International Journal of Innovation and Business Strategy (IJIBS)/ Vol. 20, No. 1, June 2025, 01-15
DOI: https://doi.org/10.11113/ijibs.v20.181

The Impact of User Interface Aesthetics on Consumer Motivation in Adopting Mobile Banking Applications: A Review

Chhayna Cheng*
Faculty of Business Administration, BELTEI International University,
Phnom Penh, Cambodia

Received 23 June 2025 Revised 25 June 2025 Accepted 29 June 2025

ABSTRACT
This review article aims to discuss the roles of user interface aesthetics and consumer motivation in m-banking applications. It draws on secondary data to illuminate the impact of design components such as colorfulness, typography, layouts, dark modes, symbolism, and icons on users' involvement and motivation. Core theoretical models and empirical findings are examined to understand the role of aesthetics in influencing user motivation. Additionally, the article demonstrates that well-designed user interface aesthetics optimize consumer experience, encourage involvement, and build confidence, leading to higher user motivation in m-banking. Key components, notably an aesthetically pleasing pattern, user-friendly navigation, and customizable themes, contribute to consumer satisfaction and loyalty. This article precisely highlights significant aspects for mobile banking developers and marketers to strengthen user interface design strategies, fostering a more interactive and inspiring user experience. It has some suggestions for future research to investigate the psychological impact of user interface aesthetics in digital banking.

Keywords: *Consumer Motivation, Mobile Banking, User Interface Aesthetics, User-Friendly Navigation*

Paper type: Research paper

1. INTRODUCTION

The Internet of Things (IoT) and Industry 4.0 have revolutionized the banking sector by enhancing efficiency, security, and user experience through technologies (Sfar et al., 2017& Nwakanma et al., 2021). The innovations in banking institutions and information technology have significantly fostered customer-bank interaction, communication, and transactions (Giannakoudi, 1999). The financial services industry has undergone an IT-based revolution driven by the Internet, fundamentally transforming how banking services are offered (Makris et al., 2009). Since the early adoption of Internet banking, the studies have explored how financial institutions leverage the Internet to optimize operations and create strategic advantages (Tan & Teo, 2000).

The banking industry has undergone significant upheaval over the past decade, driven by shifts in consumer behavior, the emergence of new technologies, and the introduction of innovative products and services into the market (Malaquias & Hwang, 2016; Oliveira et al., 2016). Likewise, advancements in internet technology have significantly influenced the evolution of digital banking, transforming how financial services are delivered (Aldiabat et al., 2019). Mobile banking transformed when banking sectors (especially banks) offered digital transactions (Aldiabat et al., 2019). Also, mobile banking acceptance has been progressively advancing through continuous innovation and a diversified range of products (Rodríguez et al., 2016).

Finally, mobile banking (m-banking) utilization has depended on smartphones, which has stimulated a worldwide usability of the services, security, trustworthiness, and performance of mobile

**Corresponding Author's *Email:* chhaynacheng@gmail.com

transactions (Tommi & Vesa, 2010). Despite the rapid advancement of mobile banking applications, a critical gap remains in understanding the direct impact of user interface design on consumer motivation (Laukkanen, 2016). While existing research primarily focuses on the technical aspects of mobile banking, limited attention has been given to the psychological and behavioral factors influencing user engagement (Hoehle & Huff, 2012).

This article discusses the relationship between user interface aesthetics elements, such as colorfulness, typography, layouts, dark modes, symbolism, icons, and consumer motivation within mobile banking applications. Understanding these factors can inform user interface design strategies that maximize consumer engagement and satisfaction. The article is structured as follows: first, it presents existing studies on the historical evolution of digital banking; then, it underlines the technological advancements in mobile banking, before discussing the role of user interface aesthetics in affecting consumer motivation. The article concludes with recommendations for future research on user interface design in mobile banking applications.

2. EVOLUTION OF DIGITAL BANKING

The financial services industry has undergone a technological transformation, fundamentally changing how banking services are delivered; furthermore, internet banking enables users to conduct financial transactions such as fund transfers, bill payments, and stock trading through secure websites provided by financial institutions (Lee & Chung, 2009; Martins et al., 2014). Banking operations have transitioned from traditional physical banking to digital banking, with significant milestones in technological advancements occurring between the 1950s and 2015 (Narteh, 2014; Laukkanen, 2016).

Emerging from a basic service in the 1950s to a user-friendly approach for seamlessly managing payment operations from any location and shopping expenses without manual cash transactions, credit cards have transformed into universally adopted financial tools prevalent among users at all levels (Durkin, 2000). Correspondingly, First National City Bank (now Citigroup) unveiled the Everything Card in 1967 to advance user finance by enabling customers to purchase distinguished products and services on credit, a breakthrough that positioned the bank as an innovator in consumer credit services, and had a significant impact on modernizing the banking sector through the broad adoption of credit cards (Zumello, 2011).

Consumers have preferred to use credit cards as a payment method, with all historical transactions recorded in their accounts (Lee & Kwon, 2002). Electronic banking originated with the introduction of credit cards, allowing customers to perform transactions without cash (Narteh, 2014). Additionally, the development of credit account banking was planned by micro-U.S. banks in the early 1950s (Vanatta, 2018). These plans enabled users to shop for various domestic goods using a single bank charge card, laying the groundwork for modern credit card systems (Vanatta, 2018). In the 1970s, the banking sector introduced some electronic financial services, operated at self-service banking terminals known as automated teller machines (ATMs) (Konheim, 2015).

For instance, Lloyds Bank launched its first "online" dispenser in December 1997, marking the transition from traditional cash dispensers to ATMs (Bátiz-Lazo, 2009). Customers can now check their balances and withdraw cash without physically visiting a branch because of the arrival of Automated Teller Machines (Laukkanen, 2016). Similarly, the organization of ATM has presented an in-depth overview of the ATM's development, utilization, and effects on the world's banking sector and analyzed the strategic choices and technology advancements that made ATMs easily accessible, providing insights into how these machines revolutionized consumer behavior and banking processes (Bátiz-Lazo, 2018).

The investigation by Scott and Zachariadis (2012) illustrated evidence of the origins and empowerment of the Society for Worldwide Interbank Financial Telecommunication (SWIFT) from 1973 to 2009, focusing on its role in the modernization of digital transfers and boosting worldwide financial connections. Online banking, which enables consumers to check balances, transfer funds, and manage accounts remotely, became possible with the proliferation of personal computers and Internet access (Zhao

et al., 2010). While it has been in the UK since the beginning of the 1980s, electronic banking is still in its formative stages (Daniel & Storey, 1997).

According to Gligor and Bozkurt (2020), offering several payment alternatives, such as financial transfer options, digital wallets, and credit cards, adheres to the requirements and preferences of distinct users and improves platform assurance. As an illustration, the payment procedure was implemented for the MasterCard Pay Pass and VISA operations (Pasquet et al., 2008). Likewise, the Pay-Per-Click model is an example of a payment method where consumers are charged to check out websites with visual information; the system automatically manages the payment once the user clicks a paid link and confirms approval (Kawazoe et al, 2002).

A substantial transformation toward self-service options in banking service distribution channels happened during the 1980s (Hernandez & Mazzon, 2007). While traditional branch-based retail banking endures as the primary approach for operating financial transactions, digital technologies have transformed the delivery of individual financial services as they are developed and provided to users (Wang et al., 2003). Internet banking has been characterized as a modern form of information system that utilizes the advanced online tools and the World Wide Web (WWW) to facilitate users to perform financial transactions in the online space (Shih & Fang, 2004). As a consequence, active internet banking consumers can now conduct conventional banking transactions such as issuing cheques, making bill payments, transferring money, generating statements, launching a fixed deposit account, purchasing portfolio funds, and checking account balances (Chong et al., 2010).

Several banking services were influenced by electronic finance applications by the end of the 1990s, except for large-value corporate financing (Gkoutzinis, 2006). Moreover, online payment platforms, including PayPal, enabled access to trustworthy e-commerce transactions, which integrated digital banking into daily life (Turban et al, 2018). As a consequence, since its 1998 introduction, PayPal has experienced a significant rise in both its user base and income, with over 100,000 daily consumers and over $1,000 in operations every second (Williams, 2007). With 17 currencies and more than 100 countries, PayPal is accelerating growth (Williams, 2007).

The initial m-banking service was introduced in Europe in 1990, facilitating users to review account balances and process bill payments (Barnes & Corbitt, 2003). Financial operations involving checking account balances, transferring money between accounts, and paying bills are all managed by mobile banking (Cruz et al., 2010). Furthermore, m-banking involves the provision of banking and financial services through smartphones and serves as the foundation of mobile commerce (Tiwari et al., 2006). M-banking and payments are among the most popular mobile commerce applications, facilitating financial transactions (Ngai & Gunasekaran, 2007). More recently, the proliferation of smartphones and apps has enhanced the accessibility and convenience of mobile banking services, granting users immediate access to financial functions (Shaikh & Karjaluoto, 2015). M-banking has become progressively appealing to individual users and is forecasted to become a primary payment channel for corporate customers as well (Ji & Tia, 2022).

The "Google Wallet" app, which was released in September 2011, is one of the inventors of this technology, and many firms in the financial and communications fields, as well as others, were very intrigued by the financial opportunities of mobile wallets over a year after their launch (Ghag & Hegde, 2012). Google Wallet serves as a holder for payment cards, gift vouchers, point cards, and exclusive offers and delivers functionality through the applications with a built-in user interface and JavaCard-based applications operating on the encryption components (Roland et al., 2013). The user interface is utilized to defend the PIN-protected wallet, to monitor the transaction, to present unique cards, to choose the presently enabled card, to discover particular distribution, and to examine past transactions (Roland et al., 2013).

Following this three-month test phase, Google Wallet was officially launched in the United States in September 2011 (Chae & Hedman, 2013). From its inception, Google engaged with distinguished industry experts to demonstrate the required ecosystem to bring a smooth new payment option for users (Chae & Hedman, 2013). As a whole, Google Wallet has substantial capability and can significantly transform

physical payment options, and distribute among Wallet users the prestige Mastercard credit card number, which is employed to facilitate the transaction, whichever saved card you use; hence, Google Wallet offers users a highly secure, fast, and seamless payment experience (Ghag & Hegde, 2012).

The advancement of digital security concerns in information systems and the need to ensure unbreakable cybersecurity patterns have prompted system programmers and engineers to configure reliable protection mechanisms that integrate the use of passwords, PINs, and navigation codes for authorization and verification (Mwema et al., 2023). Furthermore, the banks have implemented biometrics, related to identifying an individual based on users' physiological or behavioral characteristics, which could distinguish between an authorized person and an impostor (Ross et al., 2006). Biometrics can offer a higher level of protection than classic identity verification techniques, such as one-time passwords (OTP), security questions (SQ), CAPTCHA, and personal identification numbers (PIN) (Ross et al., 2006). Strengthening these resources is obtainable through permission-based accessibility and encryption from fraudulent authorization (Uchenna et al., 2018).

Fingerprint-based biometric systems, implemented with a high level of assurance and solid-state sensors, are progressively utilized across distinguished devices and applications, such as welfare disbursement, phone access, and laptop log-ins, by both banking industries and users (Basha et al., 2011). Fingerprint-based authentication has surfaced as a modern, strong contender to substitute traditional password-based verification and confirmation, especially with the significant growth in digital banking operations (Tsai et al., 2012). A security scheme involves a fingerprint biometric for authentication, which has been utilized to ensure protection and consistency (Khan et al., 2008). Encryption analysis results have displayed that the proposed system delivers safe, robust, and dependable remote authentication for mobile users across unsafe digital channels (Khan et al., 2008). Some financial institutions also integrate biometrics, establishing a highly secure defense layer when multiple authentication factors are combined with biometric verification (Khan et al., 2023).

3. BANKING AND TECHNOLOGICAL ADVANCES

The widespread acceptance of mobile banking and the significance of these services for consumers, banks, and financial institutions have seen an uptick due to the extensive adoption of mobile technology in daily life (Chen, 2013). Mobile banking has been generally characterized as leveraging a phone or other mobile device for performing financial transactions associated with a customer's account (Szczepanik & Jóźwiak, 2018). User views and reliance in the initial stage of digital banking contributed substantially to the foundation for modern digital and mobile banking platforms (Howcroft et al., 2002). The current research characterizes mobile banking as a vital aspect of modern financial services where a consumer utilizes mobile devices and mobile communication channels for implementing financial transactions as a component of an electronic procedure (Anderson, 2010). Through m-banking, bank users can access a smartphone or portable computer to conduct banking activities, including paying bills, checking account balances, locating ATMs, and transferring money (Oliveira et al., 2014).

According to Shaikh and Karjaluoto (2015), mobile banking has been utilized since the '90s. Mobile banking has supported various popular service functionalities, including commercial transactions, information providing, and announcements and alerts (Tsai et al., 2012). Similarly, mobile banking has enabled consumers and organizations to conduct financial transactions such as savings, cash transfers, and stock market deals with banks at any time and virtually anyplace (Bankole et al., 2011). It has handled the following using the mobile device: accessing the bank account, balance inquiries, bill payments, deposits, and conducting financial transactions (Railiene, 2014). Finally, the scrutiny of modern mobile banking relies on a resilient security infrastructure and thorough protocols implemented to encrypt private financial data and operations (Susmitha et al., 2024).

Significantly, the financial sector provides its users with a vast array of channel options, including traditional branch services, self-service devices like automated teller machines (ATMs), telephone banking, internet banking, and mobile banking (Al-Somali et al., 2009; Hoehle & Huff, 2012; Sharma &

Govindaluri, 2014). Many banks are motivating their customers to adopt self-service technology, which allows additional benefits such as cost savings and cross-selling activity (Al-Somali et al., 2009; Hoehle & Huff, 2012; Sharma & Govindaluri, 2014). Likewise, mobile payment solutions, including Google Wallet and Apple Pay, have transformed the purchasing experience by offering seamless digital transactions (Chae & Hedman, 2013). Fingerprints, which are the ridge and furrow patterns on the fingertips, have been commonly used for recognizing users (Chae & Hedman, 2013).

Long ago, fingerprints were utilized to facilitate verification, and their biological features were easily identifiable (Jain et al., 1997; Jain et al., 1997). The adoption of blockchain technology in m-banking guarantees decentralization, transparency, and permanence, making it challenging for attackers to breach the system without being recognized (Aryee, 2023). Extensive security features, including online mode access, two-factor authentication, suggested login credentials to deter weak passwords, and frequent inside updates and security audits to detect and fix deficiencies, are also included in the app (Aryee, 2023). Additionally, blockchain technology establishes an auditable and transparent ecosystem by offering tamper-evident transcriptions of all network activities and transactions (Habib et al., 2022). This capability is specifically significant in mobile networks, where securing confidential user information and money transfers is essential (Xiong et al., 2020).

Technology can be assumed as an engaged tool with the capacity to incorporate, associate, and retrieve other resources; therefore, the adoption of technology is a fundamental element of collaborative value creation (Zainuddin et al., 2016). Banks are starting to deliver algorithm-based customer service and artificial intelligence (AI)-based mobile banking services (Iberahim et al., 2016). A majority of banks, digital platforms, and users work collaboratively and simultaneously to achieve their shared goals, facilitated by the alignment of AI-driven insights that enhance customer services through mobile banking (Kristensson, 2019). As well, financial sectors provide a more unique value proposition in the artificial intelligence and m-banking platforms, which users then scrutinize from their utilization, verifiable resources, and specific conditions (Sandström et al., 2008).

Technology's parallel advancement with service distribution is exemplified by AI, particularly in digital banking via mobile, in which it transforms how value is recognized and obtained (Manser Payne et al., 2021). AI-driven engagements supply superior value in utilization by sending instant, customized financial solutions such as account consultation, portfolio planning, insurance solutions, and debt integration (Manser Payne et al., 2021). Chatbots, driven by AI, have become essential tools for enhancing the user experience in the banking industry (El-Shihy et al., 2024). Financial organizations now understand how important it is to support outstanding customer service and utilize chatbots to draw in and keep users in this age of digital transformation (Ariff et al., 2013; Ngo & Nguyen, 2016), and provide customers with a more customized banking experience with AI services in mobile banking (Rust & Huang, 2014).

Overall, mobile banking has significantly evolved, integrating advanced technologies to improve user convenience and security; thus, the integration of AI and blockchain improves expandability, cybersecurity, operational effectiveness, and personalization, and enables banks to distribute premium-quality services rather than being constrained by a single technological approach (Vedapradha & Ravi, 2021). Artificial intelligence can be leveraged to improve the user-centric banking functions, whereas blockchain can strengthen internal systems and workflows (Dewasiri et al., 2023). Blockchain is combined with biometric authentication systems for financial operations that require authentication and verification (Ji & Tia, 2022). Chatbots should be substantiated by the financial institution for employees' engagement (Suhartanto et al., 2022). AI-driven customer service, blockchain for security, and biometric authentication have transformed how users interact with banking services and gain confidence in utilizing banking services (Suhartanto et al., 2022).

4. ROLES OF USER INTERFACE AESTHETICS IN CONSUMER MOTIVATION

According to Chaouali et al. (2020), users' adoption intentions are motivated by the perceived value of mobile banking applications, which is influenced by design aesthetics. Researchers underline that user

views are significantly affected by factors such as layout, color schemes, and overall visualization (Creusen & Schoormans, 2005). Concerning emotional value, users "can value the 'look' of a product purely for its own sake, as looking at something beautiful is rewarding in itself" (Creusen & Schoormans, 2005). Similarly, a visually appealing mobile banking app enables the process to be simpler to deliver an enjoyable environment (Walls, 2013). Study indicates that an alluring dimension may elicit physiological users' visceral responses in the structure of enjoyment (Pham, 2004). Considering how design aesthetics influence sensations (Liu & Jang, 2009; Cai & Xu, 2011), and is probable that a visually appealing mobile banking software enriches users' subjective experiences by rendering users comfortable (Wang et al., 2003; Cai & Xu, 2011).

According to a study by Sheth et al. (1991), design aesthetics can thereby improve the predicted emotional value for the mobile banking application or its perceived capability to trigger or prolong emotions or psychological states. Beyond surface-level design, existing research highlights that mobile banking affects wider consumer behavior dynamics, illustrating both functional and affective dimensions (Laukkanen & Kiviniemi, 2018). Thus, many studies have demonstrated that aesthetics can improve performance (Moshagen et al., 2009). Finally, assessments of a website's content might be influenced by its visual appeal, and user interface aesthetics are fundamental in capturing users' intention and psychological enjoyment (Aladwani & Palvia, 2002).

The fact that the present icon corpora for use in investigations depend on using existing icons was a major motivator for our effort; hence, users' perceptions and performance are precisely impacted by their prior familiarity with the symbols (Isherwood et al., 2007). More thoroughly, dark mode is a low-light user interface that applies darkness as the primary backdrop color, commonly black or grayscale tones, and has been used as the default white user interface for decades, but this is different (Damnjanovic et al., 2024). Developers discovered that dark-themed interfaces minimize eye strain in response to our increased screen application, especially at night or in low-light conditions (Damnjanovic et al., 2024). A better working environment and fewer headaches are evidence of reduced eye strain (Damnjanovic et al., 2024). Notably, a study indicates that aesthetically pleasing layouts inspire the time users to engage in effective and satisfactory utilization, meeting consumers' expectations and leading to a strong relationship with banking services (Grossbart et al., 1990).

In the same vein, Booms and Bitner (1981) proposed the perspective of servicescape as the ecosystem in which the transaction between the financial institution and users occurs smoothly, accentuating the influence of the environmental design (e.g., layouts), in which a service process operates, shaping users' behavior. Overall, research has suggested that usability and user trust in mobile banking applications are significantly influenced by the design and functionality of the interface (Zhou, 2012; Alalwan et al., 2016). As well, capitalizing on consumer responses and advocacy-driven branding techniques can strengthen UI authenticity and confidence in mobile banking applications (Shirahada & Kosaka, 2012). The user interface features of the mobile banking app should be convenient to navigate and well-structured (Al-Somali et al., 2009). It must have efficient search capabilities and easily accessible, clear content (Gharaibeh et al., 2018). In addition to ensuring text readability, the color scheme should be visually appropriate (Gharaibeh et al., 2018).

Thus, user interface aesthetics significantly impact m-banking users through ease of use, user-friendly navigation, and individual customization (Gharaibeh et al., 2018). For instance, to offer users an extensive digital banking experience, ACLEDA Bank has been steadily developing its digital infrastructure; therefore, the consequence is the ACLEDA Super App, a secure, feature-rich platform that unifies banking operations, securities trading, public service payments, and cultural connectivity (KiriPost, 2025). ACELEDA is one of the most popular banks in Cambodia; its mobile banking application offers various user interface aesthetics (UIAs), including Basic, Modern, International Women's Day, Linear, Lunar, Valentine, and Dynamic themes (see Fig. 1).

Basic UIA Modern UIA IWD UIA Linear UIA Lunar UIA Valentine UIA Dynamic UIA

Figure 1. *ACELEDA mobile banking application user interface aesthetics*

5. CONCLUSION AND RECOMMENDATIONS

This review article has discussed the roles of user interface aesthetics in influencing consumer motivation in m-banking apps. It indicates that well-designed user interface features, covering colorfulness, typography, layouts, dark modes, symbolism, and icons, significantly inspire consumer engagement and satisfaction by developing visual appeal, readability, ease of use, and personal attachment. A strategically designed user interface facilitates creating an intuitive interface and effortless user experience, optimizing cognitive ease, empowering usability, and strengthening confidence and trustworthiness.

Also, dimensions such as seamless transitions, quick user interactions, and accessibility features contribute to a more user-friendly, accessible, and customized digital banking platform, ultimately enhancing the adoption level and ensuring long-term retention. As discussed above, previous research tends to support the concept that the visual characteristics of m-banking interfaces empower usability, seamless navigation, personal customization, trust, and psychological enjoyment. Considering the rising emphasis on mobile banking, future investigations should study the direct correlation between specific user interface aesthetics dimensions and consumer behavior. Correspondingly, the diversification of AI-driven individualization, blockchain, and biometric advancements in user interface design could further boost user experience.

This article has some recommendations. To empower consumer motivation in m-banking, financial institutions should give precedence to user interface aesthetics by expanding the application of user-focused design strategies. This includes tailoring colorfulness to enhance usability and aesthetics, improving typography, enhancing readability, and retaining a well-designed interface to facilitate navigability. In addition, integrating customizable dark mode options, functional icons, and symbolic components can augment consumer satisfaction.

Hence, AI-driven personalization should be utilized to customize the user interface experience depending on the user preferences, increasing consumer involvement insights. Protection features, such as biometric authentication and blockchain adoption, should also be harmoniously integrated into the user interface to advance ease of use and consumer confidence. Banks should conduct frequent user interface assessments and gather consumer feedback to guarantee continuous development and alignment with transforming user expectations.

As this article is a review article, future research should empirically investigate the direct impact of particular UI aesthetics, including color psychology, typography features, and icon designs, on consumer behavior in m-banking. More importantly, future research can explore the influence of AI-driven user interface personalization on consumer engagement and trust. Cross-cultural and demographic comparison research might contribute insights into how user interface options differ among consumers. Another significant aspect for investigation is the role of innovative technologies like augmented reality and virtual assistants in enriching the user interface experiences. Ultimately, longitudinal studies can scrutinize how transformation in user interface design affects long-term user loyalty and m-banking adoption levels.

Conflicts of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

Acknowledgement

This paper does not receive financial assistance from governmental, private, or non-profit organizations.

REFERENCES

Aladwani, A. M., & Palvia, P. C. (2002). Developing and validating an instrument for measuring user-perceived web quality. *Information & Management, 39*(6), 467–476. https://doi.org/10.1016/S0378-7206(01)00113-6

Alalwan, A. A., Dwivedi, Y. K., Rana, N. P., & Williams, M. D. (2016). Consumer adoption of mobile banking in Jordan: Examining the role of usefulness, ease of use, perceived risk and self-efficacy. *Journal of Enterprise Information Management, 29*(1), 118–139. https://doi.org/10.1108/JEIM-04-2015-0035

Aldiabat, K., Al-Gasaymeh, A., & Rashid, A. S. K. (2019). The effect of mobile banking application on customer interaction in the Jordanian banking industry. *International Journal of Interactive Mobile Technologies, 13*(2), 37–49. https://doi.org/10.3991/ijim.v13i02.9262

Al-Somali, S. A., Gholami, R., & Clegg, B. (2009). An investigation into the acceptance of online banking in Saudi Arabia. *Technovation, 29*(2), 130–141. https://doi.org/10.1016/j.technovation.2008.07.004

Anderson, J. (2010). M-banking in developing markets: Competitive and regulatory implications. *Info, 12*(1), 18–25. https://doi.org/10.1108/14636691011015358

Ariff, M. S. M., Yun, L. O., Zakuan, N., & Ismail, K. (2013). The impacts of service quality and customer satisfaction on customer loyalty in internet banking. *Procedia - Social and Behavioral Sciences, 81*, 469–473. https://doi.org/10.1016/j.sbspro.2013.06.462

Aryee, E. (2023). Enhancing mobile banking security through blockchain technology: Mitigating unauthorized access and protecting financial assets. *International Journal of Finance and Banking Research, 9*(2), 30–38. https://doi.org/10.11648/j.ijfbr.20230902.12

Bankole, F. O., Bankole, O. O., & Brown, I. (2011). Mobile banking adoption in Nigeria. *The Electronic Journal of Information Systems in Developing Countries, 47*(1), 1–23. https://doi.org/10.1002/j.1681-4835.2011.tb00330.x

Barnes, S. J., & Corbitt, B. (2003). Mobile banking concept and potential. *International Journal of Mobile Communications, 1*(3), 273–288. https://doi.org/10.1504/IJMC.2003.003494

Basha, A. J., Palanisamy, V., & Purusothaman, T. (2011). Efficient multimodal biometric authentication using fast fingerprint verification and enhanced iris features. *Journal of Computer Science, 7*(5), 698–706. https://doi.org/10.3844/jcssp.2011.698.706

Bátiz-Lazo, B. (2009). Emergence and evolution of ATM networks in the UK, 1967–2000. *Business History, 51*(1), 1–27. https://doi.org/10.1080/00076790802602164

Bátiz-Lazo, B. (2018). *Cash and dash: How ATMs and computers changed banking*. Oxford University Press.
https://doi.org/10.1093/oso/9780198782810.001.0001

Booms, B. H., & Bitner, M. J. (1981). Marketing strategies and organization structures for service firms. In *Marketing of services* (pp. 47–51).
https://doi.org/10.1177/004728758102000

Cai, S., & Xu, Y. (2011). Designing not just for pleasure: Effects of website aesthetics on consumer shopping value. *International Journal of Electronic Commerce, 15*(4), 159–187.
https://doi.org/10.2753/JEC1086-4415150405

Chae, S. U., & Hedman, J. (2013). Exploring business models for NFC-enabled mobile payment services: The case of Google Wallet and ISIS. *Journal of Information Technology, 28*(3), 215–225.

Chaouali, W., Lunardo, R., Ben Yahia, I., Cyr, D., & Triki, A. (2020). Design aesthetics as drivers of value in mobile banking: Does customer happiness matter? *International Journal of Bank Marketing, 38*(1), 219–241.
https://doi.org/10.1108/IJBM-03-2019-0100

Chen, C. (2013). Perceived risk, usage frequency of mobile banking services. *Managing Service Quality, 23*(5), 410–436.
https://doi.org/10.1108/MSQ-10-2012-0137

Chong, A. Y. L., Ooi, K. B., Lin, B., & Tan, B. (2010). Online banking adoption: An empirical analysis. *International Journal of Bank Marketing, 28*(4), 267–287.
https://doi.org/10.1108/02652321011054963

Creusen, M. E. H., & Schoormans, J. (2005). The different roles of product appearance in consumer choice. *Journal of Product Innovation Management, 22*(1), 63–81.
https://doi.org/10.1111/j.0737-6782.2005.00103.x

Crilly, N., Moultrie, J., & Clarkson, P. J. (2004). Seeing things: Consumer response to the visual domain in product design. *Design Studies, 25*(6), 547–577.
https://doi.org/10.1016/j.destud.2004.03.001

Cruz, P., Neto, L. B. F., Munoz-Gallego, P., & Laukkanen, T. (2010). Mobile banking rollout in emerging markets: Evidence from Brazil. *International Journal of Bank Marketing, 28*(5), 342–371.
https://doi.org/10.1108/02652321011064881

Damnjanovic, D., Stojić, D., Vujičić, D., & Milosevic, M. (2024). Minimalistic user interface design and dark mode usage in human-computer interaction. In *10th International Scientific Conference Technics, Informatics and Education – TIE 2024* (pp. 124–127). Faculty of Technical Sciences Čačak, University of Kragujevac.
https://doi.org/10.46793/TIE24.124D

Daniel, E., & Storey, C. (1997). Online banking: Strategic and management challenges. *Long Range Planning, 30*(6), 890–898.
https://doi.org/10.1016/S0024-6301(97)00074-5

Dewasiri, N. J., Karunarathne, K. S. S. N., Menon, S., Jayarathne, P. G. S. A., & Rathnasiri, M. S. H. (2023). Fusion of artificial intelligence and blockchain in the banking industry: Current application, adoption, and future challenges. In A. Saini & V. Garg (Eds.), *Transformation for Sustainable Business and Management Practices: Exploring the Spectrum of Industry 5.0* (pp. 293–307). Emerald Publishing Limited.
https://doi.org/10.1108/978-1-80262-277-520231021

Durkin, T. A. (2000). Credit cards: Use and consumer attitudes, 1970–2000. *Federal Reserve Bulletin, 86*(9), 623–634.
https://doi.org/10.17016/bulletin.2000.86-9

El-Shihy, D., Abdelraouf, M., Hegazy, M., & Hassan, N. (2024). The influence of AI chatbots in fintech services on customer loyalty within the banking industry. *Future of Business Administration, 3*(1), 16–28. https://doi.org/10.33422/fba.v3i1.644

Ghag, O., & Hegde, S. (2012). A comprehensive study of Google Wallet as an NFC application. *International Journal of Computer Applications, 58*(16), 37–42. https://doi.org/10.5120/9369-3825

Gharaibeh, M. K., Arshad, M., & Rafie, M. (2018). The impact of demographic factors and visual aesthetics of mobile application interface on intention to use mobile banking in Jordan. *Journal of Theoretical & Applied Information Technology, 96*(4), 937–945.

Giannakoudi, S. (1999). Internet banking: The digital voyage of banking and money in cyberspace. *Information and Communication Technology Law*, 205–243. https://doi.org/10.1080/13600834.1999.9965811

Gkoutzinis, A. A. (2006). Internet banking in Europe: Basic concepts and recent trends. In *Internet Banking and the Law in Europe* (pp. 7–28). Cambridge University Press. https://doi.org/10.1017/cbo9780511494703

Gligor, D. M., & Bozkurt, S. (2020). FsQCA versus regression: The context of customer engagement. *Journal of Retailing and Consumer Services, 52*, 2–12. https://doi.org/10.1016/j.jretconser.2019.101929

Grossbart, S., Hampton, R., Rammohan, R., & Lapidus, R. S. (1990). Environmental dispositions and customer response to store atmospherics. *Journal of Business Research, 21*, 225–241. https://doi.org/10.1016/0148-2963(90)90030-H

Habib, G., Sharma, S., Ibrahim, S., Ahmad, I., Qureshi, S., & Ishfaq, M. (2022). Blockchain technology: Benefits, challenges, applications, and integration of blockchain technology with cloud computing. *Future Internet, 14*(11), 341–349. https://www.mdpi.com/1999-5903/14/11/341

Hernandez, M. C., & Mazzon, A. (2007). Adoption of internet banking: Proposition and implementation of an integrated methodology approach. *International Journal of Bank Marketing, 25*(2), 72–88. https://doi.org/10.1108/02652320710728410

Hoehle, H., & Huff, S. (2012). Advancing task-technology fit theory: A formative measurement approach to determining task-channel fit for electronic banking channels. In D. N. Hart (Ed.), *Information Systems Foundations: Theory building in information systems* (pp. 133–169). ANU E Press. https://doi.org/10.22459/ISF.10.2012.06

Howcroft, B., Hamilton, R., & Hewer, P. (2002). Consumer attitude and the usage and adoption of home-based banking in the United Kingdom. *International Journal of Bank Marketing, 20*(3), 111–121. https://doi.org/10.1108/02652320210424205

Iberahim, H., Taufik, N. M., Adzmir, A. M., & Saharuddin, H. (2016). Customer satisfaction on the reliability and responsiveness of self-service technology for retail banking services. *Procedia Economics and Finance, 37*, 13–20. https://doi.org/10.1016/S2212-5671(16)30086-7

Isherwood, S. J., McDougall, S. J., & Curry, M. B. (2007). Icon identification in context: The changing role of icon characteristics with user experience. *Human Factors, 49*(3), 465–476. https://doi.org/10.1518/001872007X200102

Jain, A. K., Lin, H., & Bolle, R. (1997). Online fingerprint verification. *IEEE Transactions on Pattern Analysis and Machine Intelligence, 19*(4), 302–314. https://doi.org/10.1109/CEC.2007.4424630

Jain, A. K., Lin, H., Pankanti, S., & Bolle, R. (1997). An identity-authentication system using fingerprints. *Proceedings of the IEEE, 85*(9), 1365–1388. https://doi.org/10.1109/34.587996

Ji, F., & Tia, A. (2022). The effect of blockchain on business intelligence efficiency of banks. *Kybernetes, 51*(8), 2652–2668. https://doi.org/10.1108/K-10-2020-0668

Kawazoe, H., Shibuya, T., & Tokuyama, T. (2002). Optimal online algorithms for an electronic commerce money distribution system. *Algorithmica, 33*(2), 287–299. https://doi.org/10.1007/s00453-001-0120-9

Khan, H. U., Malik, M. Z., Nazir, S., & Khan, F. (2023). Utilizing biometric system for enhancing cyber security in banking sector: A systematic analysis. *IEEE Access, 11*, 80181–80198. https://doi.org/10.1109/ACCESS.2023.3298824

Khan, M. K., Zhang, J., & Wang, X. (2008). Chaotic hash-based fingerprint biometric remote user authentication scheme on mobile devices. *Chaos, Solitons & Fractals, 35*(3), 519–524. https://doi.org/10.1016/j.chaos.2006.05.061

KiriPost. (2025, January 27). ACLEDA enhances digital banking with feature-rich AC Super App. *KiriPost*. https://kiripost.com/stories/acleda-enhances-digital-banking-with-feature-rich-ac-super-app

Konheim, A. G. (2015). Automated teller machines: Their history and authentication protocols. *Journal of Cryptographic Engineering, 6*(1), 1–29. https://doi.org/10.1007/s13389-015-0104-3

Kristensson, P. (2019). Future service technologies and value creation. *Journal of Services Marketing, 33*(4), 502–506. https://doi.org/10.1108/JSM-01-2019-0035

Laukkanen, T. (2016). Consumer adoption versus rejection decisions in seemingly similar service innovations: The case of the Internet and mobile banking. *Journal of Business Research, 69*(7), 2432–2439. https://doi.org/10.1016/j.jbusres.2015.12.013

Laukkanen, T., & Kiviniemi, M. (2018). The impact of mobile banking on consumer behavior: An empirical study. *Journal of Financial Services Research, 54*(2), 189–206. https://doi.org/10.1016/j.jbusres.2016.01.013

Lee, K. C., & Chung, N. (2009). Understanding factors affecting trust in and satisfaction with mobile banking in Korea: A modified DeLone and McLean's model perspective. *Interacting with Computers, 21*(5–6), 385–392. https://doi.org/10.1016/j.intcom.2009.06.004

Lee, J., & Kwon, K.-N. (2002). Consumers' use of credit cards: Store credit card usage as an alternative payment and financing medium. *Journal of Consumer Affairs, 36*(2), 239–262. https://doi.org/10.1111/j.1745-6606.2002.tb00432.x

Liu, Y., & Jang, S. C. (2009). The effects of dining atmospherics: An extended Mehrabian-Russell model. *International Journal of Hospitality Management, 28*(4), 494–503. https://doi.org/10.1016/j.ijhm.2009.01.002

Makris, M., Koumaras, V., Koumaras, H., Konstantopoulou, A., Konidis, S., & Kostakis, S. (2009). Quantifying factors influencing the adoption of Internet banking services in Greece. *International Journal of E-Adoption, 1*(1), 20–32. https://doi.org/10.4018/jea.2009010102

Malaquias, R. F., & Hwang, Y. (2016). An empirical study on trust in mobile banking: A developing country perspective. *Computers in Human Behavior, 54*, 453–461. https://doi.org/10.1016/j.chb.2015.08.039

Manser Payne, E. H., Peltier, J., & Barger, V. A. (2021). Enhancing the value co-creation process: Artificial intelligence and mobile banking service platforms. *Journal of Research in Interactive Marketing, 15*(1), 68–85. https://doi.org/10.1108/JRIM-10-2020-0214

Martins, C., Oliveira, T., & Popovič, A. (2014). Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management, 34*(1), 1–13. https://doi.org/10.1016/j.ijinfomgt.2013.06.002

Moshagen, M., Musch, J., & Göritz, A. S. (2009). A blessing, not a curse: Experimental evidence for beneficial effects of visual aesthetics on performance. *Ergonomics, 52*(10), 1311–1320. https://doi.org/10.1080/00140130903061717

Mwema, J., Kimani, S., & Kimwele, M. (2023). A study of approaches and measures aimed at securing biometric fingerprint templates in verification and identification systems. *International Journal of Computer Applications Technology and Research, 12*(2), 108–119. https://doi.org/10.7753/ijcatr0402.1005

Narteh, B. (2014). Service quality and customer satisfaction in banking services: The role of digital banking. *International Journal of Bank Marketing, 32*(4), 257–271. https://doi.org/10.1108/IJBM-08-2016-0118

Ngai, E. W. T., & Gunasekaran, A. (2007). A review for mobile commerce research and applications. *Decision Support Systems, 43*(1), 3–15. https://doi.org/10.1016/j.dss.2005.05.003

Ngo, V. M., & Nguyen, H. H. (2016). The relationship between service quality, customer satisfaction, and customer loyalty: An investigation in the Vietnamese retail banking sector. *Journal of Competitiveness, 8*(2), 103–116. https://doi.org/10.7441/joc.2016.02.08

Nwakanma, C. I., Islam, F. B., Maharani, M. P., Lee, J. M., & Kim, D. S. (2021). Detection and classification of human activity for emergency response in a smart factory shop floor. *Applied Sciences, 11*(8), 36–62. https://doi.org/10.3390/app11083662

Oliveira, T., Faria, M., Thomas, M. A., & Popovič, A. (2014). Extending the understanding of mobile banking adoption: When UTAUT meets TTF and ITM. *International Journal of Information Management, 34*(5), 689–703. https://doi.org/10.1016/j.ijinfomgt.2014.04.006

Oliveira, T., Thomas, M., Baptista, G., & Campos, F. (2016). Mobile payment: Understanding the determinants of customer adoption and intention to recommend the technology. *Computers in Human Behavior, 61*, 404–414. https://doi.org/10.1016/j.chb.2016.03.030

Pasquet, M., Reynaud, J., & Rosenberger, C. (2008). Secure payment with NFC mobile phone in the Smart Touch project. In *Proceedings of the International Symposium on Collaborative Technologies and Systems (CTS)* (pp. 121–126). IEEE. https://doi.org/10.1016/j.tele.2013.06.002

Pham, M. T. (2004). The logic of feeling. *Journal of Consumer Psychology, 14*(4), 360–369. https://doi.org/10.1207/s15327663jcp1404_5

Railiene, G. (2014). The use of IT in relationship banking. In *19th International Scientific Conference Economics and Management* (pp. 569–579). Kaunas University of Technology. https://doi.org/10.1016/j.sbspro.2014.11.242

Rodríguez, A., Pileggi, P., & Nykänen, O. A. (2016). Mobile context-aware systems: Technologies, resources, and applications. *International Journal of Interactive Mobile Technologies, 10*(2), 45–56. https://doi.org/10.3991/ijim.v10i2.5367

Roland, M., Langer, J., & Scharinger, J. (2013). Applying relay attacks to Google Wallet. In *Proceedings of the 5th International Workshop on Near Field Communication (NFC)* (pp. 1–6). IEEE. https://doi.org/10.1109/NFC.2013.6482441

Ross, A., Nandakumar, K., & Jain, A. K. (2006). Biometrics: When identity matters. In *Handbook of Multibiometrics* (Vol. 6, pp. 1–35). Springer. https://doi.org/10.1007/0-387-33123-9_1

Rust, R. T., & Huang, M.-H. (2014). The service revolution and the transformation of marketing science. *Marketing Science, 33*(2), 206–221. https://doi.org/10.1287/mksc.2013.0836

Samrgandi, N. (2021). User interface design & evaluation of mobile applications. *International Journal of Computer Science and Network Security, 21*(1), 55–63. https://doi.org/10.47738/jads.v4i4.136

Sandström, S., Edvardsson, B., Kristensson, P., & Magnusson, P. (2008). Value in use through service experience. *Managing Service Quality: An International Journal, 18*(2), 112–126. https://doi.org/10.1108/09604520810859184

Scott, S. V., & Zachariadis, M. (2012). Origins and development of SWIFT, 1973–2009. *Business History, 54*(3), 462–482. https://doi.org/10.1080/00076791.2011.638502

Sfar, A. R., Chtourou, Z., & Challal, Y. (2017). A systemic and cognitive vision for IoT security: A case study of military live simulation and security challenges. In *2017 International Conference on Smart, Monitored and Controlled Cities (SM2C)* (pp. 101–105). IEEE. https://doi.org/10.1109/SM2C.2017.8071828

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

Sharma, S. K., & Govindaluri, S. M. (2014). Internet banking adoption in India: Structural equation modeling approach. *Journal of Indian Business Research, 6*(2), 155–169. https://doi.org/10.1108/JIBR-02-2013-0013

Sheth, J. N., Newman, B. I., & Gross, B. L. (1991). Why we buy what we buy: A theory of consumption values. *Journal of Business Research, 22*(2), 159–170. https://doi.org/10.1016/0148-2963(91)90050-8

Shih, Y., & Fang, K. (2004). The use of a decomposed theory of planned behavior to study internet banking in Taiwan. *Internet Research, 14*(3), 213–223. https://doi.org/10.1108/10662240410542643

Shirahada, K., & Kosaka, M. (2012). Evaluation method for service branding using word-of-mouth data. *Electronics and Communications in Japan, 95*(12), 21–28. https://doi.org/10.1002/ecj.11442

Suhartanto, D., Syarief, M. E., Chandra Nugraha, A., Suhaeni, T., Masthura, A., & Amin, H. (2022). Millennial loyalty towards artificial intelligence-enabled mobile banking: Evidence from Indonesian Islamic banks. *Journal of Islamic Marketing, 13*(9), 1958–1972. https://doi.org/10.1108/JIMA-12-2020-0380

Susmitha, K., Leelavati, T. S., & Sripathi, M. (2024). Transformative trends in digital banking: Exploring e-banking, mobile banking, digital payments, and innovative solutions. In *E-Financial Strategies for Advancing Sustainable Development: Fostering Financial Inclusion and Alleviating Poverty* (pp. 169–182). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-67523-2_10

Szczepanik, M., & Jóźwiak, I. (2018). Security of mobile banking applications. In *Advanced Solutions in Diagnostics and Fault-Tolerant Control* (pp. 412–419). Springer. https://doi.org/10.1007/978-3-319-64474-5_35

Tan, M., & Teo, T. S. (2000). Factors influencing the adoption of Internet banking. *Journal of the Association for Information Systems, 1*(1es), 5–6. https://doi.org/10.17705/1jais.00005

Tiwari, R., Buse, S., & Herstatt, C. (2006, July). Mobile banking as business strategy: Impact of mobile technologies on customer behavior and its implications for banks. In *PICMET 2006 Conference on Technology Management for the Global Future* (Vol. 4, pp. 1935–1946). IEEE. https://doi.org/10.1109/PICMET.2006.296770

Tommi, L., & Vesa, K. (2010). The role of information in mobile banking resistance. *International Journal of Bank Marketing, 28*(5), 372–388. https://doi.org/10.1108/02652321011064890

Tsai, C., Chen, C., & Zhuang, D. (2012). Secure OTP and biometric verification scheme for mobile banking. In *2012 3rd FTRA International Conference on Mobile, Ubiquitous, and Intelligent Computing (MUSIC)* (pp. 138–141). IEEE. https://doi.org/10.1109/MUSIC.2012.31

Turban, E., Outland, J., King, D., Lee, J. K., Liang, T.-P., & Turban, D. C. (2018). Electronic commerce payment systems. In *Electronic Commerce 2018* (pp. 457–499). Springer. https://doi.org/10.1007/978-3-319-58715-8_12

Uchenna, C. P., Pascal, A., & Prince, O. (2018). Evaluation of a fingerprint recognition technology for a biometric security system. *American Journal of Computer Science and Technology, 1*(4), 74–84. https://doi.org/10.11648/j.ajcst.20180104.11

Vanatta, S. H. (2018). Charge account banking: A study of financial innovation in the 1950s. *Enterprise & Society, 19*(2), 352–390. https://doi.org/10.1017/eso.2017.42

Vedapradha, R., & Ravi, H. (2021). Innovation in banking: Fusion of artificial intelligence and blockchain. *Asia Pacific Journal of Innovation and Entrepreneurship, 15*(1), 51–61. https://doi.org/10.1108/APJIE-09-2020-0142

Walls, A. R. (2013). A cross-sectional examination of hotel consumer experience and relative effects on consumer values. *International Journal of Hospitality Management, 32*(1), 179–192. https://doi.org/10.1016/j.ijhm.2012.04.009

Wang, Y. S., Wang, Y. M., Lin, H. H., & Tang, T. I. (2003). Determinants of user acceptance of internet banking: An empirical study. *International Journal of Service Industry Management, 14*(5), 501–519. https://doi.org/10.1108/09564230310500192

Williams, D. (2007). Introduction to PayPal. In *Pro PayPal E-Commerce* (pp. 1–20). Apress. https://doi.org/10.1007/978-1-4302-0353-7_1

Xiong, Z., Zhang, Y., Luong, N. C., Niyato, D., Wang, P., & Guizani, N. (2020). The best of both worlds: A general architecture for data management in blockchain-enabled Internet-of-Things. *IEEE Network, 34*(1), 166–173. https://doi.org/10.1109/MNET.001.1900095

Zainuddin, N., Tam, L., & McCosker, A. (2016). Serving yourself: Value self-creation in health care service. *Journal of Services Marketing, 30*(6), 586–600. https://doi.org/10.1108/JSM-02-2016-0075

Zhao, A. L., Koenig-Lewis, N., Hanmer-Lloyd, S., & Ward, P. (2010). Adoption of internet banking services in China: Is it all about trust? *International Journal of Bank Marketing, 28*(1), 7–26. https://doi.org/10.1108/02652321011013562

Zhou, T. (2012). Examining mobile banking user adoption from the perspectives of trust and flow experience. *Information Technology & Management, 13*, 27–37. https://doi.org/10.1007/s10799-011-0111-8

Zumello, C. (2011). The "everything card" and consumer credit in the United States in the 1960s. *Business History Review, 85*(3), 551–575. https://doi.org/10.1017/S0007680511000808