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# The Investigation of Preference Attributes of Indonesian Mobile Banking Users to Develop a Strategy for Mobile Banking Adoption

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**Abstract:** A new normal has been established as a result of the effects of the COVID-19 pandemic on social behavior, technology, and business. This has a significant effect on how technology is used, such as mobile banking services, which offer more hygienic and secure payment alternatives than cash. Mobile banking has been viewed as having the ability to enhance access to unbanked customers in developing economies such as Indonesia, where 100 million people remain unbanked. This study aims to develop strategies using importance-performance analysis (IPA) to improve adoption based on the perceived importance and performance of 1441 mobile banking users during the COVID-19 pandemic. Data were collected using an online questionnaire administered during the period of September 2022 to March 2023 using the mobile banking adoption attributes of Attitude, Perceived Usefulness, Perceived Ease of Use, Compatibility, Subjective Norm, Interpersonal Influence, External Influence, Perceived Behavior Control, facilitating conditions, self-efficacy, firm reputation, trust, disease risk, performance risk, financial risk, privacy risk, time risk, psychological risk, and perceived risk. IPA results were divided into four quadrants: “concentrate here”, “keep up the good work”, “low priority”, and “possible overkill” with a representation that respondents regard as important and well-addressed. The findings show that bank strategists seeking competitive advantage must push innovation efforts to protect users by improving privacy risk and financial risk and enhancing mobile banking security from potential cyberattacks. Digital banks and associated institutions need to educate mobile banking customers on the benefits of security measures for these services, which may improve confidence and trust, and consequently, accelerate mobile banking adoption.

**Keywords:** mobile banking adoption; strategy; importance-performance analysis; COVID-19; Indonesia



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## 1. Introduction

The digital revolution is transforming global economic and financial systems. The increasing digitalization of economies has opened a sector for payment innovation. Technological developments and advancements in mobile technology have led to transformations in people’s everyday lives, especially when faced with the coronavirus disease (COVID-19) outbreak, in which the practice of minimizing physical interaction played a significant role in accelerating the use of digital payments (Google et al. 2020). It is anticipated that this way of life will continue beyond the COVID-19 outbreak (Lee et al. 2021). In developing markets, such as Indonesia, innovations in payments, such as mobile banking services, have been viewed as having the potential to grow and expand, providing unbanked customers with improved access to banks (Anderson 2009). With over 140 million employed individuals, Indonesia presents a desirable market for digital banking and mobile payments (Bank Indonesia 2019a; BPS Indonesia 2023; Google et al. 2022). Technological advancements

and regulatory initiatives are creating opportunities to transform the business model and the structure of traditional payment systems. In 2018, the Indonesian Financial Services Authority (OJK) opened a new era by publishing regulation number 12/POJK.03/2018 regarding the implementation of digital banking services by Indonesian banks and enabling mobile banking services in Indonesia (Otoritas Jasa Keuangan 2018). Mobile banking services have evolved rapidly and now provide a wide range of services and payments, including mobile payments, money transfers, bill payments, bank balance checks, bank statements, insurance, investments, wealth management, tax payments, ATM locations, foreign exchange services, and other financial activities. The Monetary Authority of Indonesia (Central Bank of Indonesia) supported the momentum of growth and development of digital payments by introducing the Quick Response Code Indonesia Standard (QRIS) codes for quick payments using mobile devices by issuing 21/18/PADG/2019 regarding the implementation of the Quick Response Code Indonesia Standard (QRIS) (Bank Indonesia 2019b). The collective initiatives from both authorities resulted in significant growth in mobile banking transactions, with digital payments accounting for 50% of total transaction values, surpassing transactions made through ATMs and branches (Bank Central Asia Tbk 2023; Google et al. 2023). Despite the fact that digital financial services are a major sector in the digital economy and mobile banking services are rapidly expanding, the penetration of mobile banking services has yet to reach over 100 million people in Indonesia who remain unbanked, hence offering room for growth in digital adoption (Google et al. 2022; World Bank 2022). To reduce the risk of virus transmission during the COVID-19 pandemic, consumer behavior changed by preferring the use of digital payments to cash (Aji et al. 2020; Google et al. 2020; Sebayang et al. 2023). This phenomenon presents an opportunity for commercial banks to strengthen their competitive advantages by achieving sustainable performance and growth. It also implies that the use of mobile banking services is greatly affected by hygienic concerns and the practice of minimizing physical contact (Sebayang et al. 2023). As a result, understanding usage behavior patterns across various customer segments is essential for unlocking the incremental potential for growth as digital adoption matures (Google et al. 2022), and its significance has been highlighted by the recent COVID-19 pandemic.

This study aims to improve the competitiveness of digital banks in Indonesia by addressing the following research questions: (i) to identify the critical indicators of mobile banking services; (ii) how to develop strategies for improving mobile banking services that result in accelerating mobile banking adoption in Indonesia? Data were collected from 1441 Indonesian mobile banking users during the COVID-19 pandemic, and an Importance-Performance Analysis (IPA) was used to investigate how respondents viewed the relationship between importance and performance among mobile banking attributes. The mobile banking users' importance and performance preferences in adopting mobile banking services, managerial implications, and suggestions for future directions in banking innovation are then discussed.

## 2. Literature Review

### 2.1. Theory of Technology Adoption

The Technology Acceptance Model (TAM) (Davis 1989) was mainly used by earlier studies investigating mobile banking adoption (Ha et al. 2012; Lin 2007; Sudarsono et al. 2022). However, previous studies also concluded that the decomposed theory on planned behavior (DTPB) framework outperformed other models such as TAM and the theory of planned behavior (TPB) by better explaining bank consumers' intentions in adopting mobile banking services (Giovanis et al. 2019; Lin 2007). The TPB framework by Ajzen (1991) describes that Behavioral Intention (BI) influences actions to adopt technology services are influenced by Attitude (ATT), Subjective Norm (SN), and Perceived Behavior Control (PBC) (Lin 2007). TPB was refined by Taylor and Todd (1995) into the DTPB model (Taylor and Todd 1995). ATT is described as a person's good or negative feelings on attaining a specific behavior (Taylor and Todd 1995) and, in DTPB, further extends to the following

dimensions: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Compatibility (COMP). The degree to which a person feels that utilizing a given system will increase their job performance is defined as PU (Venkatesh et al. 2003). Meanwhile, PEOU refers to the measure of how much the user anticipates the target system to be easy to use and simple (Davis 1989; Giovanis et al. 2019; Wessels and Drennan 2010). COMP refers to how well a technology matches a consumer's values, needs, and lifestyle (Giovanis et al. 2019). Meanwhile, Subjective Norm (SN) refers to consumers' perceptions of a reference group's opinions on the use of services and is decomposed into two dimensions: Interpersonal Influence (IPI) and External Influence (EXI). The IPI examines the influence of closest friends and colleagues, family, and leaders in adopting technological services. In contrast, EXI evaluates the influence of news broadcasts, direction from superiors, and information delivered over the use of media in influencing behavior to adopt mobile banking services. In addition, PBC defines how customers perceive the opportunities, resources, and proficiency required to use a service, which is explained by two components: self-efficacy (SEF) and facilitating conditions (FC). SEF refers to the customer's capability to use mobile banking services, whereas FC evaluates the availability of resources to perform specific actions, such as using mobile banking (Giovanis et al. 2019).

## 2.2. Trust

Trust (TRU) is an essential component of a viable banking industry (Dahlstrom et al. 2014), and a bank's purpose is to manage money, including mobile banking services (Zhou 2012). Previous studies found that TRU influences the intention to use mobile banking (Hanafizadeh et al. 2014; Merhi et al. 2019; Wang et al. 2015). In another study, Kim et al. (2009) introduced the initial trust model (ITM) that considers the following: relative benefits, personal propensity to trust, structural assurance, and firm reputation to explain how trust affects the intention to use mobile banking. However, in this study, structural assurance is viewed as similar to PR (Giovanis et al. 2019; Sebayang et al. 2023), whereas the influence of firm reputation (FIRM) on the intention to adopt mobile banking is defined as a separate variable. Furthermore, banks must develop and maintain trust with consumers, and it is critical for banks to understand the risks customers perceive associated with adopting new technologies (Featherman and Pavlou 2003).

## 2.3. Risk

Perceived risk (PR) refers to the risk of loss when employing technology-based services to achieve a desired objective (Featherman and Pavlou 2003). Several previous studies have attempted to adopt a second-order five-dimensional PR measure comprising performance risk, privacy risk, financial risk, psychological risk, and time risk (Featherman and Pavlou 2003; Giovanis et al. 2019; Yang et al. 2015), whereas other studies adopted PR measures as having a direct negative effect on the intention to adopt mobile banking services (Sudarsono et al. 2022). Performance risk (PER) is defined as potential adopters' views on the possibility of mobile banking malfunctioning, while privacy risk (PRI) refers to expressing a potential theft of private information while using mobile banking (Lee 2009). Financial risk (FIR) is defined as potential adopters' views on the potential financial loss caused by mobile banking (Featherman and Pavlou 2003; Lee 2009). In addition, psychological risk (PSR) refers to potential bank customers' judgments of possible losses of self-esteem, peace of mind, or self-perception as a result of discomfort, pressure, or worry that results from using mobile banking services (Yang et al. 2015). Time risk (TIR) is defined as the time lost due to payment delays or navigation issues while becoming familiar with mobile banking features (Giovanis et al. 2019). Prior research has considered PR to directly affect ATT to BI (Hanafizadeh et al. 2014; Wessels and Drennan 2010), and previous studies have defined PER, FIR, and TIR as attributes directly influencing ATT to BI (Lee 2009). Regarding the COVID-19 outbreak, disease risk (DSR) was found to positively affect the preference for using technology in conducting payments due to uncertainty and anxiety about infectious diseases (Aji et al. 2020; Sebayang et al. 2023), suggesting that changes in

consumer behavior result in a preference for using mobile banking to conduct payments over exchanging physical money.

The impact and influence of PR on mobile banking acceptance differs among countries (Ha et al. 2012). Thus, the PR variables may vary. In this study, PR, PER, PRI, FR, PSR, and TIR are considered relevant attributes that have a negative influence on mobile banking service adoption. The higher the risk of adopting innovative technology such as mobile banking services, the less willing people are to adopt it. By contrast, disease risk (DSR) is considered to have a positive influence on the intention to adopt mobile banking services due to recent pandemic events.

### 3. Methods

#### 3.1. Importance-Performance Analysis (IPA)

IPA has been widely adopted in numerous studies, such as in bank service quality (Ennew et al. 1993; Matzler et al. 2003), service delivery technologies (Joseph et al. 2005), tourism management (Azzopardi and Nash 2013; Sever 2015), and in improving healthcare services due to the COVID-19 pandemic (Lee et al. 2021). In IPA, consumer satisfaction depends on the expectations and judgments of attribute performance for various key attributes (Ennew et al. 1993; Hawes and Rao 1985; Lee et al. 2021; Martilla and James 1977; Sever 2015). The following IPA procedures were performed in this study: (1) deciding what attributes to measure; (2) differentiating the importance and performance measures; (3) arranging the vertical and horizontal axes on the grid; and (4) examining the importance-performance matrix (Martilla and James 1977). The respondent’s perception of the mobile banking service’s “level of importance” is represented by the vertical *y*-axis, and the “level of performance” is represented by the horizontal *x*-axis. According to (Joseph et al. 2005; Martilla and James 1977), customer perceptions plotted using the IPA matrix provide decision-makers with valuable conceptual insights and translate them into suggestions for strategic decisions. We evaluated each attribute’s degree of importance and its actual performance in mobile banking services. The results were graphically displayed in each quadrant of the importance-performance matrix using the following terms: concentrate here (A), keep up the good work (B), low priority (C), and possible overkill (D), referring to their specific location on the grid, as shown in Figure 1. The placement of the two cross-hairs (*x*-axis and *y*-axis) that create the respective boundaries of the four quadrants of the importance-performance matrix is determined by the overall mean values of each mobile banking service importance and performance ratings evaluated by respondents (Joseph et al. 2005).

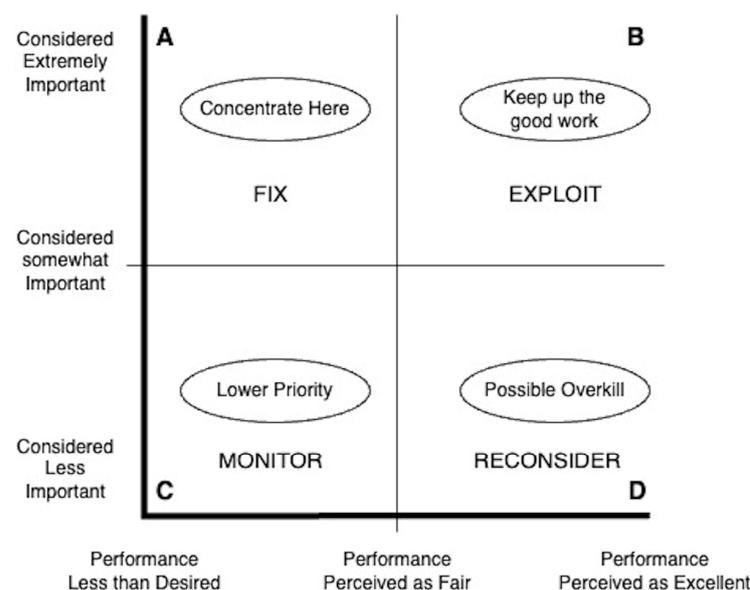


Figure 1. Interpreting the IPA matrix. Source: Adapted from Martilla and James (Martilla and James 1977).

### 3.2. Data Analysis

The data analysis was performed by incorporating AI-based techniques, including machine learning, into the data analysis process by using ChatGPT 4.0 to more accurately assess the scientific significance of this research. The following procedure was involved in the data analysis: (1) A frequency analysis was performed to investigate the demographic characteristics (Gender, Age, education level, Occupation, household expenses, mobile banking experience (years), total number of bank accounts, and total number of mobile banking applications used by respondents; (2) Cronbach's  $\alpha$  values were calculated to assess the reliability and consistency of the questionnaire; (3) a correlation analysis was carried out to validate the relationships among the variables of mobile banking services; and (4) IPA was carried out to verify the results of each variable.

For reliable prediction, social science research requires a sample size of approximately 15 respondents per observed variable (Stevenson 2009). Consequently, a minimum of 180 respondents was required. The following criteria were applied: having an active bank account, being an active mobile banking user, having experience using mobile banking services, living in a major city in Indonesia, and being an active mobile banking user from a digital bank. The Monetary Authority of Indonesia identified that banks viewing digitalization as a core value and being committed to digital transformation are mainly in the BUKU III (IDR 5 to 30 trillion) and BUKU IV (over IDR 30 trillion) categories, which are bank categorizations based on business activities, indicating the differences in IT priorities, strategic decisions, and resource allocation among the different categories of banking institutions (Bank Indonesia 2019a; Tallon 2010). These banks were converted from BUKU III and BUKU IV categorization into a newer classification known as KBMI 3 (IDR 14 to 70 trillion) and KBMI 4 (over IDR 70 trillion), respectively, which is a newer bank categorization based on core capital established in 2021 by the Financial Services Authority in Indonesia (OJK) regulation number 12/POJK.03/2021 (Otoritas Jasa Keuangan 2021), as shown in Table 1.

**Table 1.** Mobile banking services offered by digital banks.

No.	Mobile Banking	Bank Name	Core Capital (in Trillion)	Bank Classification
1	BRI Mo	Bank Rakyat Indonesia (BRI), Tbk	IDR 303.40	KBMI 4
2	Livin' by Mandiri	Bank Mandiri, Tbk	IDR 252.25	KBMI 4
3	BCA Mobile	Bank Central Asia (BCA), Tbk	IDR 221.18	KBMI 4
4	BNI Mobile	Bank Negara Indonesia (BNI), Tbk	IDR 140.20	KBMI 4
5	Mobile Panin	Bank Panin, Tbk	IDR 50.72	KBMI 3
6	D-Bank PRO	Bank Danamon, Tbk	IDR 47.48	KBMI 3
7	OCTO Mobile	Bank CIMB Niaga, Tbk	IDR 45.28	KBMI 3
8	PermataMobileX	Bank Permata, Tbk	IDR 37.62	KBMI 3
9	BTPN Wow! Jenius	Bank BTPN, Tbk	IDR 39.40	KBMI 3
10	One Mobile	Bank OCBC NISP, Tbk	IDR 34.20	KBMI 3
11	BSI Mobile	Bank Syariah Indonesia (BSI), Tbk	IDR 33.50	KBMI 3
12	M2U ID App	Bank Maybank Indonesia, Tbk	IDR 29.21	KBMI 3
13	BTN Mobile Banking	Bank Tabungan Negara (BTN), Tbk	IDR 25.91	KBMI 3
14	M-SMILE	Bank Mega, Tbk	IDR 20.63	KBMI 3
15	HSBCnet Mobile	Bank HSBC, Tbk	IDR 17.75	KBMI 3
16	Citi Mobile	Citibank, Tbk	IDR 16.11	KBMI 3

Source: Annual Report 2022.

Table 1 summarizes the 16 largest banks in Indonesia based on core capital offering mobile banking services: BRI Mo, Livin' by Mandiri, BCA Mobile, BNI Mobile, Mobile Panin, D-Bank PRO, OCTO Mobile, PermataMobileX, and BTPN Wow! Jenius, One Mobile, BSI Mobile, M2U ID App, BTN Mobile Banking, M-SMILE, HSBCnet Mobile, and Citi Mobile.

### 3.3. Instruments

An online survey was designed and developed based on measures from previous research on mobile banking adoption to operationalize the constructs with language changes by utilizing a Likert-type scale (ranging from 1 = “Strongly Disagree” to 5 = “Strongly Agree”). The questionnaire measured respondents’ perceptions of the importance versus performance of each attribute: ATT (four items), PU (four items), PEOU (four items), COMP (three items), PBC (three items), FC (three items), SEF (three items), SN (three items), IPI (three items), EXI (three items), TRU (three items), FIRM (three items), PER (three items), PRI (three items), FIR (three items), PSR (three items), TIR (three items), PR (four items), and DSR (four items).

The study conducted by [Davis \(1989\)](#) developed the ATT, PEOU, PU, and COMP measures ([Davis 1989](#)). SN, IPI, and EXI measures were adopted from a study by [Giovanis et al. \(2019\)](#); [Taylor and Todd \(1995\)](#). In addition, the DTPB study by [Taylor and Todd \(1995\)](#) was used to develop PBC, SEF, and FC measures. Meanwhile, TRU measures were adopted based on prior studies that found that trust significantly influences the intention to adopt mobile banking services ([Hanafizadeh et al. 2014](#); [Kim et al. 2009](#); [Malaquias 2016](#); [Merhi et al. 2019](#)). Furthermore, the PER, PRI, FIR, PSR, and TIR measures were adopted from studies by [Lee \(2009\)](#) and [Featherman and Pavlou \(2003\)](#). Finally, the DSR measure was adopted from a study by [Aji et al. \(2020\)](#).

The IPA self-administered online questionnaire consisted of 62 questions that were originally written and prepared in English, and a professional translator helped to translate the questionnaire into Bahasa Indonesia to ensure that the translations were accurate and understood by respondents. The questionnaire was subsequently pre-tested on ten experienced mobile banking users who provided input to help improve the instrument’s clarity, resulting in a few minor improvements to the final questionnaire.

## 4. Results

### 4.1. Respondent Demographics

Samples were collected using convenience sampling with the assistance of an online questionnaire from September 2022 to March 2023 in major cities in Indonesia. It involved 1692 active mobile banking users from 16 digital banks in Indonesia. Among the data, 253 responses were excluded from the analysis due to incomplete answers (242) and insincere responses (11), resulting in the final data of 1441 respondents. Respondents were required to choose one mobile banking service among the 16 digital banks that they had adopted and evaluate its importance and actual performance. The scores were calculated independently for each variable with the assistance of SPSS software version 29.0.

Table 2 summarizes that the respondents are primarily from urban areas and suburban regions with potentially higher access to digital banking services, with 79.5% of the respondents under the age of 25 and 9.0% falling between the ages of 24 and 35. Most respondents were university students at 71.3%, suggesting that the majority of respondents were still young, followed by private sector workers at 16.7%. The data collected primarily features responses from younger individuals, especially those within the 20–24 age range, and a significant number of students. This demographic detail is interesting as it reflects the digital savviness and adoption rates of mobile banking solutions among younger, educated individuals. Meanwhile, 45.7% had been using mobile banking services for two to five years, 32.6% had already used them for one to two years, and 14.2% had been using them for more than five years, indicating that most respondents had experience as users of mobile banking. In addition, the data suggests that 69% used one mobile banking service, 21.9% used two, 6% used three, and the remaining used more than three. The highest number of respondents based on education level have studied and graduated from high school at 55.9%, followed by undergraduate degree holders at 36.6%. In addition, the findings show that 69% used one mobile banking service, 21.9% used two, 6% used three, and the remaining respondents used more than three. The data indicates a broad acceptance and use of mobile banking among the participants, with a variety of banks represented, suggesting

that users appreciate having multiple options for their banking needs. Furthermore, 54.0% of respondents reported having one bank account, followed by respondents using two bank accounts at 31.6%, indicating that respondents were familiar with banking services. There is a noticeable trend where respondents with higher education levels tend to use mobile banking more actively. This could suggest a correlation between education level and the adoption or utilization of mobile banking services. Finally, 58.2% of respondents reported monthly household expenses of less than \$200, 28.0% reported spending between \$200 and \$500, and 13.7% reported expenses beyond \$500. Most respondents fall into the <\$200 expense range, considering that the majority were university students with relatively lower monthly expenses and maybe still had financial support from their parents. The number of respondents decreases as the expense range increases, suggesting fewer respondents with higher monthly expenses, referring to older respondents who may have more dependents or higher financial obligations. Considering that the annual Indonesian GDP is just over US\$ 3000 per capita (BPS Indonesia 2022), the demographic characteristics suggest that the respondents' characteristics, comprised of younger, educated individuals in urban areas with higher income levels, are key users of mobile banking services.

**Table 2.** Frequency analysis.

Attribute	Description	Number	Percentage
Gender	Man	777	53.9
	Woman	664	46.1
Cities	Jakarta, Bekasi, Depok, Bogor, Tangerang	1171	81.3
	Bali, Surabaya, Bandung	270	18.7
Age	15 to 24 years	1145	79.5
	25 to 35 years	129	9.0
	Over 35 years	167	11.6
Degree	High School	795	55.2
	Diploma	46	3.2
	Undergraduate	538	37.3
	Postgraduate	42	2.9
	Doctoral	20	1.4
Occupations	Family Manager	40	2.8
	University Student	1027	71.3
	Public Sector employee	18	1.2
	Private Sector employee	241	16.7
	Self-employed	108	7.5
	Unemployed	7	0.5
Bank Account(s)	1 Bank account	778	54.0
	2 Bank accounts	456	31.6
	3 Bank accounts	132	9.2
	>3 Bank accounts	75	5.2
Mobile Banking(s)	1 Mobile Banking	995	69.0
	2 Mobile Bankings	315	21.9
	3 Mobile Bankings	86	6.0
	>3 Mobile Bankings	45	3.1
Experience using Mobile Banking services	Less than 1 year	109	7.6
	1–2 years	469	32.5
	2–5 years	658	45.7
	More than 5 years	205	14.2
Monthly Expenses	Less than \$200	839	58.2
	\$200–\$500	404	28.0
	More than \$500	198	13.7

*USD = IDR 15,000*

Table 3 summarizes that mobile banking is widely adopted among the respondents, with 90.5% choosing mobile banking services from ‘BCA Mobile’ being the most popular service, followed by ‘Livin’ by Mandiri’ and ‘BNI Mobile Banking’, suggesting that mobile banking services from the top five largest digital banks are more popular and better suited to the characteristics of the respondents. This indicates a strong preference for major bank mobile banking services, highlighting the importance of service quality and brand trust in mobile banking adoption. The responses illustrate the diversity in mobile banking preferences, with ‘BCA Mobile’ being the most popular. It also highlights that many respondents use services from multiple banks, suggesting that users benefit from the features of different banking apps. This may be due to the fact that the sampling was carried out in major cities in Indonesia, reflecting the largest banks as major players in Indonesia, which is in line with a previous study suggesting that in developing markets, consumers are most attracted to the platform that has the highest number of users and business partners for conducting financial transactions, known as the Network effect (Anderson 2009).

**Table 3.** Mobile banking services evaluated by respondents.

Bank Name	Mobile Banking	Number	Percentage
Bank Danamon, Tbk	D-Bank PRO	1	0.1
Bank Panin, Tbk	MobilePanin	1	0.1
Bank Citibank, Tbk	Citi Mobile Indonesia	2	0.1
Bank BTPN, Tbk	BTPN WOW!	2	0.1
Bank Tabungan Negara (BTN), Tbk	BTN Mobile Banking	3	0.2
Bank OCBC NISP, Tbk	ONE Mobile	7	0.5
Bank Maybank, Tbk	Maybank2U	8	0.6
Bank Permata, Tbk	PermataMobileX	8	0.6
Bank Syariah Indonesia (BSI), Tbk	BSI Mobile	24	1.7
Bank Rakyat Indonesia (BRI), Tbk	BriMo	40	2.8
Bank CIMB Niaga, Tbk	OCTO Mobile	41	2.8
Bank Negara Indonesia (BNI), Tbk	BNI Mobile Banking	61	4.2
Bank Mandiri, Tbk	Livin’ by Mandiri	111	7.7
Bank Central Asia (BCA), Tbk	BCA Mobile	1132	78.6

The large difference in frequency between “BCA Mobile—Bank BCA” and other services indicates that the dataset is skewed towards BCA mobile as the preferred mobile banking service among respondents. This skewness suggests a strong preference for or higher adoption rate of BCA mobile compared to other mobile banking applications within the respondent group. In the above context, the high preference of BCA mobile may be due to user satisfaction, brand loyalty, firm reputation, and service offerings. It highlights BCA Mobile’s significant presence in the mobile banking sector among the survey’s respondents.

#### 4.2. Reliability and Validity of the Instruments

Cronbach’s  $\alpha$  values for both importance and performance attributes were calculated to examine the reliability of the questionnaire, resulting in importance attribute values ranging from 0.780 to 0.938, indicating strong internal consistency, thus accomplishing the minimum acceptable criteria of  $>0.70$  (Hair et al. 2019). The reliability analysis of the characteristics examined in this study is summarized in Table 4, which demonstrates a high level of internal consistency across all the characteristics of mobile banking services.

Cronbach’s  $\alpha$  values for dimensions and the mobile banking services attributes showed high internal consistency for both importance and performance, ranging from 0.721 to 0.940, therefore meeting the minimum acceptable threshold of 0.70 (Hair et al. 2019).

**Table 4.** Reliability Analysis of Importance and Attributes.

Variables	Dimension	Cronbach's $\alpha$	
		Importance	Performance
ATT	PU	0.883	0.897
	PEOU	0.843	0.922
	COMP	0.857	0.873
PBC	FC	0.830	0.778
	SEF	0.850	0.840
SN	IPI	0.903	0.893
	EXI	0.883	0.899
TRU		0.865	0.883
FIRM		0.844	0.899
PER		0.863	0.863
PRI		0.938	0.940
FIR		0.918	0.904
PSR		0.881	0.877
TIR		0.780	0.721
PR		0.881	0.888
DSR		0.823	0.876

**4.3. Descriptive Analysis**

Table 5 presents the mean values of each calculated importance characteristic. The perceived importance results show that the mean values ranged from 4.069 to 4.426. The calculated results for skewness and kurtosis were  $-1.018$  to  $-0.427$  and  $-0.544$  to  $0.744$ , respectively, indicating that the results met the acceptable thresholds of skewness:  $\pm 2.0$  and kurtosis:  $\pm 7.0$ . (West et al. 1995). Statistical significance was set at  $p < 0.05$ .

**Table 5.** Descriptive Statistics of Importance Attributes.

Variables	Dimension	Overall Mean	Rank	Skewness	Kurtosis
ATT	PU	4.268	8	$-0.839$	0.081
	PEOU			$-1.018$	0.744
	COMP			$-0.637$	0.113
PBC	FC	4.426	1	$-0.427$	$-0.544$
	SEF			$-0.834$	$-0.077$
SN	IPI	4.069	12	$-0.577$	$-0.080$
	EXI			$-0.508$	0.066
TRU		4.399	2	$-0.888$	$-0.203$
FIRM		4.373	3	$-0.865$	$-0.192$
PER		4.356	4	$-0.747$	$-0.360$
PRI		4.336	5	$-1.011$	0.270
FIR		4.297	6	$-0.971$	0.322
PSR		4.269	7	$-0.849$	0.003
TIR		4.188	11	$-0.759$	0.290
PR		4.241	10	$-0.675$	$-0.385$
DSR		4.246	9	$-0.751$	$-0.118$
Total		4.289			

Referring to Table 5, the aggregate mean evaluation of the entire sample of Indonesian mobile banking respondents regarding the importance of the 12 mobile banking service attributes equals 4.289. Mobile banking service attributes were ranked according to their importance as follows: PBC, TRU, FIRM, PER, PRI, FR, PSR, ATT, DSR, PR, TIR, and SN. Evaluations of importance higher than 4.289 indicate ‘above average’ importance and were identified as PBC first, followed by TRU second, FIRM third, and PER fourth, suggesting that these attributes are perceived as the most important by mobile banking users when adopting these services.

Table 6 summarizes the aggregate mean value results for each calculated performance characteristic. The performance evaluation results showed that the mean values ranged from 3.993 to 4.431. The aggregate mean evaluation of all 12 service attributes by mobile banking respondents equals 4.180 for all the service items. The performance ranking attributes, from highest to lowest, were as follows: FIRM, PBC, DSR, ATT, TRU, PER, SN, PR, FIR, PRI, TIR, and PSR. Assessments of service performance with values higher than 4.180 are viewed as ‘above average’ performance and identified as FIRM, PBC, DSR, ATT, TRU, and PER. The results indicate that FIRM is well addressed, referring to mobile services offered by the largest banks in this study. PBC also performs well among the other variables measured by the availability and resources necessary to use mobile banking services.

**Table 6.** Descriptive Statistics of Performance Attributes.

Variables	Dimension	Overall Mean	Rank	Skewness	Kurtosis
ATT	PU	4.252	4	−1.030	1.278
	PEOU			−0.921	0.933
	COMP			−0.698	0.321
PBC	FC	4.318	2	−0.685	0.356
	SEF			−0.818	0.109
SN	IPI	4.164	7	−0.706	0.459
	EXI			−0.832	1.044
TRU		4.248	5	−0.694	0.251
FIRM		4.431	1	−0.973	0.840
PER		4.224	6	−0.812	0.956
PRI		4.031	10	−1.002	1.038
FIR		4.065	9	−0.886	0.840
PSR		3.993	12	−0.861	0.586
TIR		4.015	11	−0.774	0.600
PR		4.112	8	−0.654	0.252
DSR		4.310	3	−0.914	0.419
Total		4.180			

#### 4.4. Correlation Analysis

A Pearson’s correlation analysis was performed for both the importance and performance variables and dimensions to evaluate the relationship between the driving factors of mobile banking adoption. The correlation results among the attributes of mobile banking adoption are summarized in Tables 7 and 8.

**Table 7.** Pearson’s correlation analysis of mobile banking service importance.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
A	1.00																			
B	0.67	1.00																		
C	0.62	0.66	1.00																	
D	0.66	0.67	0.64	1.00																
E	0.72	0.71	0.71	0.58	1.00															
F	0.54	0.57	0.57	0.54	0.54	1.00														
G	0.60	0.71	0.71	0.57	0.69	0.60	1.00													
H	0.68	0.42	0.42	0.58	0.52	0.52	0.41	1.00												
I	0.54	0.43	0.43	0.53	0.40	0.55	0.47	0.65	1.00											
J	0.50	0.44	0.44	0.52	0.41	0.54	0.45	0.55	0.62	1.00										
K	0.67	0.71	0.71	0.58	0.82	0.52	0.66	0.45	0.37	0.40	1.00									
L	0.60	0.70	0.70	0.58	0.68	0.62	0.72	0.44	0.47	0.47	0.72	1.00								
M	0.62	0.74	0.74	0.65	0.69	0.55	0.65	0.42	0.38	0.42	0.72	0.67	1.00							
N	0.46	0.58	0.58	0.44	0.60	0.39	0.50	0.28	0.22	0.27	0.64	0.54	0.64	1.00						
O	0.45	0.58	0.58	0.45	0.57	0.40	0.49	0.26	0.20	0.27	0.63	0.52	0.66	0.86	1.00					
P	0.51	0.61	0.61	0.48	0.59	0.45	0.51	0.35	0.24	0.31	0.65	0.53	0.66	0.84	0.78	1.00				
Q	0.59	0.66	0.66	0.56	0.65	0.52	0.58	0.43	0.35	0.40	0.71	0.58	0.66	0.66	0.65	0.75	1.00			
R	0.65	0.62	0.62	0.56	0.69	0.51	0.58	0.45	0.35	0.41	0.74	0.61	0.67	0.66	0.67	0.70	0.70	1.00		
S	0.62	0.57	0.57	0.56	0.61	0.51	0.54	0.50	0.45	0.43	0.60	0.55	0.57	0.48	0.46	0.51	0.60	0.64	1.00	

Note: A = ATT, B = PU, C = PEOU, D = COMP, E = PBC, F = FC; G = SEF; H = SN; I = IPI; J = EXI; K = TRU; L = FIRM; M = PER; N = PRI; O = FIR; P = PSR, Q = TIR; R = PR, S = DSR.  $p < 0.001$ .

**Table 8.** Pearson’s correlation analysis of mobile banking services actual performance.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
A	1.00																			
B	0.69	1.00																		
C	0.69	0.69	1.00																	
D	0.71	0.68	0.73	1.00																
E	0.79	0.66	0.73	0.64	1.00															
F	0.62	0.64	0.63	0.62	0.60	1.00														
G	0.65	0.69	0.75	0.63	0.67	0.72	1.00													
H	0.77	0.59	0.61	0.64	0.69	0.58	0.55	1.00												
I	0.61	0.60	0.54	0.61	0.51	0.64	0.60	0.71	1.00											
J	0.55	0.56	0.50	0.58	0.48	0.56	0.50	0.58	0.67	1.00										
K	0.76	0.61	0.70	0.66	0.79	0.63	0.63	0.69	0.55	0.51	1.00									
L	0.63	0.64	0.68	0.60	0.65	0.74	0.74	0.55	0.57	0.50	0.67	1.00								
M	0.69	0.65	0.73	0.74	0.69	0.63	0.64	0.62	0.58	0.59	0.73	0.65	1.00							
N	0.47	0.40	0.45	0.43	0.48	0.43	0.40	0.43	0.32	0.33	0.59	0.45	0.54	1.00						
O	0.49	0.42	0.48	0.48	0.50	0.44	0.42	0.45	0.35	0.36	0.60	0.47	0.60	0.85	1.00					
P	0.50	0.42	0.48	0.49	0.50	0.45	0.42	0.47	0.37	0.36	0.61	0.46	0.59	0.80	0.75	1.00				
Q	0.58	0.48	0.54	0.54	0.58	0.49	0.46	0.54	0.42	0.44	0.66	0.51	0.62	0.64	0.61	0.75	1.00			
R	0.69	0.56	0.58	0.59	0.65	0.58	0.54	0.62	0.51	0.51	0.72	0.59	0.66	0.62	0.63	0.63	0.64	1.00		
S	0.68	0.66	0.66	0.59	0.68	0.54	0.60	0.60	0.49	0.44	0.65	0.60	0.60	0.45	0.47	0.50	0.54	0.63	1.00	

Note: A = ATT, B = PU, C = PEOU, D = COMP, E = PBC, F = FC; G = SEF; H = SN; I = IPI; J = EXI; K = TRU; L = FIRM; M = PER; N = PRI; O = FIR; P = PSR, Q = TIR; R = PR, S = DSR.  $p < 0.001$ .

The correlation analysis findings indicate a significant positive relationship among the importance of each mobile banking adoption attribute. Table 7 shows that the correlation

coefficients ranged from 0.20 to 0.86, indicating that strong correlations (>0.80) were only found between Perceived Behavior Control and Trust (0.82), privacy risk and financial risk (0.86), and privacy risk and psychological risk (0.84). The findings indicate that higher levels of Perceived Behavior Control are associated with higher levels of trust in adopting mobile banking services. The results also suggest that as perceptions of privacy risk increase, so do perceptions of financial risk. This could imply that respondents who are generally more risk-averse or concerned about risks are also more concerned about the financial risks associated with banking activities. The findings indicate that higher levels of Perceived Behavior Control are associated with higher levels of trust in adopting mobile banking services. The results also suggest that as perceptions of privacy risk increase, so do perceptions of financial risk. This could imply that respondents who are generally more risk-averse or concerned about risks are also more concerned about the financial risks associated with banking activities. The same applies for privacy risk and psychological risk, suggesting that the higher the perceived privacy risk of personal data loss, the greater the concern of monetary loss (psychological risk) as a result of using mobile banking services. The results of the correlation analysis for the other attributes showed no significant correlations.

The results in Table 8 show a significantly positive relationship across the performance of all mobile banking service attributes. The correlation coefficients ranged from 0.32 to 0.85, indicating that nearly all the attributes had no strong correlations (>0.80). The only exceptions were financial risk and privacy risk, which showed strong correlations (0.85). The result implies that as perceptions of financial risk performance increase, so do perceptions of privacy risk. This suggests that respondents who are concerned about the financial risks performance because of mobile banking activities are also concerned about personal data loss.

#### 4.5. Analysis of Differences between the Importance and Performance Attributes

Table 9 summarizes the analysis of the differences between each mobile banking service attribute’s perceived importance and actual performance by Indonesian respondents. This suggests comparing the perceived performance and perceived importance results for each mobile banking attribute. A negative value in the P-I column indicates that the respondents’ mean perception of mobile banking performance is lower than their mean perceived importance of the service. By contrast, a positive P-I number indicates that the respondents believe that the degree of service performance is relatively higher than the importance of the service performed (Joseph et al. 2005). Six attributes showed significant positive differences: SN#2, FIRM#2, DSR#3, and the attributes of FC, indicating that the service performance was relatively higher than the importance of the service and thus considered excessive. Significant negative differences were found between performance and importance for all items of PRI, FIR, PSR, and two items of PR, indicating that respondents viewed the service performance in these items as significantly lower than the importance of the service, suggesting the need for improvement in these areas. The standard deviations for perceived importance ranged from 0.721 to 0.945, whereas those for perceived performance ranged from 0.664 to 1.113.

**Table 9.** Differences between perceived importance and actual performance of mobile banking attributes.

Attributes	Importance		Performance		P-I
	Mean	Standard Deviation	Mean	Standard Deviation	
ATT#1 (Using mobile banking is wise)	4.308	0.765	4.295	0.738	−0.013
ATT#2 (Using mobile banking is beneficial)	4.219	0.807	4.201	0.794	−0.019
ATT#3 (Using mobile banking is interesting)	4.348	0.742	4.298	0.760	−0.050
ATT#4 (Using mobile banking to pay my bills would not be risky)	4.198	0.807	4.216	0.769	0.018
Overall	4.268	0.783	4.252	0.766	−0.016

Table 9. Cont.

Attributes	Importance		Performance		P-I
	Mean	Standard Deviation	Mean	Standard Deviation	
<i>PU#1 (During the COVID-19 pandemic using mobile banking is effective)</i>	4.425	0.857	4.445	0.703	0.019
<i>PU#2 (During the COVID-19 pandemic, using mobile banking makes payment easier)</i>	4.468	0.724	4.476	0.703	0.008
<i>PU#3 (During the COVID-19 pandemic, using mobile banking increases productivity)</i>	4.297	0.829	4.311	0.807	0.014
<i>PU#4 (During the COVID-19 pandemic, Using mobile banking may improve performance)</i>	4.291	0.724	4.307	0.810	0.016
<i>Overall</i>	4.370	0.756	4.385	0.761	0.014
<i>PEOU#1 (Easy to become skillful in using mobile banking)</i>	4.386	0.829	4.375	0.708	−0.010
<i>PEOU#2 (Using mobile banking is clear and understandable)</i>	4.434	0.717	4.406	0.688	−0.028
<i>PEOU#3 (Easy to follow all the steps to use mobile banking)</i>	4.409	0.829	4.389	0.681	−0.019
<i>PEOU#4 (Easy to interact with mobile banking)</i>	4.454	0.717	4.431	0.681	−0.023
<i>Overall</i>	4.421	0.728	4.400	0.690	−0.020
<i>COMP#1 (Using mobile banking is compatible with my lifestyle)</i>	4.210	0.859	4.236	0.789	0.026
<i>COMP#2 (Using mobile banking fits well with the way I do my finances)</i>	4.161	0.717	4.145	0.889	−0.016
<i>COMP#3 (Using mobile banking fits into my working style)</i>	4.208	0.859	4.228	0.777	0.019
<i>Overall</i>	4.193	0.809	4.203	0.821	0.010
<i>PBC#1 (I have the resources, knowledge, and ability to make use of mobile banking)</i>	4.491	0.721	4.329	0.776	−0.162
<i>PBC#2 (I would be able to use the mobile banking)</i>	4.348	0.761	4.266	0.773	−0.082
<i>PBC#3 (I think that people whose opinions I value would approve that I use mobile banking)</i>	4.438	0.722	4.359	0.697	−0.078
<i>Overall</i>	4.426	0.737	4.318	0.750	−0.108
<i>SN#1 (I think that people who influence my behavior would think that I should use mobile banking)</i>	4.103	0.900	4.189	0.801	0.086
<i>SN#2 (I think that people who are important to me would agree if I use mobile banking)</i>	4.021	0.912	4.135	0.839	0.115
<i>SN#3 (I think that using mobile banking is a good idea)</i>	4.085	0.910	4.169	0.807	0.085
<i>Overall</i>	4.069	0.908	4.164	0.816	0.095
<i>FC#1 (I have the resources necessary to use mobile banking)</i>	4.186	0.793	4.355	0.723	0.169
<i>FC#2 (I have the knowledge necessary to use mobile banking)</i>	4.200	0.803	4.343	0.714	0.143
<i>FC#3 (I can get help from others when I have difficulties using mobile banking)</i>	4.035	0.857	4.137	0.917	0.101
<i>Overall</i>	4.140	0.821	4.278	0.797	0.138
<i>SEF#1 (If feel that, if wanted, I could easily use mobile banking by myself)</i>	4.414	0.739	4.435	0.671	0.022
<i>SEF#2 (I feel that I am able to use mobile banking even if I do not have any)</i>	4.273	0.793	4.341	0.778	0.068
<i>SEF#3 (I feel comfortable using mobile banking by myself)</i>	4.443	0.803	4.458	0.685	0.015
<i>Overall</i>	4.377	0.762	4.412	0.715	0.035
<i>TRU#1 (I find mobile banking is secure in conducting transactions)</i>	4.416	0.754	4.298	0.723	−0.119
<i>TRU#2 (I find mobile banking is safe for receiving bank statements)</i>	4.396	0.778	4.195	0.827	−0.201
<i>TRU#3 (I trust my bank to offer secure mobile banking)</i>	4.386	0.741	4.253	0.760	−0.133
<i>Overall</i>	4.399	0.758	4.248	0.772	−0.151
<i>FIRM#1 (My bank is trustworthy)</i>	4.429	0.758	4.446	0.700	0.017
<i>FIRM#2 (I recommend the services my bank provides)</i>	4.234	0.753	4.429	0.664	0.195
<i>FIRM#3 (My bank is a secure institution)</i>	4.456	0.739	4.418	0.731	−0.038
<i>Overall</i>	4.373	0.756	4.431	0.699	0.058
<i>PER#1 (mobile banking may be unstable or blocked)</i>	4.337	0.791	4.196	0.850	−0.141
<i>PER#2 (mobile banking might not work as expected)</i>	4.408	0.733	4.284	0.737	−0.124
<i>PER#3 (mobile banking may involve less interaction)</i>	4.322	0.753	4.192	0.806	−0.130
<i>Overall</i>	4.356	0.760	4.224	0.800	−0.132
<i>PRI#1 (Using mobile banking, privacy information could be misused, inappropriately shared, or sold)</i>	4.323	0.861	4.037	0.991	−0.285

Table 9. Cont.

Attributes	Importance		Performance		P-I
	Mean	Standard Deviation	Mean	Standard Deviation	
PRI#2 (I feel using mobile banking, my personal information could be intercepted or accessed)	4.356	0.843	4.031	0.996	−0.325
PRI#3 (By using mobile banking, transactions' information could be collected, tracked, and analyzed)	4.328	0.843	4.024	0.994	−0.305
Overall	4.336	0.849	4.031	0.993	−0.305
FIR#1 (Using mobile banking would cause the exposure of capital accounts and passwords)	4.326	0.861	4.091	0.934	−0.235
FIR#2 (Using mobile banking would cause malicious and unreasonable charges)	4.278	0.886	4.057	0.964	−0.221
FIR#3 (Using mobile banking can cause financial risk)	4.289	0.868	4.049	0.949	−0.240
Overall	4.297	0.872	4.065	0.949	−0.232
PSR#1 (I feel that mobile banking would cause unnecessary tension, e.g., concerns about errors in operation)	4.300	0.837	4.001	1.010	−0.299
PSR#2 (I feel that a breakdown in mobile banking system could cause unwanted anxiety and confusion)	4.250	0.883	3.924	1.099	−0.325
PSR#3 I feel that usage of mobile banking could cause discomfort	4.256	0.877	4.055	0.959	−0.201
Overall	4.269	0.866	3.993	1.026	−0.275
TIR#1 (I have experienced time loss due to instability and low speed of mobile banking)	4.223	0.901	3.917	1.113	−0.306
TIR#2 (I feel that it takes too much time to learn how to install and use mobile banking)	4.221	0.862	4.216	0.880	−0.006
TIR#3 (I feel that more time is required to fix mobile banking errors offline)	4.119	0.890	3.910	1.066	−0.209
Overall	4.188	0.885	4.015	1.034	−0.173
PR#1 (mobile banking services are safe to use)	4.210	0.826	4.129	0.856	−0.081
PR#2 (It is safe to use mobile banking to pay my bills)	4.310	0.838	4.125	0.884	−0.185
PR#3 (I am not worried of risks when using mobile banking)	4.212	0.870	4.121	0.872	−0.091
PR#4 (I am not worried of becoming infected with coronavirus when using mobile banking)	4.231	0.872	4.071	0.908	−0.160
Overall	4.241	0.852	4.112	0.880	−0.129
DSR#1 (I am worried of becoming infected with coronavirus when using physical cash)	4.217	0.913	4.276	0.856	0.060
DSR#2 (I am not comfortable making payments using physical cash)	4.393	0.776	4.390	0.748	−0.003
DSR#3 (I am afraid of becoming infected by the coronavirus when using physical cash)	4.185	0.939	4.299	0.844	0.115
DSR#4 (I am afraid there is a coronavirus droplet in physical cash)	4.188	0.945	4.275	0.880	0.087
Overall	4.246	0.900	4.310	0.835	0.064

#### 4.6. Analysis of Importance and Performance

The overall mean of respondents' perceptions of the mobile banking service attributes was used to determine the location of the two cross-hairs (4.180 on the horizontal axis and 4.289 on the vertical axis) that create the four quadrants of each IPA grid: A (concentrate here), B (keep up the good work), C (low priority), and D (possible overkill), which refers to the bank's strategy and effort. The crossing point location of each attribute was determined by calculating the performance mean values as the horizontal x-axis and the mean values of importance as the vertical y-axis and projected on the IPA grid as follows: ATT (4.252, 4.268), PBC (4.318, 4.426), SN (4.164, 4.069), TRU (4.248, 4.399), FIRM (4.431, 4.373), PER (4.224, 4.356), PRI (4.031, 4.336), FIR (4.065, 4.297), PSR (3.993, 4.269), TIR (4.015, 4.188), PR (4.112, 4.241), and DSR (4.310, 4.246). The results of the IPA analysis are graphically displayed on an easily comprehended two-dimensional grid, which makes it easier to understand and implement, as shown in Figure 2.

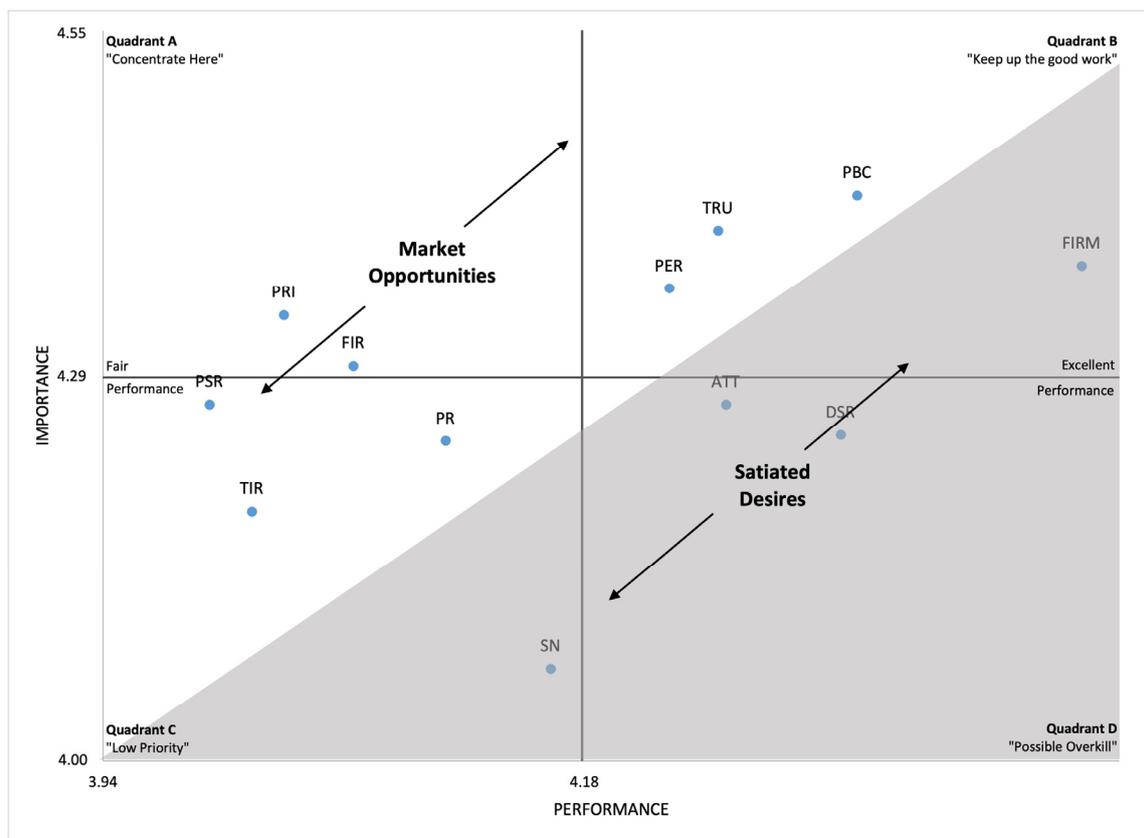


Figure 2. Importance—Performance analysis of mobile banking services.

The cross-hair location that divides the four quadrants of the grid translates the aggregate mean evaluation of the respondent’s sample regarding the performance (4.180) and importance (4.289) of the evaluated banks on all 12 mobile banking service attributes. As illustrated in Figure 2, a cross-diagonal line through the IPA grid was drawn to distinguish the ‘satiated desires’ shaded area against the unshaded ‘market opportunities’ areas, which provide important strategic insights by providing a distinct visual cue that helps to quickly compare the level of perceived service performance versus importance (Hawes and Rao 1985). The cross-diagonal line provides an additional visual stimulus, indicating that ‘market opportunities’ exit digital banks by addressing consumer expectations for greater performance on essential mobile banking service attributes. Figure 2 shows that in quadrant (A), PRI and FIR are plotted, suggesting that these areas must be evaluated and improved because they are very important to respondents. Quadrant (B) shows that PER, TRU, PBC, and FIRM must be maintained by banks operating mobile banking services because they are considered very important for respondents and have good performance. This can be interpreted as an indication that bank respondents evaluated the performance of mobile banking services on these items as ‘above average’. This means that the aggregate performance results were higher than 4.289 for these attributes. Meanwhile, a total of four attributes, namely PSR, PR, TIR, and SN, were plotted in the lower left of the vertical cross-hair as ‘low priority’ in Quadrant (C). This indicates that these attributes are considered less important factors, and their performance is not too special. Last, in the lower right of the vertical crosshair ‘possible overkill’ in Quadrant (D) are two attributes, namely DSR and ATT, that are deemed to be less important; however, the performance of these services was considered excessive by respondents.

### 5. Discussion

Respondents rated the importance of these attributes and the actual performance of digital banks that offer mobile banking services. The perceived mean importance and

performance ratings of the evaluated attributes are shown in Tables 5 and 6, respectively. Generally, the data analysis revealed relatively high levels of importance as well as the respondents' performance ratings. The high levels of importance were not unexpected based on previous studies by Davis (1989), Taylor and Todd (1995), Featherman and Pavlou (2003), Lin (2007), and Kim et al. (2009), Ha et al. (2012), Yang et al. (2015), Giovanis et al. (2019), Aji et al. (2020), and Sebayang et al. (2023), which suggested that each of the 12 variables included in this study were key characteristics of mobile banking adoption. However, the relatively high performance ratings provided by respondents revealed interesting results, given that mobile banking services were recently introduced in Indonesia.

The results reveal that PBC was identified as the attribute with the highest mean importance rating for respondents selecting a bank providing mobile banking services. This indicates that respondents viewed mobile banking services offered by digital banks as easily accessible via the Apple Store and Google Play Store. Consistent with earlier findings, this study also suggests that this influence is positive (Giovanis et al. 2019; Ha et al. 2012; Sebayang et al. 2023; Taylor and Todd 1995). TRU ranked second, whereas FIRM and PER ranked third and fourth, respectively. As a result, TRU plays an important role, as shown by the fact that 90.5% of respondents evaluated mobile banking services among the top five banks offering mobile banking services in Indonesia, supporting prior research suggesting that individuals with higher trust in mobile banking make it more likely to be adopted (Ha et al. 2012; Hanafizadeh et al. 2014; Kim et al. 2009; Merhi et al. 2019; Zhou 2012). The bank's reputation also plays an important role, as it reflects a stronger network, credibility in providing non-faulty mobile banking applications, and the ability to provide mobile banking services effectively. Another interesting note is that no attribute received mean importance ratings below the middle value (3.00) on the five-point Likert-type scale. This suggests that in this study, all attributes were identified as important characteristics of mobile banking services. The strategy to improve mobile adoption should take into account these attributes in accordance with their rankings, as shown in Table 5.

The performance ratings show that in almost every attribute, eleven of the 12 variables had mean values (>4.00) on the five-point Likert-type scale. The results can be interpreted as indicating that, on average, the performance of mobile banking services in Indonesia during the pandemic was already well addressed. FIRM was the top-performing attribute, followed by PBC and DSR. The results show that in developing markets such as Indonesia, the credibility of the firm providing mobile banking services was shown to be of high importance and performance, which differs from studies conducted in Korea (Kim et al. 2009) but is in line with findings in China (Zhou 2012). The clear preference for BCA mobile demonstrates the strong network effects among the surveyed respondents and suggests high customer satisfaction and brand loyalty toward BCA Mobile. The findings support the study of Anderson (Anderson 2009), suggesting that consumers are most attracted to adopting platforms with the highest number of users. TIR and PSR were the two attributes with the lowest mean performance ratings. As mentioned, mobile banking services have recently been introduced in Indonesia, showing that it takes time to become familiar with new services, especially in developing markets. These relatively low scores may be partially due to the discomfort or worry resulting from payment delays or navigation issues when using mobile banking services (Featherman and Pavlou 2003). Furthermore, the relative results may be the result of the pandemic, when mobile banking services became a necessity and a safety measure against disease when performing payments (Aji et al. 2020; Sebayang et al. 2023). Therefore, strategies that can be developed to improve the performance of TIR and PSR attributes include introducing user-friendly navigation tailored to user preferences based on engagement, reducing concerns about using these technologies, and educating mobile banking users about the safety measures applied in these technologies, such as using a one-time password (OTP), face ID, encryption, and digital certificates.

The findings become easier to understand and actionable when graphically displayed on an importance-performance two-dimensional grid. Quadrant A includes PRI and FIR,

showing that more resources in these attributes are required to satisfy bank respondents' concerns and that they currently feel unserved about these important characteristics of mobile banking. These attributes require managerial attention, and banks in Indonesia need to allocate more resources to satisfy respondents, suggesting that 'market opportunities' may be available to banks that address consumer expectations for better protection from the potential loss of control over private information and potential monetary loss as a result of transaction errors while using mobile banking.

Quadrant B includes the PBC, TRU, PER, and FIRM. Three of the four attributes were plotted above the shaded 'satiated desires,' indicating that 'market opportunities' exist in improving PBC, TRU, and PER areas, where banks must maintain exceptional services within these essential service parameters using the current strategic strengths, highlighting the high-performance service technology valued by the target segments. The respondents' clear preference for BCA mobile demonstrates that in developing markets such as Indonesia, for other platforms to attract more users, banks need to strengthen their network effects by increasing the number of registered consumers and forming partnerships with more commercial partners (Anderson 2009). Quadrant C includes PSR, PR, TIR, and SN. Despite being perceived as less important by respondents, PSR, PR, and TIR attributes are plotted above the shaded area, indicating that 'market opportunities' exist in these areas. Therefore, strategists are advised to focus on innovation and organizational resources to improve app performance, implement AI-powered conversational commerce technologies that can send personalized data-driven messages directly to users to address concerns about the possibility of mobile banking malfunctioning, and hence reduce anxiety caused by mobile banking services and trouble navigating when learning how to use mobile banking services. Finally, quadrant D includes two attributes, ATT and DSR, which are plotted in the shaded 'satiated desires,' indicating that bank strategists were engaged in possible overkill in delivering these services. Decision-makers are advised to maintain present practices and may desire to reallocate organizational resources to improve other attributes.

There are several limitations to future investigations and research opportunities. First, the findings are limited to mobile banking users in Indonesia, and they may not be applicable to other national, cultural, or other countries with varying levels of economic growth and infrastructure. Second, non-probability sampling (convenience sampling) and data collection were skewed toward young individuals and Indonesia's top five mobile banking services. This observed skew towards BCA mobile emphasizes the importance of considering user preferences and the market dominance of certain services when analyzing mobile banking behavior. It highlights BCA Mobile's service-oriented business strategy and significant presence in the mobile banking sector among survey respondents (Tallon 2010). The study's limitations do not affect the validity of the findings; they do limit the implications that can be determined by the findings. Therefore, the conclusions of this study are more indicative rather than generalizable. Future research should expand the target population and include respondents from various backgrounds, such as the unbanked and individuals that have not adopted mobile banking services, from different countries and age categories, including performing longitudinal studies of mobile banking adoption, which can then be compared with the findings of this study. Finally, the attribute importance-performance classification is driven by consumer expectations, which are influenced by consumer needs, experience, word-of-mouth, and organizational communication. Consequently, a general classification of these variables was not possible. It differs depending on the segment and target customer.

## 6. Conclusions

These findings emphasize the importance of user experience, security, and service diversity in driving mobile banking adoption and customer satisfaction. While banks should strive for excellent customer evaluations across a wide range of mobile banking attributes, priority should be given to essential 'must-have' traits before investing in service areas that respondents consider 'nice-to-have.'

We conclude that during the COVID-19 pandemic, Indonesian mobile banking respondents recognized the importance and danger of disease risk in their daily lives and preferred using this technology over cash due to hygiene factors. However, the increased use of mobile banking services raised concerns regarding privacy risk and financial risk among respondents, showing that in developing markets such as Indonesia, potential loss of control over private information during mobile banking usage and the respondents' perception of potential financial loss due to transaction errors are still major concerns. Digital bank strategists must push innovation efforts to improve security against potential cyberattacks and fraudsters to prevent, identify, and respond to attacks by creating and spreading best practices that ensure mobile banking protection, such as two-step verification, One-Time Password (OTP), real-time transaction notification, and applying single-device security. It is also important that digital banks and related institutions promote and educate mobile banking users on these services' benefits and security measures, which may increase their confidence in these systems, thereby strengthening the network effect and accelerating mobile banking adoption rates.

Second, by prioritizing innovation in improving the performance of mobile banking services by enhancing IT infrastructure, maintaining trust, and building credibility by having a good reputation in conducting business, the ability to perform mobile banking services effectively, and tailoring personalized user experiences based on user engagement using machine learning, banks can encourage the adoption of mobile banking services by more people, increase their organizational resilience, and thus create a sustainable advantage.

Third, digital banks offering mobile banking services were not very aware of the importance of psychological risk, time risk, and perceived risk for respondents who were affected by these risks in their daily lives. These risks are more evident as a result of the pandemic, when mobile banking services become a necessity and not part of a lifestyle, but more as a safety measure against disease. The 12 mobile banking service attributes investigated in this study provide insights that current mobile banking users find important and offer a useful foundation for better future mobile banking innovation, help widen and accelerate mobile banking adoption, and improve the organizational effectiveness of digital banks in providing these services.

## 7. Managerial Implications

This study's findings have numerous implications for understanding customer preferences, enhancing mobile banking services, and addressing concerns related to various perceived risks for digital banking and other relevant institutions. The results provide valuable insights into how banks can gain a competitive advantage by pushing innovations in mobile banking services to strengthen security measures to protect banks' consumer privacy from potential cybersecurity threats and fraudsters. Digital banks and associated institutions need to promote and educate mobile banking customers on the benefits and raise awareness of the security measures of these services, which, in developing markets, may improve the confidence and trust of unbanked consumers in these systems, accelerating their intention to use mobile banking.

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