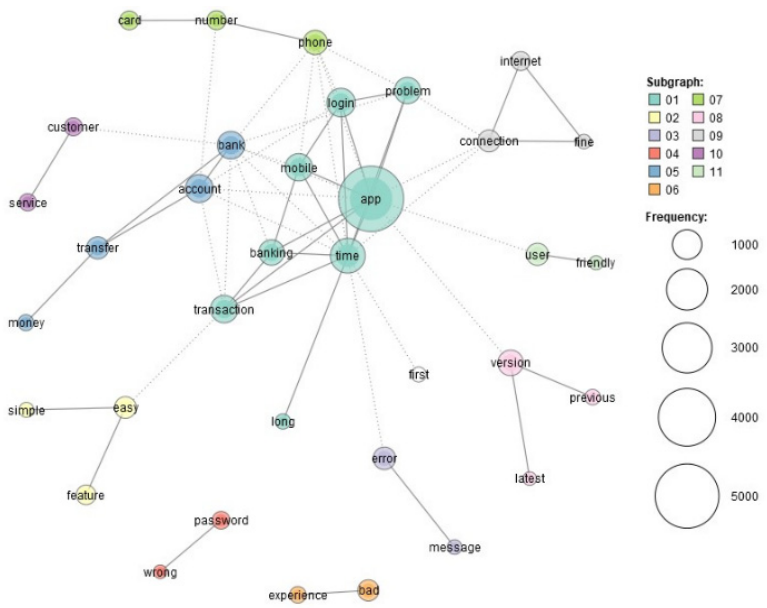

Figure 3. Co- Occurrence analysis result

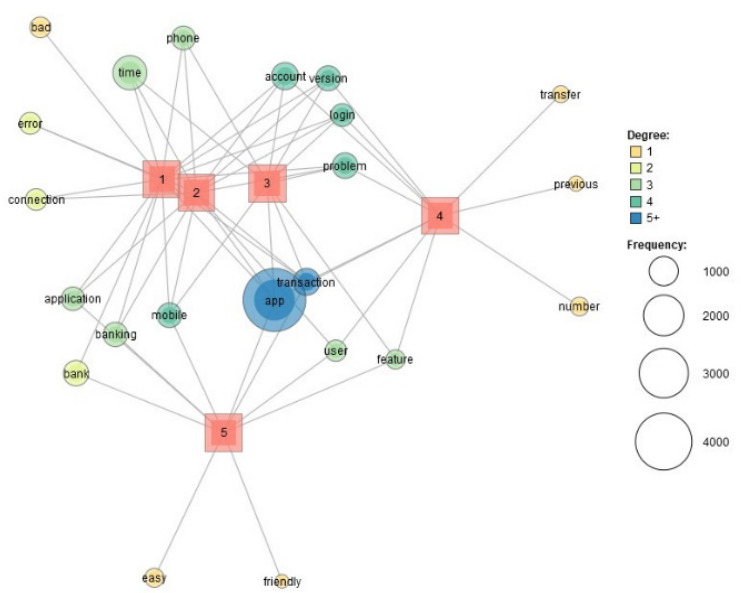

Figure 4. Co- Occurrence based on ratings result

ratings, indicating user satisfaction. The frequent co-occurrence of these terms suggests that they are pivotal elements contributing to positive user experiences. For instance, terms like 'easy,' 'friendly,' and 'user' likely point to an intuitive and user-friendly interface, while 'transfer,' 'number,' and 'feature' may signify efficient and reliable transactional capabilities.

In Figure 5 lists the 10 topics with the top ten terms and their corresponding probabilities of occurrence. Utilizing a form of statistical model known as Latent Dirichlet Allocation (LDA), employed by KH Coder, each topic represents a collection of words that frequently appear together. Additionally, the model assigns coefficients to these topics, where a higher coefficient indicates a stronger association or relevance within the dataset. In essence, topics with higher coefficients are the central themes or focal points in the user reviews (Zhu et al., 2023).

The topic modeling results reveal several key themes. Topic #1, characterized by an app coefficient of 0.856, is primarily concerned with app issues and transactions. Topic #2 focuses on the banking system and includes terms closely related to it. Topic #3 discusses the ease of use associated with mobile banking applications. Topic #4 clusters around connection problems, featuring words such as 'problem,' 'error,' 'connection,' and 'internet.' Topic #5 delves into app-related issues, mentioning terms like 'bug,' 'issue,' and 'system.' Topic #6 encompasses terms that point to undesirable features of the apps. Topic #7 is centered on transaction login issues, with words related to login difficulties. Topic #8 pertains to user experience and includes terms like 'customer,' 'experience,' and 'service.' Topic #9 addresses time and security, featuring words such as 'day,' 'password,' and 'user.' Finally, Topic #10 is concerned with verification processes, as evidenced by terms like 'phone,' 'number,' 'card,' 'verification,' and 'code'.

B. Statistical Analysis

Referring to Table 3, the KMO (Kaiser Meyer Olkin) value stands at 0.667. This surpasses the recommended benchmark of 0.6, as highlighted by Effendi et al., (2019); Feng & Chen, (2020), affirming the suitability of factor analysis for this study. Furthermore, Bartlett's test produced an X^2 value of 12677.826. With a significance level below 0.001 ($p < 0.01$), the data's correlation matrix is notably distinct from an identity matrix. This outcome, as pointed out by Niu et al. (2022), confirms the multivariate normal distribution of our dataset, further supporting the application of exploratory factor analysis (EFA).

The EFA demonstrated that the ten factors under consideration were apt for in-depth analysis. From the initial co-occurrence findings, 35 words were extracted. However, post factor loading and by setting a baseline coefficient of 0.4, as suggested by Hair et al. (2019), only 26 words were deemed fit for subsequent analysis based on the EFA results. Additionally, the internal consistency of the evaluation tool was assessed using Cronbach's alpha (α). In this research, the Cronbach's alpha values fluctuated between 0.6 and 0.8, falling within the acceptable range, indicating a reliable measure.

Following the factor analysis, linear regression was applied in this research to examine the nuances of user ratings for mobile banking applications, as

#1	_r	#2	_r	#3	_r	#4	_r	#5	_r	#6	_r	#7	_r	#8	_r	#9	_r	#10	_r
app	0.856	account	0.360	application	0.267	problem	0.271	app	0.963	version	0.308	transaction	0.355	app	0.322	time	0.555	phone	0.264
issue	0.131	bank	0.308	user	0.185	error	0.239	issue	0.019	bad	0.168	login	0.232	mobile	0.314	password	0.135	number	0.154
system	0.006	transfer	0.125	easy	0.162	connection	0.232	system	0.005	feature	0.159	bug	0.104	banking	0.310	day	0.104	card	0.149
transaction	0.002	money	0.108	customer	0.138	internet	0.142	experience	0.005	previous	0.104	balance	0.098	experience	0.031	wrong	0.076	verification	0.118
time	0.001	slow	0.037	service	0.124	device	0.095	bug	0.002	latest	0.078	annoying	0.088	phone	0.006	month	0.054	code	0.090
bug	0.001	system	0.022	friendly	0.081	button	0.004	login	0.001	slow	0.064	button	0.087	customer	0.005	bad	0.037	message	0.087
month	0.001	month	0.021	transaction	0.018	number	0.003	day	0.001	experience	0.060	month	0.011	service	0.003	user	0.025	problem	0.056
account	0.000	button	0.005	login	0.010	transfer	0.003	month	0.001	login	0.018	system	0.009	transaction	0.002	application	0.003	time	0.035
problem	0.000	customer	0.004	feature	0.010	bank	0.002	mobile	0.001	user	0.011	feature	0.005	bank	0.001	internet	0.003	system	0.035
bank	0.000	problem	0.003	app	0.001	money	0.001	number	0.000	day	0.010	issue	0.003	message	0.001	app	0.003	experience	0.002

Figure 5. Topic modeling result

detailed in Table 4. This regression analysis, building upon the groundwork set by the factor analysis, sought to understand user experiences and satisfaction levels, emphasizing app ratings (Handani, et al., 2022).

In the regression model of this study, ten independent variables were considered: Factor 1 through Factor 10. These factors collectively accounted for 14.5% of the variation in user ratings, as indicated by an R^2 value of 0.145. It's worth noting that while these ten factors were significant, there are numerous other determinants that can influence user ratings in mobile banking applications. Some of these determinants might not have been captured in the ten clusters due to their infrequent appearance in the data gathered by this research.

The observed correlations between the independent and dependent variables in this study were not particularly strong. This can be attributed to the myriad of factors that play a role in shaping user satisfaction. When analyzing results derived from text mining, especially subjective data like user opinions, capturing the entirety of influential factors becomes challenging. Previous research has also indicated that in such scenarios, the R^2 value might

Table 3. Exploratory factor analysis result

	Words	Factor Loading	Cronbach α
Factor 1	banking	0.897	0.748
	bank	0.851	
	mobile	0.683	
Factor 2	internet	0.820	0.643
	connection	0.819	
	fine	0.474	
Factor 3	user	0.846	0.696
	friendly	0.843	
Factor 4	customer	0.827	0.655
	service	0.824	
Factor 5	transfer	0.739	0.635
	money	0.724	
	account	0.451	
Factor 6	version	0.776	0.634
	latest	0.612	
	previous	0.561	
Factor 7	number	0.760	0.633
	phone	0.730	
Factor 8	easy	0.676	0.621
	feature	0.543	
	simple	0.51	
	transaction	0.43	
Factor 9	password	0.751	0.625
	wrong	0.68	
Factor 10	error	0.776	0.627
	message	0.74	
KMO (Kaiser Meyer Olkin) = 0. 667			
Bartlett's chi square (p) = 12677.826 p< 0.001)			

Table 4. Regression analysis result

	Unstandardized Coefficients		Standardized Coefficients	t
	β	Std. error	β	
(Constant)	2.328	0.020		117.489
Factor 1	-0.048	0.020	0.03	-2.414*
Factor 2	-0.212	0.020	0.131	-10.718**
Factor 3	0.119	0.020	0.074	6.023**
Factor 4	-0.148	0.020	-0.091	-7.468**
Factor 5	-0.109	0.020	-0.067	-5.481**
Factor 6	-0.141	0.020	-0.087	-7.113**
Factor 7	-0.161	0.020	-0.099	-8.111**
Factor 8	0.433	0.020	0.267	21.824**
Factor 9	-0.14	0.020	-0.086	-7.057**
Factor 10	-0.189	0.020	-0.117	-9.533**

Notes: Dependent variable: User Rating (UR); R^2 = 0.146; adjusted R^2 = 0.145; **p < 0.01; *p < 0.05.

be on the lower side reinforcing the findings of this study (Handani & Kim, 2023; Kim & Noh, 2019).

"Factor 1 (F1, β=0.03, p <0.05)", "Factor 2 (F2, β=0.131, p <0.01)", "Factor 3 (F3, β=0.074, p <0.01)", "Factor 4 (F4, β = -0.091, p <0.01)" , "Factor 5 (F5, β = -0.067, p <0.01)" , "Factor 6 (F6, β = -0.087, p <0.01)" , "Factor 7 (F7, β = -0.099, p <0.01)" , "Factor 8 (F8, β = 0.267, p <0.01)" , "Factor 9 (F9, β = -0.086, p <0.01)" , "Factor 10 (F10, β = -0.117, p <0.01)".

Based on the standardized β, the regression equation is:

UR = 0.03 F1* + 0.131 F2** + 0.074 F3** - 0.191 F4** - 0.067 F5** - 0.087 F6** - 0.099 F7** + 0.267 F8** - 0.086 F9** - 0.117 1 F10*

The equation predicts user ratings (UR) based on various factors (F1 to F10) identified from Exploratory Factor Analysis, each representing a distinct aspect of user experience with mobile banking applications. The coefficients show the magnitude and direction of each factor's influence, with positive values indicating a factor that increases user satisfaction, and negative values highlighting areas negatively impacting user experience. The stars (*) and double stars (**) denote the statistical significance, with more stars indicating higher confidence in the factor's impact. This regression analysis offers critical insights, showing which elements of mobile banking apps have the most significant positive or negative effect on user ratings, thus guiding developers on where to focus improvements for enhancing overall user satisfaction.

V. Discussion and Implications

In the intricate landscape of mobile banking in Indonesia, the findings of this study offer a profound understanding of user perceptions and experiences. The Kaiser Meyer Olkin (KMO) measure, standing confidently at 0.667, not only surpasses the scholarly benchmark of 0.6 but also underscores the meticulousness of our data collection and the subsequent suitability of factor analysis. Such a value, juxtaposed with Bartlett's test, paints a vivid picture of a significant correlation matrix, a testament to the

robustness of our research methodology.

The average rating of 3.76, while indicative of moderate user satisfaction, suggests potential areas for enhancement. The frequent appearance of negative terms such as 'bug,' 'slow,' 'issue,' and 'problem' in the reviews serves as a clarion call for immediate managerial intervention (Justitia et al., 2019). In an era where mobile banking apps are indispensable, such shortcomings can significantly impact user retention and overall business performance. Addressing these issues transcends mere technical fixes; it's about evolving with the needs of a customer base increasingly reliant on mobile technology for their banking needs (Ferrari, 2022; Kim & Bae, 2020).

The term frequency analysis, consistent with prior research, emphasized the role of specific keywords in shaping user perceptions. The prevalence of negative terms such as 'error,' 'bad,' and 'bug' in the top 60 most frequent terms underscores areas of user dissatisfaction, a sentiment echoed in other studies that utilize keyword frequency analysis to gauge user satisfaction. This finding corroborates earlier studies that highlight the impact of negative reviews on user satisfaction (Trivedi et al., 2022).

Co-occurrence analysis and Latent Dirichlet Allocation (LDA) further deepen our insights. Terms associated with time, transactions, and login issues, often mentioned in tandem, highlight user priorities for efficiency and reliability. High coefficients for topics related to app issues, banking systems, and ease of use indicate these areas are of paramount importance to users.

Furthermore, our quantitative text analysis identified significant words using Co-Occurrence (Noerhartati et al., 2023). The exploratory factor analysis (EFA) discerned ten crucial factors from the initial co-occurrence findings. Adhering to the scholarly guidelines of Hair et al. (2019), we refined the list to 26 words, each echoing the intricacies of mobile banking experiences in Indonesia. The Cronbach's alpha values, ranging between 0.6 and 0.8, validate the internal consistency of our evaluation tool, reinforcing our findings' reliability.

The regression analysis elucidates the factors shaping user ratings for mobile banking applications in Indonesia. While some factors positively correlate with user ratings, indicating areas of approval, others negatively influence them, pinpointing potential concerns. For instance, areas like 'internet connection,' 'user-friendliness,' and 'simplicity' positively impact user ratings, suggesting improvements here would be well-received. Conversely, aspects related to 'banking,' 'customer service,' and 'technical errors' require proactive attention to enhance user satisfaction.

In the grand tapestry of mobile banking in Indonesia, this research, with its intricate weave of insights and implications, serves as both a compass and a beacon. It beckons mobile banking applications to embark on a journey of introspection, innovation, and incessant improvement, all in pursuit of the elusive yet attainable zenith of unparalleled user experience.

A. Theoretical Implications

This study's findings contribute to the broader theoretical understanding of mobile banking user perceptions in several ways. First, by successfully applying the Kaiser Meyer Olkin (KMO) measure and Bartlett's test in the mobile banking context, it extends the generalizability of these measures beyond traditional sectors. This aligns with the work of Hair et al. (2019) which suggests that these measures can be effective tools in assessing data suitability in modern digital contexts.

Secondly, the emphasis on term frequency analysis in mobile banking reviews provides a novel lens through which academic researchers can interpret digital user feedback. This finding, especially in the context of mobile banking, resonates with the insights presented by Blei et al. (2003), emphasizing the power of language in influencing digital user experiences.

The application of Latent Dirichlet Allocation (LDA) in this study also offers a theoretical advancement. While LDA has been employed in diverse fields, its use in deciphering patterns within digital banking reviews highlights its versatility and potential for

GLOBAL BUSINESS & FINANCE REVIEW, Volume. 29 Issue. 2 (MARCH 2024), 127-141

uncovering hidden thematic structures in complex digital datasets.

Furthermore, the study's approach to Principal Component Analysis in the context of mobile banking feedback suggests that traditional data reduction techniques can be effectively adapted to modern digital arenas. This perspective is supported by (Jolliffe, 2002), who emphasized the potential of these techniques in contemporary digital challenges.

Lastly, the regression analysis findings, particularly the varied positive and negative correlations with user ratings, offer a more nuanced theoretical understanding of user satisfaction determinants in digital platforms. This research suggests that user satisfaction in digital domains like mobile banking is influenced by a complex interplay of both positive and negative factors, a perspective that aligns with the insights of Zhao et al. (2012). In essence, this study enriches the theoretical landscape by bridging traditional analytical techniques with modern digital challenges, offering fresh perspectives and methodologies for future academic inquiries in the realm of digital user perceptions.

B. Practical Implications

The insights derived from this study offer tangible directives for stakeholders in the mobile banking sector in Indonesia. The frequent mentions of terms like 'bug,' 'slow,' 'issue,' and 'problem' in user reviews underscore a pressing need for technical refinements. Mobile banking application developers and IT teams should prioritize addressing these concerns, ensuring that users experience a seamless and glitch-free interface. This proactive approach to technical issues can significantly elevate user satisfaction, fostering increased app engagement and loyalty, a sentiment echoed by Chong et al. (2012).

Moreover, the term frequency analysis spotlighted the importance users place on the app's loading time and the login process. This suggests a clear directive for banks: invest in optimizing these pivotal features. Zhou (2012) emphasized the significance of perceived usefulness and ease of use in mobile banking adoption, underscoring the need for banks to ensure swift app loading times and a streamlined login experience.

Additionally, the feedback concerning 'customer service' points towards potential service quality gaps. This calls for banks to bolster their customer support initiatives, possibly through comprehensive training programs, ensuring that user grievances are addressed with efficiency and empathy (Laukkanen, 2007).

Given the invaluable insights user reviews offer, banks might also benefit from instituting robust in-app feedback mechanisms. Hoehle et al. (2012) emphasized the role of user reviews in shaping mobile banking strategies, suggesting that periodic surveys or dedicated feedback sections can empower users to voice their opinions.

Furthermore, the positive correlation of factors related to 'user-friendliness' and 'simplicity' with user ratings indicates a lucrative avenue for banks. Shaikh & Karjaluoto (2015) discussed the importance of usability in mobile banking, suggesting that banks can further amplify the user experience by weaving in personalized features.

The results from linear regression can inform app developers and stakeholders about which factors are most influential on user ratings, helping them to focus on these areas for improvement. For example, if ease of use is found to have a strong positive correlation with higher ratings, developers might focus on simplifying the user interface.

Lastly, understanding the myriad factors influencing user ratings can serve as a compass for banks in sculpting their marketing and communication strategies. The role of effective communication in enhancing mobile banking adoption, suggesting that banks can cultivate trust and nurture enduring relationships with their clientele by accentuating the positive features and proactively addressing user concerns (Ha et al., 2021).

VI. Conclusion

In conclusion, this research casts a spotlight on the intricate dynamics of user experience within the rapidly evolving realm of mobile banking in Indonesia. The average user satisfaction rating, which hovers in the moderate range, serves as a clarion call for banks to invest in technological refinements, especially in areas spotlighted by user feedback. By harnessing a multi-faceted analytical approach, encompassing term frequency, co-occurrence analysis, and Latent Dirichlet Allocation (LDA), this study crafts a comprehensive blueprint for enhancing digital banking experiences. For industry leaders and decision-makers, these insights are invaluable, underscoring the pivotal role of technology in elevating user satisfaction and ensuring sustained engagement. As the digital banking frontier continues its relentless march forward, spurred by technological innovations, this research offers a foundational platform. It beckons future scholars to delve deeper, extending these insights across diverse geographies and technological paradigms, thereby broadening the horizons continually reshapes the contours of user experiences in the digital banking ecosystem.

The study acknowledges certain limitations that are crucial to consider. While the research is geographically focused on Indonesia, it is important to note that the findings did not reveal any unique characteristics specific to the Indonesian context in mobile banking user satisfaction. This is primarily due to the inherent challenges associated with analyzing online review data, where controlling for specific regional traits or ensuring the representation of unique geographical factors is difficult.

Moreover, the choice of analytical tools, the subjective nature of user reviews, and potential biases in user-generated content necessitate a cautious interpretation of the findings. These limitations underscore the challenges in isolating distinct regional factors in studies based on user-generated content and highlight the need for future research to develop methodologies that can more accurately capture and analyze geographical nuances in user experiences.

References

Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent dirichlet allocation. *Journal of Machine Learning Research, 3*, 993-1022.

Budiharseno, R. S., Kim, M. J., Cahyaningtyas, B. M. A. P., Putra, D. F. S., & Husein, F. (2023). Recovery hotel industry luxury hotels in semarang: Big data analysis. *Proceedings of the International Conference On Law, Economics, and Health (ICLEH 2022)*, 143-149. doi:10.2991/978-2-38476-024-4

Chong, A. Y. L., Chan, F. T. S., & Ooi, K. B. (2012). Predicting consumer decisions to adopt mobile commerce: Cross country empirical examination between China and Malaysia. *Decision Support Systems, 53*(1), 34-43. doi:10.1016/j.dss.2011.12.001

Ciptarianto, A., & Anggoro, Y. (2022). E-Wallet application penetration for financial inclusion in Indonesia. *International Journal of Current Science Research and Review, 5*(2), 319-332. doi:10.47191/ijcsrr/v5-i2-03

Effendi, M., Matore, E. M., Khairani, A. Z., & Adnan, R. (2019). Exploratory factor analysis (EFA) for adversity quotient (AQ) instrument among youth. *Journal of Critical Reviews, 6*(6), 234-242. doi:10.22159/jcr.06.06.33

Febrian, D., Simanjuntak, M., & Hasanah, N. (2021). The effect of benefits offered and customer experience on re-use intention of mobile banking through customer satisfaction and trust. *Jurnal Keuangan Dan Perbankan, 25*(3), 551-569. doi:10.26905/jkdp.v25i3.5879

Feng, B., & Chen, M. (2020). The impact of entrepreneurial passion on psychology and behavior of entrepreneurs. *Frontiers in Psychology, 11*(July), 1-14. doi:10.3389/fpsyg.2020.01733

Ferrari, M. V. (2022). The platformisation of digital payments: The fabrication of consumer interest in the EU FinTech agenda. *Computer Law & Security Review, 45*, 105687. doi:10.1016/j.clsr.2022.105687

Goswami, S., Sharma, R. B., & Chouhan, V. (2022). Impact of financial technology (Fintech) on financial inclusion (FI) in rural India. *Universal Journal of Accounting and Finance, 10*(2), 483-497. doi:10.13189/ujaf.2022.100213

Ha, S. B., Udonava, I., & Cheng, M. (2021). Consumer adoption of offline M-payment: The Chinese case. *Global Business and Finance Review, 26*(2), 83-109. doi:10.17549/gbfr.2021.26.2.83

Hair, J. F., Black Jr., W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis*. Pearson New International Edition.

Handani, N. D., & Kim, H.-S. (2023). Unlocking customer

satisfaction of Halal restaurant in South Korea through online review analysis. *Environment and Social Psychology, 7*(2). doi:10.18063/esp.v7.i2.1501

Handani, N. D., Riswanto, A. L., & Kim, H.-S. (2022). A study of inbound travelers experience and satisfaction at quarantine hotels in Indonesia during the COVID-19 pandemic. *Information, 13*(5), 254. doi:10.3390/info13050254

Handani, N. D., Williady, A., & Kim, H. S. (2022). An analysis of customer textual reviews and satisfaction at luxury hotels in Singapore's marina bay area (SG-Clean-Certified hotels). *Sustainability (Switzerland), 14*(15), 9382. doi:10.3390/su14159382

Higuchi, K. (2016). *KH Coder 3 reference manual*. Kioto (Japan): Ritsumeikan University.

Hoehle, H., Scornavacca, E., & Huff, S. (2012). Three decades of research on consumer adoption and utilization of electronic banking channels: A literature analysis. *Decision Support Systems, 54*(1), 122-132. doi:10.1016/j.dss.2012.04.010

Hwang, S. Y. (2022). Effects of online purchase e-CRM activities and e-customer satisfaction on e-loyalty during COVID-19: The mediating effects of e-customer satisfaction. *Global Business and Finance Review, 27*(5), 100-114. doi:10.17549/gbfr.2022.27.5.100

Jian, F., Yajiao, W., & Yuanyuan, D. (2018). Microblog topic evolution computing based on LDA algorithm. *Open Physics, 16*(1), 509-516. doi:10.1515/phys-2018-0067

Jolliffe, I. T. (2002). *Principal component analysis for special types of data*. Springer.

Justitia, A., Semiati, R., & Ayuvinda, N. R. (2019). Customer satisfaction analysis of online taxi mobile apps. *Journal of Information Systems Engineering and Business Intelligence, 5*(1), 85. doi:10.20473/jisebi.5.1.85-92

Kamal, I., Rizki, R. N., & Aulia, M. R. (2023). The enthusiasm of digital payment services and millennial consumer behaviour in Indonesia. *International Journal of Professional Business Review, 8*(2), 1-16. doi:10.26668/businessreview/2023.v8i2.923

Kim, D., & Bae, J. K. (2020). Understanding internet-only bank service adoption: An integration of the unified technology theory of acceptance and innovation resistance model. *Global Business and Finance Review, 25*(3), 49-59. doi:10.17549/gbfr.2020.25.3.49

Kim, H. S., & Noh, Y. (2019). Elicitation of design factors through big data analysis of online customer reviews for washing machines. *Journal of Mechanical Science and Technology, 33*(6), 2785-2795. doi:10.1007/s12206-019-0525-5

Kim, J. M., Lee, E., & Mariani, M. M. (2021). The influence of launching mobile channels on online customer reviews. *Journal of Business Research, 137*, 366-378. doi:10.1016/j.jbusres.2021.08.048

Kouraogo, Y., Zkik, K., Idrissi, N. E. J. El, & Orhanou, G. (2017). Security model on mobile banking application: attack simulation and countermeasures. *International Journal of Intelligent Enterprise, 4*(1-2), 155-167. doi:10.1504/IJIE.2017.087014

Laukkanen, T. (2007). Internet vs mobile banking: Comparing customer value perceptions. *Business Process Management Journal, 13*(6), 788-797. doi:10.1108/14637150710834550

Lee, S. M., & Lee, D. H. (2020). "Untact": A new customer service strategy in the digital age. *Service Business, 14*(1), 1-22. doi:10.1007/s11628-019-00408-2

Naeem, M., Ozuem, W., & Ward, P. (2022). Understanding the accessibility of retail mobile banking during the COVID-19 pandemic. *International Journal of Retail and Distribution Management, 50*(7), 860-879. doi:10.1108/IJRDM-02-2021-0064

Noerhartati, E., Handani, N. D., & Dhaneswara, N. (2023). Exploring the influence of online reviews on sales: An empirical analysis of lady - Managed Indonesia restaurants in east. *Journal of Women's Entrepreneurship and Education*, 48-74. doi:10.28934/jwee23.34.pp48-74

Oh, Y.-K., & Kim, J.-M. (2021). What improves customer satisfaction in mobile banking apps? An application of text mining analysis. *Asia Marketing Journal, 23*(4), 28-37. doi:10.53728/2765-6500.1581

Populix. (2022). Consumer preference towards banking and e-wallet apps. Populix.Co. https://info.populix.co/report/digital-banking-survey/

Rozie, V., Sardiana, A., & Puspita, P. (2023). A short review of customer satisfaction on mobile banking service quality of Islamic banks. *Paradigma, 20*(1), 74-84. doi:10.33558/paradigma.v20i1.5934

Ruslan, G. M., Karmawan, Y., Suharjito, F., & Gui, A. (2019). QR code payment in Indonesia and its application on mobile banking. In *FGIC 2nd Conference on Governance and Integrity*.

Sailaja, M. (2020). Comparative study of net banking vs mobile payment apps. *Sanshodhan, 9*(1), 37. doi:10.53957/sanshodhan/2020/v9i1/152478

Shaikh, A. A., & Karjaluoto, H. (2015). Mobile banking adoption: A literature review. *Telematics and Informatics, 32*(1), 129-142. doi:10.1016/j.tele.2014.05.003

Tavera-Mesias, J. F., van Klyton, A., & Zuñiga Collazos, A. (2022). Social stratification, self-image congruence, and mobile banking in Colombian cities. *Journal of International Consumer Marketing, 34*(3), 312-331. doi:10.1080/08961530.2021.1955426

Tran, V. D., & Vu, Q. H. (2019). Inspecting the relationship among e-service quality, e-trust, e-customer satisfaction and behavioral intentions of online shopping customers. *Global Business and Finance Review, 24*(3), 29-42. doi:10.17549/gbfr.2019.24.3.29

Trivedi, S. K., Singh, A., & Malhotra, S. K. (2022). Prediction of polarities of online hotel reviews: An improved stacked decision tree (ISD) approach. *Global Knowledge, Memory and Communication, 72*(8/9), 765-778. doi:10.1108/gkmc-12-2021-0197

Xin, G., & Choi, J. G. (2020). The impact of factors formingemployee service attitude on service quality, customer satisfaction and loyalty in the hotel industry.

Global Business and Finance Review, 25(3), 84-95. doi:10.17549/gbfr.2020.25.3.84

Yusop, N., Kamalrudin, M., & Sidek, S. (2015). Security requirements validation for mobile apps: A systematic literature review. *Jurnal Teknologi (Sci. Eng.), 77*(33), 123-137.

Zhao, L., Lu, Y., Zhang, L., & Chau, P. Y. K. (2012). Assessing the effects of service quality and justice on customer satisfaction and the continuance intention of mobile value-added services: An empirical test of a multidimensional model. *Decision Support Systems, 52*(3), 645-656. doi: 10.1016/j.dss.2011.10.022

Zhou, T. (2012). Understanding users' initial trust in mobile banking: An elaboration likelihood perspective. *Computers in Human Behavior, 28*(4), 1518-1525. doi:10.1016/j.chb.2012.03.021

Zhu, M., Tanaka, K., & Akamatsu, T. (2023). Visualizing the annual transition of ocean policy in Japan using text mining. *Marine Policy, 155*, 105754. doi:10.1016/j.marpol.2023.105754