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Unlocking Mobile Banking Adoption: The Interplay of Interface Design, System Quality, Service Quality, Security, and Customer Involvement

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ABSTRACT

Mobile banking (M-Banking) is an extension of internet banking that permits users to easily access online bank facilities through mobile devices. Due to the fast development of information technology, mobile banking has grown noticeably throughout the world, particularly in recent years. The study examines the impact of mobile banking interface design (INT), system quality (SYS), security assurance (SEC) and service quality (SER) on mobile banking adoption (MBA) with the mediating role of Customer Involvement (CI). For this a sample size 400 people collected from five cities of Punjab Pakistan with the help of Google form questionnaire. The researcher uploaded the respond data from questionnaire to SmartPLS 3 and tested the reliability, validity and hypotheses. The researcher finds that INT, SYS, SER and SEC positively influence the MBA with the mediating role of CI. This examination contributes to a more profound comprehension of how mobile banking adoption improves. The study explained the various aspects of mobile banking system its interface design, quality services, security, customer choices over traditional banking.

Introduction

Mobile banking (M-Banking) is an extension of internet banking that permits users to easily access online bank facilities through mobile devices (Shankar et al., 2020). Due to the fast development of information technology, "M-Banking," has grown noticeably throughout the world, particularly

in recent years (Shankar et al., 2020). Mobile banking is an essential and developing channel for carrying out financial transactions (Kumar et al., 2020). Customers are adopting mobile banking apps in greater numbers for routine banking tasks, including depositing cheques, money transactions, and investing (Rao and Carrillat, 2020). Additionally, it provides services including account opening, checking balances and statements, paying bills, transferring funds, trading stocks, requesting checks, paying bills, and topping up mobile airtime. M-banking has become widely recognized in worldwide, changed how financial services are generated and consumed and modified the relationship between banks and their clients by recognizing them as value co-producers (Sheng, 2020).

Due to advancements and modernization, smart technologies now have a vital role in life, and mobile banking is attaining stimulus through the diverse usage of mobiles (Allawah et al., 2016; Shankar et al., 2020). There are several causes for the extensive use of M-Banking in every aspect of life might it be in business, education, social or other working areas. It remains the constant need of people or consumers to move smoothly or constructively that provide extensive facilities to their clients (Alalwan et al., 2016). Many factors like smart phone availability, mobile network access, wireless networks/internet access, convenience/facilitating quality services and user friendly are imperative reasons in developing intentions towards M-Banking (Lee and Chung, 2009).

Currently, banking has been altered and advanced from branch banks to the internet and then towards mobile banking due to emerging self -service technologies (Safeena et al., 2011; Goh et al.,2014; Puschel et al., 2010). Concerning the banker's perception M-banking is an efficient way of providing a continuous source of financial services that have been modified and working or operating through smart phones; however the customer standpoint related to M-banking is simply performing financial work and money transfer while attaining access to a bank account either directly through the banking application or wireless internet (Deng et al.,2010; Puschel et al.,2010; Mehrad and Mohamadi et al., 2017; Changchit etal., 2017). However, there is still much to learn about how mobile banking works. Financial research institutions have invested a lot in mobile banking technology to attract consumers, keep them around, and enhance their usage of financial and banking services (Shareef et al., 2018; Albashrawi and Motiwalla, 2019). Many banks select the M-Banking alternative for providing financial services to save their infrastructure expenses and customer’s efforts and time (Shareef et al., 2018). Now banks also choose digital platforms to Initiate or transform their facilities to make it more affordable and more accessible, which encourages clients to adopt M-Banking. Therefore, various studies have focused on and investigated the literature related to the variables that affect M-Banking adoption (Shaikh and Karjaluoto, 2015; Shareef et al., 2018; Shankar and Jebarajakirthy, 2019; Shankar et al., 2019).

Compatibility, attitude, trust, perceived usefulness, credibility, social influence, self-efficacy, behavior, cost, relative advantage, and perceived risk are some of the variables that were examined in the majority of the studies to determine their effects on customer adoption behavior (Shaikh and Karjaluoto, 2015; Tam and Oliveira, 2016). Usefulness, performance, facilitating conditions, social influencers, customers awareness and trust have been studied and indicated constructive factors in convincing the customers towards the adoption of digital services, while variables like security, complex process, technical problems, or inadequate knowledge might hamper the adoption of mobile banking (Gupta et al., 2017; Burucuogla and Erdogan,2016).It is also seen that knowledge of the learning skills and positive attitude of the client regarding the digital system or M-Banking is critical besides; the consumer's preference for traditional banking is imperative in M-Banking adoption (Haider et al.,2018; Kishore and Sequeira, 2016; Oliveira et al., 2014).

Apart from this aspect, increased bank charges, poor telecommunication network, security and social risk are other factors or barriers in rejecting mobile banking (Changchit et al., 2017; karma et al., 2014; Iddris et al., 2013). Research on manufacturing enterprises in Pakistan is expanding (Tahir et al., 2024a; Jabeen et al., 2024a; Zain et al., 2023a). The majority of businesses are aware of their reputation (Zain et al., 2024) and sustainability (Tahir et al., 2024b; Zain et al., 2023b) to secure a competitive advantage (Aslam et al., 2024). Customer loyalty and engagement are paramount in the service industry (Fida et al., 2023; Danyal et al., 2024) and in manufacturing to enhance reputation (Shaheer et al., 2024a; Jabeen et al., 2023) and influence customer purchasing behaviour (Jabeen et al., 2024b; Shaheer et al., 2024b). Research on the service sector within Pakistan is limited. The effects of M-Banking interface design; service quality and security assurance on M-Banking adoption with mediating role of customer involvement has not been discussed. Thus, researchers have conducted this study concerning the above problem in previous studies. This study will be fruitful in providing knowledge, stimulating the M-Banking design, and customizing and achieving the effects of interface design, system quality, service and security on M-Banking adoption with customer involvement in new markets.

Literature Review and Hypotheses Development

Mobile Banking Interface Design

Mobile user interface enables interaction with the app, features, content, and functionalities of the device (Reach, 2021). According to Caplin (2001), Mobile phone use for communication these days encompasses speaking, listening, touching, and other actions in addition to hand-to-hand contact. By encouraging user involvement with the interface, interaction with a system turns it into a communication medium. A mobile phone interface's primary objective is to link phone features and operations to effective interaction components (sounds and visual elements). Icons are used in mobile interfaces to indicate the capabilities users need to complete activities. Since visual elements like graphics and icons are crucial for user-device interaction, they are frequently employed in interface design because they can communicate across language barriers and condense meaning. More people are utilizing mobile devices to manage their wealth as time management shifts to become more focused on financial management. More than 11.3 million people will reportedly utilize mobile banking in 2022(SBP, 2022).

Users can complete tasks more quickly with mobile banking services with fewer functionality and a clearer interface (Zhou andWang, 2010). To improve accessibility, designing a simple user interface is proposed (Lin, 2011). Mobile environment restrictions like small screens and awkward typing boost the requirement for well-designed interfaces (Zhou, 2012). Poor interface design undermines customer confidence in the service provider (Zhou and Wang, 2010). Zhou and Lu (2021), a group of images that transmit non-verbal information for various applications is referred to as an iconic interface. For creating better software, these visual metaphors are useful. Computer icons as consumer goods have evolved into a culture rather than only serving as an information sign. Such user-oriented products emphasize their features and user interfaces (Merdenyan et al., 2014). Both designers and consumers should clearly understand the symbol's intended meaning. An effective icon increases icon recognition and lowers the need for extra user instructions. Understandable icons are thought to provide benefits such as decreasing system complexity and defect count as well as improving usability and user satisfaction. The utility function and reliability significantly impact symbol usability (Huang and Lai, 2008). Consequently, selecting a clean icon ensures the mobile application will function normally (Sankaran and Chakraborty, 2021).

System Quality

A system of elements structured with a purpose, a collection of elements tied together to fulfill common goals (Ramachandra & Srinivas 2011). Brien and Marakas, (2007) explained that the systems frequently have several objectives. A system is made up of subsystems, which can then be further divided into subsystems. Data is sent and received across subsystems. A system is an ordered collection of elements with unique relationships. (Belle et al., 2020). In Hardcastle's words, a system can be characterized as a group of parts that cooperate to achieve a single objective. A system aims to take inputs and convert them into outputs (Hardcastle, 2011). Petter et al., (2011), a desirable property of an information system is system quality, simplicity of use, adaptability of the system, dependability of the system, simplicity of learning, sophistication, and response time. The degree to which consumers felt using IS required less effort is measured by the ease of usage. For a user to use the system, IS quality must also be adaptable enough. Flexible IS refers to the system's adaptability to internal and external changing circumstances. System flexibility causes a decline in user satisfaction, reducing the customer's engagement with the system. Reliability is another essential indicator of high-quality IS. Reliability is the measure of user confidence in the IT system (Petter et al., 2011; Shafiq et al., 2023; Li et al., 2023). Furthermore, ease of learning is a key indicator of high-quality IS. The easiness of learning is determined by how easy users find it to learn the system. System attributes like sophistication, reactivity, and intuitiveness are signs of high-quality ARE Response time is the time a device takes to respond to a command. Lower user satisfaction may result from slower system responses (Al-Mamary et al., 2014; Wright, O'Brien et al., 2016; Abbas et al 2018; Abbas et al., 2018).

Security Assurance

Information security management has grown significantly over the past 25 years and has become a frequent and ongoing problem in the public sphere. Due to phrases like "hacking" and "computer security" appearing in news and being constantly brought up by normal technology users, cyber security is a hot topic. Health Information Trust Alliance, (2018), Over the years, these security-related terms have changed as leaders in the field of information security have pushed concepts like cyber security systems and information assurance up the Initiative and ultimately into the public eye, also under its current pretense of cyber security, which focuses on electronic aspects. The objectives, however, which are to secure sensitive data that the researcher manages and for which the researcher is responsible, have not changed over time. Another major issue is that the security community doesn't have a fundamental knowledge of cyber security. CESG (2021) explained four assurance components as being a part of an assurance model. Administrative assurance, execution assurance, external assurance, and internal assurance made up of these four elements. Available assurance refers to the steps necessary to maintain the security functionality of a product, system, or service.

Service Quality

An indicator of the caliber of information system services is service quality. In general, it is a method created for marketing researchers to evaluate general service quality. Service Quality as one of the factors affecting information system effectiveness (Pitt and Kavan, 1997). The timeliness, dependability, and empathy of the support organization are frequently used as indicators of service quality, which refers to the IS department's assistance of users (Benmoussa and Larbi, 2018).

Fitzsimmons and Fitzsimmons (2014), in this method, the service quality is described as tangibles, assurance, trustworthiness, empathy, and responsiveness; however different authors have defined these traits differently. The physical dimension of service quality, which includes the company's facilities and equipment, physical environmental factors, communication materials, and the like, is what Fitzsimmons and Fitzsimmons refer to as the tangibility of the services provided. The service quality substantially impacts services for higher education providers as well (Davis, Acquilano, and Chase, 2003).

Fida and Al-Balushi (2020), For more than three decades, scholarly research has focused heavily on service quality and its impacts. Therefore, it appears from a few questions about service quality that it is important to determine consumer happiness, which then influences clients' confidence. All things considered, a company will most likely experience consumer loyalty and dedication if its service quality meets or exceeds that of its clients. Despite the fact that the concept of a service standard or quality is crucial for the domains of collection and service, research into the division's internal service quality is becoming increasingly alluring due to the notable development in the next industry. According to Fida and Al-Balushi (2020), customers' opinions of service quality are influenced. The overall client assessment of the nature of online administrative conveyance determines service quality. These three factors are essential to online customers' satisfaction, which raises their inclination to make a purchase (Fidaand Al-Balushi, 2020).

Customer Involvement

It is "the process, deeds, and interactions where a service provider engages with present or potential consumers to learn about the market and influence organizational behavior" (Pedrosa, 2012). Customer participation emphasizes close interaction between businesses and their clients for both sides to benefit from one another's experiences and develop a shared understanding (Agyeiand Ofori-Boafo, 2020).

Technology-based service creation is frequently characterized by a significant degree of ambiguity. Thus, it would be challenging for customers to understand how such technologies work and, in particular, to offer suggestions for enterprises to use (Agyei and Ofori-Boafo, 2020). Abbas and Shah (2018), Customers may make suggestions that are hard for the company to adopt since they are typically unaware of the constraints of their recommended ideas and solutions and are not completely capable of knowing what is doable from a technological point of view. Therefore, it is more accurate to think of clients as an inspiration than a supply of ready-made solutions. It follows that only a small portion of the consumer base has the traits and creative abilities required to truly be a valuable source in developing the service, given that customers find it difficult to predict what is technologically achievable. In a business-to-consumer setting, that is caused by an uneven distribution of technical expertise (Chai and Dash, 2015).

Chai and Dash (2015), discovered that consumers with less technological expertise were an opportunity for innovation in creating new services. As a result, these customers could offer more suggestions than consumers with great technological understanding would have for improving the value of the service. Malhotra attributed this to the fact that technologically savvy individuals failed to consider how their suggestions might benefit other users (Chai and Dash, 2015). The same author emphasizes, however, that to propose workable ideas to implement, a certain amount of technological competence is essential. Even though some clients may offer implausible answers, one should exercise caution when dismissing them because an unmet demand might be concealed beneath the suggested remedy (Dessart and Morgan-Thomas, 2015). Customers' input throughout

the development of a technology-based service is, therefore, more likely to center on the assumptions of how it should operate from the customers' point of view than on what is implementable (Chai and Dash, 2015). This means that incorporating clients in the development process should be done to be inspired and facilitate the discovery of the latent demands of the customer through the gathered suggestions (Chai and Dash, 2015).

The concept of "involvement" has been covered in consumer behavior literature for about 20 years and in psychology for much longer. Involvement has drawn the attention of those studying consumer decision-making in recent years. Consumer researchers of anthropomorphism when they imply that consumers are always just as interested in the purchase decision as they are (Kassarjian, 1977). A choice process never occurs, not even on the first buy for many purchases (Olshavsky and Granbois, 1979).

As a result, a school of thought has emerged those questions whether the traditional understanding of the customer is accurate in all situations involving purchases. The concept of the low participation buyer—someone who avoids making hard decisions and absorbing plenty of information has recently emerged. Several texts on consumer behavior adopt this new strategy and devote special parts to the low participation choice process or involvement (Abbas and Shah, 2018).

Mobile Banking Adoption

"M-Banking" refers to a service provided by a mobile network provider, telecom company, and banking institution. Micro-finance institutions like in Pakistan have started M-Banking services available for economic and non-financial transfers. Mobile banking and the newest technology are the most cutting-edge instruments in banking industry. The operational activities of today's banks now utilize the most current level of technological progress thanks to this dynamic platform (Glavee and Karjaluoto, 2017).

Liébana (2018), technically, mobile banking gives the general public more access to their account balances, financial transactions, and pertinent information at any time. Because it is user-friendly, convenient, and technological advances, this robust mobile banking platform has gained widespread acceptance. Thakur asserts that compared to the alternative, more affordable methods of delivering financial services via the Internet, mobile banking provides its target consumers with more convenient financial service features (Thakur, 2014). The use of mobile banking features is a crucial factor that affects financial activity among customers of banks (Abdinoor & Mbamba, 2017).

The newest electronic technology is mobile banking. It enables users to communicate directly with their preferred banks and quickly and easily obtain the necessary services through a smartphone (Abdinoor and Mbamba, 2017). When mobile financial services initially became available, corporate customers may pay another energy bill and share crucial information on the balances of their bank accounts using the short message services on their mobile phones (Ananth et al., 2011). Ananth et al., (2011), Mobile banking now offers new services so customers such as money deposits, money withdrawals, and digital payment execution. Technically speaking, mobile banking is more of a specialized version of online banking that provides more convenient quick access to financial data wherever you are. When there is a break in the internet connection, the upgraded mobile banking application speeds up the processing of different financial services. In

contrast, internet banking needs this kind of constant connection to the internet to conduct financial operations.

Mobile banking has long been regarded as one of the most useful and significant economic electronic commerce-based apps on a global scale (Haider and Hussain, 2018). Mobile banking offers various services, including monitoring balances, browsing financial data, transferring money, paying bills, exchanging stocks, and managing portfolios. Importantly, this type of banking channel offers notable advancements in banking operations that combine financial services with mobile technologies. This service is often provided via several commercial channels, with a short message service and reciprocal voice feedback being the most widely used ones (Abdinoor and Mbamba, 2017).

M-Banking Interface Design and Customer Involvement

M-Banking is a flexible, affordable, and efficient method of delivering financial services compared to other distribution channels (Shankara, Jebarajakirthy, and Ashaduzzaman, 2020). M-Banking platforms are a useful way for customers to access banking services and offer various advantages to banks (Samrgandi, 2021). Clients can effortlessly complete transactions, investments, bill payments and account information through M-Banking systems (Shankara, Jebarajakirthy, and Ashaduzzaman, 2020). Shankara et al.,(2020), as a result, many customers opt to access financial services using mobile banking platforms. TRAI (2020), in India, 32% of adults (over 15) used mobile banking in 2019, which amounted to more than 1.7 billion users. India ranks second in mobile and internet penetration with 1147.92 million cellular subscriptions and 695.72 million broadband connections. By 2020, 150 million people are expected to use M-Banking globally. Banks have a great opportunity to provide financial services through M-Banking platforms. Customers obtain financial services through mobile banking applications, which is a big issue for banks (Jebarajakirthy and Shankar, 2021). Jebarajakirthy and Shankar (2021) in order to improve client involvement, banks have tried to provide mobile banking services. As the use of M-Banking platforms rises, banks are curious about how they might boost consumer engagement with the mobile banking application.

Additionally, customer engagement aids in attracting and keeping M-Banking consumers. The interactivity of mobile applications, in addition to the conventional service marketing mix, is essential for raising consumer engagement on M-Banking platforms (Islam et al., 2019). Additionally, the application's interactivity provides users of M-Banking platforms with some functional and hedonic benefits (Sankaran and Chakraborty, 2022).

System Quality and Customer Involvement

The term "information systems quality" refers to an object whose many aspects correspond to the preferences of various client groups (Al-Mamary and Aziati, 2014). Haghkhah (2020), the information system ensures quality services and the satisfaction of a wide range of clients. According to a prior study, the system quality contributes to a smoother and more rewarding bricks-and-mortar buying experience and fosters customer loyalty. System quality efficiency is essential to offer quality services and a pleasant online banking experience. Customer involvement in online banking is significantly and favorably correlated with system quality, information quality, and other factors, according to several prior research (Haghkhah and Asgari, 2020).

According to Horng et al. (2018), the system's quality was utilized in the research for interaction between companies and their customers, and it was fundamental to achieving success in e-commerce. To quote Horng and Tsai (2018), **the** overall system quality of a website is determined by the aggregate of the opinions expressed by its users regarding its adaptability, availability, and other features. If the technology is accessible whenever required and responds promptly to end users, the client will experience a sense of satisfaction and trust. Trust is an important metric, and the participation of customers and academics gives the impression that there is a significant association between the system's quality and trust.

Service Quality and Customer Involvement

In service contexts, the connection between service quality and customer engagement has been thoroughly investigated and was found to be positive, indicating that the better the level of service quality supplied, the larger the anticipation of customer satisfaction (Mukherjee, 2018). In a B2B study, Gandhi et al. found that distributor quality of service (DSQ), which ensures the institution's happiness and fidelity to the distributor, is influenced by organizational service quality (Gandhi and Gupta, 2019). In a higher education environment, Subrahmanyam empirically examined a research model and found that students' loyalty is significantly connected with their opinion of the service quality they receive (Subrahmanyam, 2017). Numerous academics have also looked into the connection between good customer service and loyalty in various service contexts, and they have determined that this connection is statistically significant (Boonlertvanich, 2019; Iqbal, Hassan and Habibah, 2018; Prentice and Kadan, 2019).Prentice and Kadan (2019), Numerous studies in retailing have also demonstrated that service quality in vital determining customers' loyalty to businesses over the long term. In a similar vein, Konuk examined the impact of perceived quality on consumers' purchase intentions for organic private-level food and discovered a positive and substantial link (Konuk, 2018).

Security Assurance and Customer Involvement

On an online retailer's website, assurance statements have an effect on how customers perceive power and supplier trust (Arcand and Vincent, 2017). This is true because assurance statements show suppliers value customer privacy and have good intentions when managing customers' data. As a result, assurance claims help to reduce risks associated with the potential utilization of personal data, which reduces customer worry. Assurance statements encourage customers to interact with a business by supplying personal information to expedite transactions. Because assurance statements increase consumers' purchasing intents by reducing their concerns about the unknowns, we assume that consumer concerns moderate the impact of assurance claims on intention to buy. Assurance seals function similarly to assurance statements (Bansal, 2018). E-commerce websites bearing specialized assurance seals have agreed to abide by the third party's standards and use specific technologies (Kimery and McCord, 2012). E-commerce websites employ the assurance seal to give their customers greater control (Bansal, Zahedi, and Gefen, 2018). Online retailers use it to allay their customers' apparent anxieties about online purchases (Zhang, 2015).Zhang (2015), Assurance seals persuade buyers that a website has undergone third-party management and monitoring and attained the required service quality. Researchers anticipate that third-party assurance seals' effect on buy intention is mediated by the primary concerns, given that they influence consumers' purchase intentions by easing their worries about the hazards associated with online shopping.

Customer Involvement and Mobile Banking Adoption

A study showed how certain factors, including financial information from various sources, financial education, and awareness of low-income rural residents, can encourage financial inclusion for underrepresented populations in remote areas (Purwati and Isnalita, 2018). Laforet and Li (2013) stated that one factor influencing the acceptance and implementation of mobile banking is the level of individual awareness. Even though different studies came to different conclusions on additional problems that prevented the respondents from accessing financial information, People's behavioral characteristics, ease of use, usability, and education are some of these components. A study performed by Chai and Dash (2015) posited that the adoption of mobile banking is influenced not only by an individual's awareness of the technology but also by the behavioral characteristics of that individual. (Boonlertvanich, 2019) addressed financial knowledge for low-income people, proximity to the banks, and government assistance as factors influencing the adoption of mobile banking.

The following hypothesis was developed after reading the literature on security assurance and customer involvement.

H1: Mobile Banking interface design positively impact on Customer Involvement.

H2: System Quality positively effects on Customer Involvement.

H3: Service Quality positively effect on Customer Involvement.

H4: Security Assurance positively impact on Customer Involvement.

H5: Customer Involvement positively impact on Mobile Banking Adoption.

H6a: Customer Involvement mediates between Mobile Banking interface and Mobile Banking Adoption.

H6b Customer Involvement mediates between System Quality and Mobile Banking Adoption.

H6c: Customer Involvement mediates between Service Quality and Mobile Banking Adoption.

H6d: Customer Involvement mediates between Security Assurance and Mobile Banking Adoption.

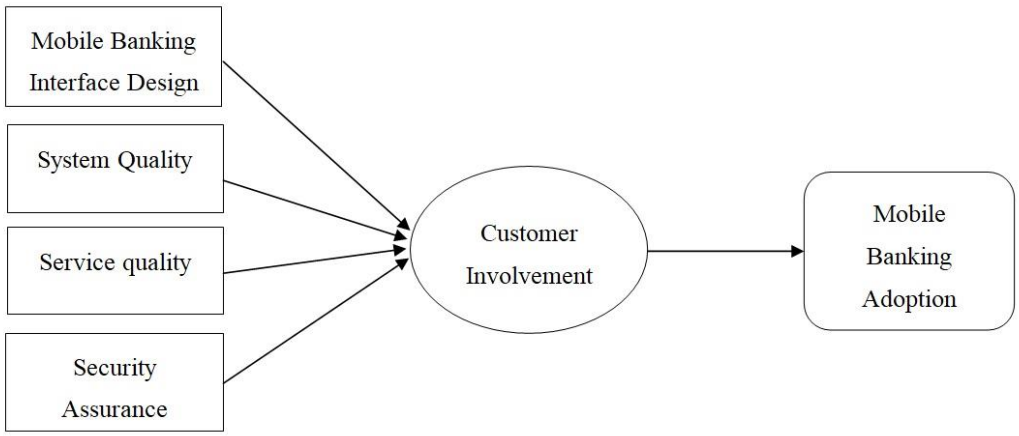

Figure 1: Conceptual Framework

Methodology

The research design is the method or approach that guides an investigation from beginning to end. It demonstrates, among other things, how the research was funded, how the data was obtained, and what kind of analytical approach was utilized to achieve the desired results (Sekaran, 2003). A logical issue is solved via research design (Massaro, 2019). This study has an exploratory character and is quantitative because it tests hypotheses empiricallyA survey study design often involves developing a questionnaire to collect primary data. By sending a structured questionnaire to account holders of six Pakistani banks (HBL, ABL, NBP, Bank Alfalah, Bank Al Islami, and Meezan Bank) in Pakistan's five districts, the researcher was able to collect primary data from respondents (Dera Ghazi Khan, Rajanpur, Muzafargarh, Multan and Lahore).

Saunders et al. (2016) conclude that the population is the most important component of study design to address the research problem. The population generally refers to the whole collection of observations from which the sample is selected using one or more sampling techniques (Sekaran and Bougie, 2016). The population of this study is the account holder of Pakistani banks; the researcher collected the data from them, people of five cities who have accounts in banks operating in Pakistan. The researcher collected the data through a questionnaire from account holders of six banks. A sample size of 400 complete filled responses is collected via online questionnaire which were used in analysis. The individuals also filled the consent forms to ensure that they individuals were taking part in the research willingly. The questionnaire included demographic information of subjects and questions related to variables. The researchers utilized SmartPLS 3 for reliability, validity and hypotheses testing. Any individual who possesses an account at any of the aforementioned banks served as the unit of analysis. This study has used scales from previous studies. The questionnaire for this research used a five-point Likert scale, with responses ranges from "strongly disagree" (1) to "strongly agree" (5).

Data Analysis

Table 1 illustrates the demographics of the sample respondents, encompassing details regarding their gender, age, educational qualifications, and experience. Approximately 82.8% of the sample's participants are male, while approximately 17.3% are female. The sample is predominantly composed of respondents aged 18 to 27, accounting for 55.3%. 27% have 28-27 years age, 15% have 38 to 47 years age, and only 2.8% have age 48 years and above. The sample exhibits a high level of education, with 41.0% holding a bachelor degree and 31.5% possessing a master degree. Additionally, forty-two individuals held qualifications exceeding a master's degree. Most of the respondents (40.3%) belong to Dera Ghazi Khan and only 9.3% belong to Rajanpur.Mostly respondents (20.5 %) were account holder of Mezan bank. A total of one hundred eleven respondents (27.8%) possess under1 years of experience, ninety respondents (22.5%) possess 1 to 2 years of experience, 36.5% have 2 to 5 years of experience, and only fifty three respondents (13.3%) have over 15 years of experience.

Table 1: Demographic profile of participants

Features	Options	Frequencies	Percentage
Gender	Male	331	82.8
	Female	69	17.3
Age	18-27	221	55.3
	28-37	108	27.0

	38-47	60	15.0
	48 and above	11	2.8
Education	Matriculation	26	6.5
	Intermediate	42	10.5
	Bachelors	164	41.0
	M.Phil./MS	126	31.5
	PHD	42	10.5
Place	Dera Ghazi Khan	161	40.3
	Rajanpur	37	9.3
	Muzaffargarh	62	15.5
	Multan	72	18.0
	Lahore	68	17.0
Banks	Allied Bank	49	12.3
	Bank Alfalah	55	13.8
	Habib Bank	61	15.3
	Meezan Bank	82	20.5
	National Bank of Pakistan	59	14.8
	United Bank Limited	50	12.5
Experience	Under 1 Year	111	27.8
	1-2 Years	90	22.5
	2-5 Years	146	36.5
	5 to Onwards	53	13.3

Measurement model

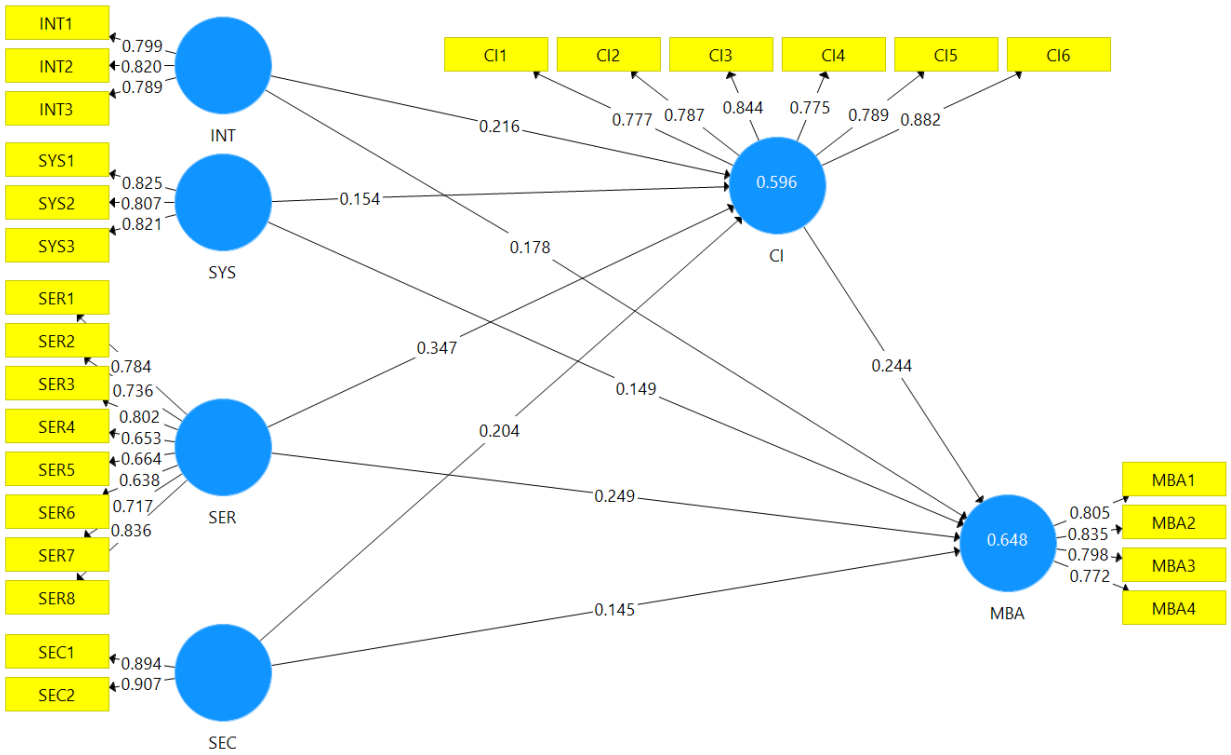

Figure 2: Measurement model

The loadings, Alpha and CR as well as are presented in Table 2. The factor loadings of each of these items are all greater than 0.638, which is a significant amount higher than the threshold of 0.5 required for statistical significance. As a consequence of this, we decided to keep all of these documents for further investigation. While values for the VIF that are near 10 indicate that there is a significant amount of multicollinearity, Table 2 demonstrates that these values are significantly lower than 10, confirming that the data does not contain any instances of this issue. According to the findings of earlier research (Hair et al., 2016; Diamantopoulos et al., 2012), both the Alpha and CR values were higher than the 0.70 threshold. Consequently, the reliability of the scales was established. (Hair et al., 2016) established that convergent validity was present because the AVE was greater than 0.500.

Table 2: Reliability and validity

Constructs	Items	Loadings	VIF	Alpha	CR	AVE
MBA	MBA1	0.805	1.682	0.816	0.879	0.645
	MBA2	0.835	1.865			
	MBA3	0.798	1.710			
	MBA4	0.772	1.552			
CI	CI1	0.777	1.912	0.895	0.920	0.656
	CI2	0.787	1.946			
	CI3	0.844	2.431			
	CI4	0.775	1.854			
	CI5	0.789	1.991			
	CI6	0.882	3.020			
INT	INT1	0.799	1.417	0.724	0.845	0.645
	INT2	0.820	1.468			
	INT3	0.789	1.394			
SYS	SYS1	0.825	1.590	0.753	0.858	0.669
	SYS2	0.807	1.528			
	SYS3	0.821	1.442			
SER	SER1	0.784	2.177	0.875	0.902	0.536
	SER2	0.736	1.782			
	SER3	0.802	2.157			
	SER4	0.653	1.457			
	SER5	0.664	1.503			
	SER6	0.638	1.490			
	SER7	0.717	1.676			
	SER8	0.836	2.727			
SEC	SEC1	0.894	1.634	0.768	0.896	0.811
	SEC2	0.907	1.634			

Table 3 below displays the "Heterotrait-Monotrait Ratio of Correlations (HTMT)," which is used for discriminant validity. The purpose of using discriminant validity is to quantify the discrimination that exists between the variables of the study in order to protect against any multi-

relationship errors. The HTMT value must be less than 0.85 in order to demonstrate that the discriminant validity of the test has been demonstrated, as stated by Hensler et al. (2015) and Hamid et al. (2017). According to the findings, all of the HTMT values are lower than 0.85, which demonstrates that discriminant validity has been established.

Table 3: Discriminant Validity – HTMT

Constructs	MBA	CI	INT	SYS	SER	SEC
MBA						
CI	0.828					
INT	0.834	0.773				
SYS	0.810	0.741	0.727			
SER	0.848	0.791	0.778	0.845		
SEC	0.764	0.722	0.715	0.657	0.700	

Structural model

It is demonstrated in Table 4 and Figure 3 that the SmartPLS-3 program was utilized in order to test the hypotheses of the study by employing the PLS-SEM method in order to obtain the findings. You can also see the structural model in Figure 3, which can be found below. All six hypotheses that were proposed for the study were accepted because their significance values were close to zero and their t-values were greater than 1.96. There is a substantial relationship between the INT, SYS, SER, SEC, and CI, respectively, as demonstrated by the fact that hypotheses H1, H2, H3, and H4 have been confirmed accurate. It is clear that CI also has significant impact on MBA, confirmed H5.

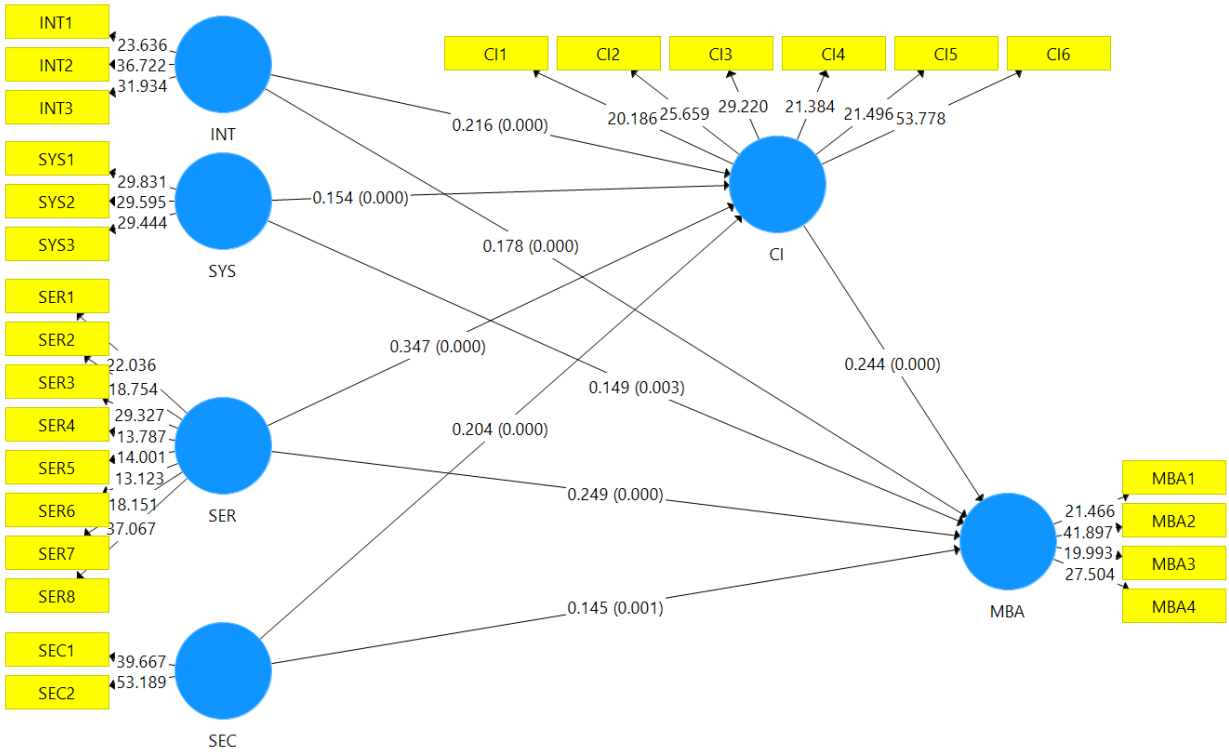

Figure 3: Structural model

Furthermore, mediation hypotheses (H6a, H6b, H6c, and H6d) were approved because the p-value was less than 0.05, which supported the hypotheses that CI partially mediate the relationship between INT, SYS, SER, SEC, and MBA. As far as the indirect effects are concerned, they were accepted because they demonstrated significant results. CI was shown to be important mediators between INT, SYS, SER, SEC, and MBA, as demonstrated by these findings.

Table 4: Hypothesis Testing

Hypothesis	Construct	β value	SD	T statistics	P values
H1	INT -> CI	0.216	0.049	4.460	0.000
H2	SYS -> CI	0.154	0.043	3.575	0.000
H3	SER -> CI	0.347	0.062	5.587	0.000
H4	SEC -> CI	0.204	0.051	3.972	0.000
H5	CI -> MBA	0.244	0.066	3.696	0.000
H6a	INT -> CI -> MBA	0.053	0.021	2.464	0.014
H6b	SYS -> CI -> MBA	0.037	0.016	2.313	0.021
H6c	SER -> CI -> MBA	0.085	0.026	3.252	0.001
H6d	SEC -> CI -> MBA	0.050	0.020	2.503	0.013

Discussion

M-Banking Interface Design and Customer Involvement

M-Banking Interface design has a direct link with customer involvement. Results of SEM describe that the m-banking interface positively impacts customer involvement. In previous research findings show that mobile banking applications in consumer engagement is positively influenced by interactivity. Additionally, customer involvement moderate between consumer inventiveness and perceived security concerns (Shankar, 2021).

System Quality and Customer Involvement

The system quality positively impacts on customer involvement. The results of the SEM indicate that the system's quality positively impacts customer involvement. Based on previous research findings, it has been established that the quality of both the system and the website has a direct and positive influence on customer satisfaction, with the quality of the website serving as a part of the mediator (Kumar and Lata, 2021).

Security Assurance and Customer Involvement

Through the structural equation modeling, we have proved that security assurance positively affect customer involvement. In previous research, the findings showed that simplicity of use and consumer perception of risk (security and privacy issues) favors e-satisfaction and trust (Annisa and Ezni, 2021). In another research finds key factors influencing privacy and trust issues include security assurance etc (Alzaidi and Agag, 2022).

Service Quality and Customer Involvement

Customer involvement is favorably impacted by service quality. The previous research finds that customer involvement and loyalty were significantly impacted by service quality (Supriyanto et

al., 2021. Also, in a previous study, tangibles, assurance, reliability, responsiveness, and empathy all influence customer involvement (Zygier et al., 2022).

Customer Involvement and M-Banking Adoption

Customer involvement positively impacts M-Banking Adoption. Previous research findings show that customer involvement, consumer trust and satisfaction positively impact M-banking adoption (Sharma et al., 2022).

Conclusion

By examining the impact of mobile banking interface design, service quality, system quality, and security assurance on mobile banking adoption, as well as the role that customer involvement plays as a mediator, this study aims to explore the relationship between these factors. In order to collect the necessary information, a questionnaire was developed. A total of four hundred with bank accounts using mobile banking enabled data collection. The study used SPSS software to analyze descriptive statistics and correlations. SmartPLS 3 was utilized as a measurement model to ensure reliability and validity. About the postulated model, SEM was utilized. According to the results of this research, the design of the mobile banking interface, the quality of the system, the quality of the service, and the assurance of security all positively impact the adoption of mobile banking, with customer involvement playing a mediating role.

Academic Contribution

The study explained the various aspects of mobile banking system its interface design, quality services, security, customer choices over traditional banking. The introduction section covers most of the background related to new technology and mobile banking its uses, applications, advantages and functions. In addition, also describes the banker and customer perception and standing points in adopting the M-Banking. The literature review throws light on the previous research to provide knowledge about the past studies. Diverse data related to revolutionary technologies, self-service technologies bank transitions, online or internet banking, mobile banking, the relation between consumption values, and M-Banking, consumer’s awareness and acceptance, various factors or barriers as security and risks perceptions have been provided. The scales were used from prior studies and the study collected data with help of online questionnaire. SmartPLS 3 used for data analysis. The outcome of the study academically add to the existing literature and will augment the conceptual understanding of the M-Banking system and help the researchers and academicians by offering the real data from different banks of Pakistan. Thus study provided important and real facts about the customer's involvement for different mobile bank applications in Pakistan, their quality services and security. This study also provides suggestions or recommendations to promote overall M-Banking adoption and reveals various findings and limitations that future researchers can explore or investigate to provide novel data in the field of M-Banking.

Managerial Contribution

The present research delivers several practical conclusions for banks and financial institutes apart from academic contribution. While making decisions and developing mobile banking apps, financial institutions and decision-makers should consider how investigated factors affect banking adoption. Customers can have confidence in their mobile banking if it offers a solid, protected, error-free M-Banking system and at the same time, the programmers also need to provide diverse

functions with security to enhance the customer's perceive using mobile banking applications. Most of the respondents were satisfied with the security of online banking with trust. The banking companies must structurally guarantee to customers through effective strategies to enhance the personal security level and notify the considerable risks while using mobile banking services like transfer of money, financial investments and more. They must have to improve the standard of the facilities to assist the customers at any time. Furthermore, they have to modify the existing applications to facilitate the customers they should regularly check and consider the valuable reviews of customers through the official sites and resolve the customers issues in minimal time by mentioning the latest changing in the banking system. Banks have to update their application with time to ensure more security and quality with the developing technologies introduced to the M-Banking system or applications. The negative comments should be addressed quickly it will develop the Initial trust and intention so that the customers develop a positive attitude towards mobile banking lastly. Banks can also consider the current research studies that have shown surveys data from customers of multiple banks with their application services in different cities of Pakistan and recorded the views that shows current status of the Mobile Banking and its services or can create a separate online page to enable the customers to complain or suggest that leads to lessen the negative views.

Limitation of Research

The sample size used in this study is enough for research, but the findings would be more comprehensive if it were increased. This study is conducted on different demographic areas. The researcher takes four districts from south Punjab and one from upper Punjab, which is relevantly considered a developed district; if one type of demographic area is chosen, the results will definitely be different. Another limitation is that this study is only conducted in few provinces of Punjab though the results should be different if conducted in other provinces of Pakistan. This study was evaluated on the bases of customers of the bank however this study could be implemented on practitioners of the banks. This study is conducted on the banking industry; however, the framework is essential for almost all types or service industries because it will help them to retain their customers.

Recommendations

Making a suggestion for additional thought was one of the goals of this primary research. Because there is little existing literature on the subject, future studies should include individuals from various fields and financial institutions to ensure that the results can be generalized. According to this study, banks and other mobile service providers should base their future service development on new and customer-centric thinking. Customers utilize a service more frequently and may develop a closer bond with the service and the provider when it is an essential part of them. The current study use only one mediator (customer involvement) and did not use any moderator or control variable in the model. Future researcher can examine mediators or moderators such as customer satisfaction, customer trust, and customer retention. Future researcher may add customer experience as moderator in this model. This customer-dominant logic of service proposes that banks and service providers should pay more attention to how customers create value rather than just concentrating on creating their own procedures and practices. Our research suggests that some face-to-face services will still be required in the future, despite mobile banking services becoming a more significant industry. The adoption of new mobile applications is constantly increasing. For instance, in the future, some personal financial services (like obtaining a mortgage) might still be done through personal interaction. Building lasting relationships with consumers will also need

more than just engaging them directly during bank-customer transactions. Banks should consider the various client segments and their varying abilities, wants, and value experiences, especially when establishing mobile services. Therefore, we advocate for further investigations on customizing mobile banking services.

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