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Decoding FinTech Uptake: The Interplay of Digital Literacy, Brand Image, Data Security, and Trust

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Abstract

Purpose: This study aims to investigate the factors affecting the uptake of FinTech services in Kuwait, an area that academic and industry experts have not extensively examined, with an overall consumer adoption rate of 15%.

Methodology: The research applied the Technology Acceptance Model concepts. Using convenient and snowball sampling methods and self-reported questionnaires, 463 valid responses were gathered and examined using Partial Least Square-Structural Equation Modeling.

Findings: The results revealed both direct and indirect effects. Digital literacy and the perception of a brand play crucial roles in building trust and encouraging consumers to adopt FinTech services, whereas data security does not seem to impact these aspects. Enhancing digital literacy is vital for raising awareness, and a strong brand image greatly affects how consumers view a company, bolstering trust and increasing the chances of FinTech adoption.

Implications for theory and practice: This study significantly contributes to theory and practice with a new model, filling a research gap in the country and providing recommendations for professionals and regulatory authorities to enhance digital literacy, emphasize brand image, and develop products and services that customers highly value.

Originality and value: The uniqueness and significance of this study lie in its examination of the direct and indirect ways that digital literacy and brand image influence trust and the likelihood of adopting FinTech services, addressing a previously identified research gap. Through this investigation, the study contributes to a deeper comprehension of FinTech adoption in Kuwait.

Categories: Consumer Behavior, Digital business, Fintech and Cryptocurrencies
Keywords: digital finance, tam, data security, digital literacy, trust, consumer trust, brand image, kuwait, intention

Introduction

The financial services industry has undergone significant transformation in recent decades, fueled by rapid technological progress. From the invention of the telegraph to the rise of the modern Internet, technological advancements have continuously transformed this industry. Innovations like big data analytics, blockchain technology, and enhanced cybersecurity have also contributed significantly to these transformations. These advancements have led to the development of innovative financial products, services, and business models. They have also reduced reliance on intermediaries in financial transactions through technologies such as blockchain and open banking systems. Countries like India and China have effectively utilized these technological advancements to stimulate economic growth. In particular, New Delhi has gained recognition as a leading International Financial Center (Migozzi et al., 2024). Likewise, China has made significant strides in poverty reduction by implementing digital financial inclusion initiatives (Wang and Fu, 2022). Despite the many benefits of FinTech-including enhanced financial inclusion, cost efficiency, and improved access to financial services (Odei-Appiah et al., 2022) -Kuwait lags with a FinTech adoption rate of only 15% (Deloitte, 2020). This research explores the factors affecting FinTech adoption in Kuwait, a topic that has received limited attention in academic studies (Rabaa'i, 2023). For instance, (Odei-Appiah et al., 2022) suggest that lacking digital literacy could hinder FinTech's potential to promote financial inclusion.

On the other hand, researchers point out that cybersecurity poses a major challenge for FinTech firms, as increasing cyber threats jeopardize financial stability and hinder consumer adoption (AlBenJasim et al., 2023). In a similar vein, (Usman et al., 2020) stress the critical role of trust in online transactions, noting that it helps mitigate perceived risks and uncertainties for consumers, especially when they lack control over the actions of merchants. Furthermore, the current body of research is criticized by (Alkhowaiter,

2020) for its limited analysis of digital banking and FinTech adoption. Thus, a more comprehensive examination of the influencing factors is considered necessary in Gulf region.

This study explores the key factors influencing FinTech adoption in Kuwait. It incorporates constructs from the Technology Acceptance Model (TAM) and its extended frameworks to analyze these influences. The research proposes that digital literacy, brand image, and data security indirectly shape trust in FinTech services, which subsequently influences the intention to adopt these services. Trust also acts as a mediator between these indirect factors and adoption intention. Data were gathered from 463 participants through convenience and snowball sampling, using an online self-administered questionnaire. The study applied Partial Least Squares-Structural Equation Modeling (PLS-SEM) to analyze the data based on the TAM framework. The results reveal that digital literacy and brand image significantly impact individuals' willingness to adopt FinTech services in Kuwait, with trust playing a mediating role. However, the effect of data security was found to be minimal.

This research makes notable contributions to both theory and practice. First, it presents a novel model that integrates key constructs like digital literacy and brand image, while also emphasizing the importance of data security and intention within the TAM framework. Specifically tailored to the Kuwaiti context, this model aims to provide a deeper understanding of consumer intention to adopt FinTech services. This model comprehensively evaluates FinTech adoption factors, providing a valuable foundation for future studies in other regions. Second, the study underscores the pivotal role of trust in FinTech adoption, recommending that regulators and service providers focus on fostering trust to enhance consumer acceptance. Furthermore, the findings highlight the importance of improving digital literacy and strengthening brand image, offering practical strategies for FinTech companies in Kuwait to refine their services and attract more users.

The paper is organized into several sections: the first section reviews the relevant literature, followed by a description of the research framework. The next section formulates the hypotheses, while the subsequent section explains the materials and methods used in the study. The following section presents the results, which are then discussed in the penultimate section. Finally, the paper concludes with a summary of the findings.

Literature review

Theoretical Framework: Technology Acceptance Model

For decades, beginning in the 1970s, researchers have sought to understand how individuals accept, adopt, and utilize technology. Several factors that influence individuals' decisions to adopt new technologies have been highlighted in initial studies (Rondan-Cataluna et al., 2015). Despite continuous technological advancements, including the emergence of FinTech, researchers persist in addressing gaps in the literature on technology acceptance. Certain experts argue that research on technology adoption remains inadequate, urging for more comprehensive investigations (Bauer and Kenton, 2005) and (Franklin and Molebash, 2007). On the other hand, some suggest that the relevance of existing research might vary depending on particular contexts and circumstances (Hughes and Ooms, 2004) and (Drucker, 2006).

This research utilizes TAM as the theoretical foundation for its constructs. TAM is a widely recognized theory that examines the factors influencing technology acceptance. Understanding user behavior, offering a structured framework for effective technology implementation, and delivering actionable insights for practitioners is critical. Rooted in empirical research, TAM suggests that individuals' technology adoption is shaped by their evaluation of the perceived benefits relative to the anticipated effort required. The original TAM framework revolves around two core constructs: perceived usefulness and perceived ease of use.

Perceived usefulness is the degree to which an individual believes adopting a specific technology will improve performance. In contrast, perceived ease of use refers to the effort an individual expects to exert when using the technology. A three-stage process is followed by the TAM framework, with external factors such as system design and features being incorporated. Cognitive responses related to perceived ease of use and usefulness are influenced by these factors, with behavioral intentions being shaped as a result. The model proposes that perceived ease of use may not directly determine technology adoption. However, it establishes the foundation for perceived usefulness to exert its influence (Davis, 1989). When individuals find a technology simple to use, they are more likely to recognize its usefulness, thereby increasing its chances of being accepted.

Initially, it was uncertain which particular elements play a role in shaping perceived usefulness and impact a person's choice to adopt technology. To tackle this issue, (Venkatesh and Davis, 2000) explored the key factors that contribute to perceived usefulness. They aimed to create an inclusive model for technology acceptance in the workplace. Their research resulted in the creation of TAM2, an expanded version of the original TAM. It included extra external factors like subjective norms, output quality, job relevance, and image. Additionally, it considered result demonstrability, voluntariness, and experience.

Among these, subjective norms relate to social environments. In such environments, individuals are driven to behave in ways they think will be approved by their social circles (Venkatesh and Davis, 2000).

(Lee et al., 2003) contended that TAM lacked actionable guidance for practitioners. To address this, the interaction effects between the factors influencing perceived usefulness and ease of use were addressed by (Venkatesh and Bala, 2008), integrating them into a unified framework. They proposed TAM3, which broadened the theoretical foundation of previous models. It also indicated that behavioral intention is a predictor of actual technology adoption. Under TAM3, perceived ease of use is influenced by factors including the perception of self-efficacy, external control, computer playfulness, and computer anxiety. Additionally, objective usability and perceived enjoyment also play a role in shaping perceived ease of use. These are categorized into anchoring and adjustment groups. The initial evaluation of perceived ease of use is significantly influenced by anchoring factors. Adjustment factors, on the other hand, gain importance after users interact with information systems (Venkatesh, 2000).

The TAM has been widely referenced due to its strength, highlighting its significance in scholarly research (Rondan-Cataluna et al., 2015). Recently, a review of TAM research in Scopus-indexed journals was carried out by (Musa et al., 2024). It showcased its purpose across various disciplines including social sciences, finance, and economics. Their findings highlight TAM's effectiveness in assessing technology acceptance. Over the years, numerous scholars have explored TAM and its adaptations. For instance, (Hu et al., 2019) applied TAM to investigate the adoption of FinTech services among bank customers in China. (Junger and Mietzner, 2020) used the same model to analyze FinTech adoption by households in Germany. Similarly, (Usman et al., 2020), (Singh et al., 2021), and (Rehman and Zeb, 2023) leveraged TAM to study FinTech acceptance. They examined factors including brand image, trust, and data security. More recent studies, such as those by (Alshakhsi et al., 2025) and (Polyportis and Pahos, 2024), have applied this theory in innovative technological contexts, including AI and ChatGPT adoption, demonstrating its robustness in analyzing emerging technologies. Similarly, (Ladeira et al., 2024) employed the TAM framework to investigate behavioral intentions in the complex context of internet of things adoption, highlighting the model’s broad applicability. Despite its widespread use, TAM has seen limited application in scientific research within Kuwait. This study aims to validate its constructs, enhancing its relevance and applicability in this context.

Brand Image

"Brand image" refers to how the public views a company, influenced by customer evaluations and the organization’s visibility and reputation in the marketplace (Wu and Wang, 2014). This viewpoint is shaped by elements such as brand characteristics, name, design, cost, status, and overall credibility. As noted by (Hu et al., 2019), a strong brand image serves as a significant intangible resource that enhances a company’s financial value and favorably influences customer perceptions. A solid and recognizable brand image can successfully attract customers and play a major role in influencing their buying decisions (Shamma and Hassan, 2011). The role of brand image in FinTech adoption is well-documented. For example, research by (Setiawan et al., 2021) found that a strong brand image has a favorable impact on the FinTech adoption in Indonesia. They noted that people's perception of a company’s brand is shaped by various brand-building and product innovation efforts, extending beyond just promotional activities. Consistent with these findings, (Chandra et al., 2010) demonstrated that a strong brand image plays a vital role in building customer trust and promoting the use of FinTech services.

Conversely, (Moreira-Santos et al., 2022) found that brand reputation had only a minor moderating influence on the willingness to adopt FinTech. They attributed this outcome to the relatively small number of participants in their research. In another investigation, (Chen, 2013) examined how brand image affects mobile banking and found a strong link between brand perception and customers’ attitudes and intentions to use financial services. These results are consistent with the insights of (Setiawan et al., 2021) and (Chandra et al., 2010), reinforcing the significant influence that brand image holds in guiding consumer decisions in the financial industry.

Digital Literacy

Digital literacy proficiency encompasses the basic skill to navigate through a complex and varied information landscape. This includes the proficient use of information and communication technologies, the ability to evaluate and interpret information, and the efficient engagement with different types of media, including social media, as noted by (UNESCO, 2011). According to (Bandura and Leal, 2022), digital literacy refers to a person's ability to effectively and safely handle digital technologies, whether they are hardware or software.

The significance of digital literacy in the adoption of advanced technologies such as FinTech has been widely researched. (Odei-Appiah et al., 2022) contend that insufficient digital literacy can impede individuals' capacity to effectively utilize FinTech services, restricting financial inclusion. (Nikou et al., 2022) enhanced the TAM by integrating financial and digital literacy as crucial elements, showing that these kind of literacy have an indirect effect on the intention to embrace technology within organizational

environments. (Fu and Mishra, 2022) emphasize the crucial role of financial regulators and supervisors in safeguarding consumers, which is key to establishing trust in the FinTech industry. This is especially important as many users lack experience with digital financial services and possess limited financial and digital literacy. Similarly, (Laidroo et al., 2021) raise concerns about the challenges that service providers may face as a result of these digital literacy gaps.

However, (Breza et al., 2020) propose that the digital literacy gap may lessen over time as less experienced users rapidly adapt to emerging financial technologies. This also could lead to a reduced dependence on traditional financial intermediaries. (Kakinuma, 2022) views FinTech adoption as an indicator of digital literacy, observing a positive correlation between financial literacy and the use of FinTech, which can improve individuals' overall quality of life. Furthermore, the study underscores the role of digital literacy in moderating the relationship between financial literacy and FinTech adoption.

Data Security

Data play a critical role in securing a competitive advantage in the modern business environment. As companies embrace digital transformation, they leverage data to enhance decision-making, predict market trends, incorporate new technologies, and strengthen internal operations. However, this critical asset also draws cybercriminals aiming to exploit or breach it for financial gain, highlighting the importance of robust data security measures. According to (Sila, 2013), data security encompasses the strategies and measures to safeguard online transactions. This is especially pertinent in the FinTech sector, where the use of distributed ledger technology with limited administrative oversight (KFAS, 2019)-particularly in the absence of permissioned blockchains-emphasizes the need to secure data at rest and during transmission. Robust data security practices are essential for fostering trust and encouraging the adoption of FinTech services.

Numerous studies highlight the importance of data security in the adoption of e-services. For example, (Sila, 2013) and (Matos and Krielow, 2019) identify data security as a key factor in adopting B2B e-commerce. (Egala et al., 2021) establish a clear relationship between effective security protocols and greater customer satisfaction in online banking, ultimately resulting in better customer loyalty. Similarly, (Stewart and Jurjen, 2018) highlight the importance of data protection in building consumer confidence in FinTech services, as demonstrated by their study in Germany. In contrast, (Ahmed and Sur, 2023) found that data security did not significantly influence trust in digital banking services.

Trust

(Zhang et al., 2018) characterize trust as a "belief in the integrity, benevolence, skill, and capacity that one person perceives in others." This definition is especially relevant in online commerce, where trust plays a crucial role because transactions rely heavily on the Internet backbone (Pavlou, 2003). In e-commerce, trust is crucial for online vendors as it helps overcome challenges such as physical separation, the imbalance of information between buyers and sellers, and the need to share sensitive personal and financial data (Pavlou, 2003). (Luo, 2002) emphasizes the importance of trust in online transactions, pointing out that it helps reduce risk and uncertainty, as users lack direct control over the vendor's activities.

The growth of FinTech and digital banking has led scholars to explore the critical role of trust in consumer adoption, particularly given the complexity of financial transactions that occur without in-person interactions. For example, (Ali et al., 2021) found a strong connection between customer trust and the adoption of Islamic FinTech services. Their study revealed that trust increased with higher perceived benefits but decreased when perceived risks were elevated.

Similarly, (Zhang et al., 2018) emphasized that trust in banks significantly shapes consumers' attitudes toward adopting mobile banking services. These insights align with (Khuong et al., 2022) study on FinTech adoption intentions in Vietnam, highlighting trust's importance. Additionally, (Rabaa'i, 2023) identified trust as a critical factor in adopting m-wallet services in Kuwait, reinforcing its essential role in the broader FinTech ecosystem.

Intention

According to (Hall, 2013), intention refers to the extent of personal effort an individual is prepared to invest in performing a particular action. Other scholars define intention as the probability or willingness of an individual to undertake a specific behavior (Morwitz and Munz, 2020). This notion has been extensively applied in studies of consumer behavior and marketing, frequently utilizing survey techniques (Morwitz and Munz, 2020).

In the FinTech industry, intention plays a vital role in predicting the adoption and actual utilization of services, underscoring its significance in transforming and enhancing conventional financial systems (Fenga et al., 2014). Due to its importance, scholars have explored numerous elements that affect the

willingness to adopt FinTech services. For instance, (Singh et al., 2020) investigated the influence of security and responsiveness on the intention and adoption of FinTech services, finding favorable results. In a similar vein, (Stewart and Jurjens, 2018) discovered a significant positive correlation between trust and the willingness to embrace FinTech services in Germany. (Asif et al., 2023) also identified a favorable connection between trust and intention in their study on FinTech adoption in India.

The Present Landscape of FinTech in Kuwait

Financial technology, commonly known as FinTech, refers to technological innovations that transform the financial industry. It helps develop new processes, services, business models, and applications (Financial Stability Board, 2020). These innovations have a profound influence on financial institutions and markets, serving as a key driver in delivering contemporary financial services. The partnership between the financial and technology sectors has led to groundbreaking advancements in the industry. These innovations have enhanced accessibility and convenience in services such as financial consulting and insurance (Singh et al., 2020). It has also influenced lending, payments, savings, and risk management.

The influence of FinTech extends beyond traditional banking and financial industries. It allows various non-financial companies to offer unique and innovative financial products and services. A total of 68% of global consumers are willing to adopt innovative financial services offered by companies outside the traditional financial sector (Ernst and Young, 2019). The growth of FinTech is driven by benefits like cost-effectiveness and convenient access to financial services. These advantages are especially valuable for people in remote or underserved regions where traditional banking facilities are unavailable. This significantly advances financial inclusion (Moufakkir and Mohammed, 2020). The promising future of FinTech has drawn significant investments, leading to rapid expansion. In 2023, venture capitalists contributed more than 30.8 billion, bringing total sector investments to 46.3 billion (Ruddenklau, 2024).

Several banks in Kuwait have integrated FinTech solutions, including tap-and-go payments, virtual assistance, enhanced security measures, and digital wallets. Prominent examples include platforms led by entrepreneurs and small businesses, such as Tap Payments for e-commerce transactions. Other examples include One Global for international money transfers and Ajar Online for property management. Additionally, crowdfunding platforms such as Jaribha and Propnology Q8 provide financial support to new ventures. Although these efforts are in the early phases, they have the potential for wider acceptance in the future. In contrast, other Gulf Cooperation Council (GCC) nations, particularly Saudi Arabia, have witnessed the expansion of FinTech into a wide range of sectors, such as capital markets, lending, financing, fundraising, and insurance services.

Research conducted by (Ernst and Young, 2019) shows that the global uptake of FinTech services averages 64%, with China and India leading the way at 87%. In contrast, the Middle East trails with an average adoption rate of 22%. Saudi Arabia reports a rate of 40%, while Kuwait lags behind at just 15% (Deloitte, 2020). Furthermore, 57% of Kuwait's population remains unaware of FinTech services (Rabaa'i, 2023). On a global ranking of financial hubs, Kuwait City occupies the 116th position, while Dubai and Riyadh rank 17th and 86th, respectively (The FinTech Times, 2022). Significantly, more than half of Kuwait's population is between the ages of 15 and 39. Additionally, over 70% have bank accounts, which is higher than the global average of 54% (KFAS, 2019). Although these promising statistics exist, the low rate of FinTech adoption highlights an underutilized opportunity for financial expansion and improved business efficiency across multiple industries.

Theoretical Framework

The author of this study has developed a theoretical framework incorporating constructs from established models, including Digital Literacy (DL), Brand Image (BI), and Data Security (DS). The framework also considers trust (TR) as a potential mediator affecting the intention to adopt FinTech services in Kuwait. The theoretical framework is depicted in Figure *1*.

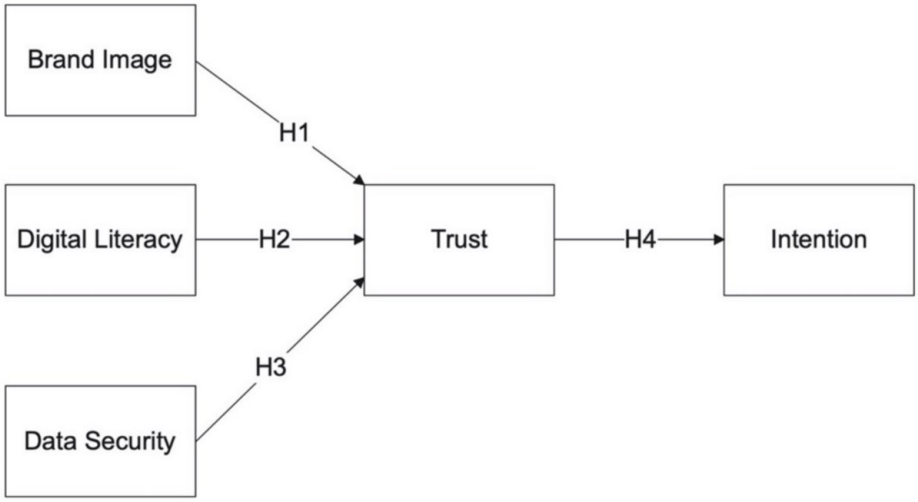

FIGURE 1: Proposed Research Framework and Hypothesized Relationships

Hypotheses development

Brand Image on Trust

Brand image plays a vital role in building user confidence in financial technology, especially in the context of non-face-to-face FinTech services. A positive and well-established brand image can boost revenue and enhance consumer perceptions (Hu et al., 2019). (Setiawan et al., 2021) discovered a positive association between brand reputation and adopting FinTech services in Indonesia. Similarly, (Chandra et al., 2010) found a comparable relationship between brand reputation and trust in FinTech services. (Chen, 2013) also identified a positive correlation between brand reputation and the willingness to use mobile banking services. However, (Moreira-Santos et al., 2022) observed only a weak moderating effect of brand reputation on the intention to adopt FinTech. As a result, this study will investigate similar hypotheses in Kuwait to assess the significant influence of brand reputation on trust in FinTech services.

H1: Brand Image (BI) positively and significantly affects Trust (TR) within FinTech services.

Digital Literacy on Trust

In the TAM3 model, literacy is critical in predicting technology adoption (Venkatesh and Bala, 2008). (Setiawan et al., 2021) demonstrated a positive relationship between financial literacy and adopting FinTech services in Indonesia. Similarly, (Matos and Krielow, 2019) found that a lack of knowledge increases perceived risk, negatively impacting the adoption of e-services in emerging markets. (Fu and Mishra, 2022) contend that low financial and digital literacy levels can undermine consumer trust in FinTech services. (Laidroo et al., 2021) also emphasized that insufficient digital literacy may hinder the effectiveness of FinTech providers. Building on the TAM, (Nikou et al., 2022) investigated the influence of digital literacy on the willingness to adopt digital technologies and identified a positive relationship. This study will focus on the roles of digital literacy and trust in FinTech services and providers. Based on these insights, the following hypothesis is proposed:

H2: Digital Literacy (DL) positively and significantly affects Trust (TR) in FinTech services.

Data Security on Trust

Ensuring data security in online transactions is essential, as it is a fundamental aspect of Data Security (Sila, 2013). (Stewart and Jurjens, 2018) identified a direct association between Data Security and FinTech adoption in Germany. Similarly, (Matos and Krielow, 2019) reported a significant relationship between perceived data security and the adoption of e-services. (Egala et al., 2021) further emphasized the vital role of data security in digital banking through their experimental findings. However, (Ahmed and Sur, 2023) found no significant influence of data security on digital banking adoption. Based on these findings, the hypothesis for this study is proposed as follows:

H3: Data Security (DS) negatively and significantly affects Trust (TR) within FinTech services.

Trust on Intention

Extensive research has explored the role of trust in shaping the intention to adopt new technologies across various contexts. For example, (Saif et al., 2022) examined adoption intentions for digital-only banks in Malaysia. They identified a positive correlation between trust and adoption intention within the TAM framework. Similarly, (Moreira-Santos et al., 2022) observed comparable results regarding FinTech adoption in organizational settings, employing the Technological, Organizational, and Environmental framework. (Nguyen et al., 2022) investigated mobile banking adoption in Vietnam, confirming a significant positive relationship between trust and adoption intention. These findings align with (Stewart and Jurjen, 2018) study on FinTech adoption in Germany. Drawing on these insights, the following hypothesis is proposed for this study:

H4: Trust (TR) positively and significantly affects the Intention (INT) to adopt FinTech services.

Mediating Effect of Trust

Given their inherent complexity, studies have consistently underscored the significance of trust in various contexts, particularly within financial services. (Ali et al., 2021) examined trust in the adoption of Islamic FinTech and found a positive relationship. Likewise, (Khuong et al., 2022) identified a strong correlation between trust and the intention to adopt FinTech services in Vietnam. (Zhang et al., 2018) and (Zhang et al., 2023) also reported similar positive findings in their research on trust in mobile banking and FinTech services. These studies highlight the critical role of trust in the adoption of financial technology. Accordingly, the hypotheses for this study are proposed as follows:

H5a: Trust (TR) serves as a positive and significant mediator in the association between Brand Image (BI) and Intention (IN) to adopt.

H5b: Trust (TR) serves as a positive and significant mediator in the connection between Digital Literacy (DL) and Intention (IN) to adopt.

H5c: Trust (TR) serves as a positive and significant mediator in the connection between Data Security (DS) and Intention (IN) to adopt.

Research Method

Kuwait boasts an impressive internet penetration rate of 98%, indicating extensive digital inclusion and widespread access to digital devices (Marmore, 2019). This study targets Kuwaiti residents aged 18 and above who use digital devices for banking and financial services. Given the large target population of over 3 million individuals (Jain, 2023), determining an optimal sample size is essential to balance time, cost, and research efficiency. According to (Krejcie and Morgan, 1970), a sample size 384 is suitable for populations exceeding one million. Several studies have successfully applied this sampling approach to achieve meaningful scientific insights. For instance, (Saif et al., 2022) adopted a similar method to examine the intention to adopt digital-only banks in Malaysia, while (Shahzad et al., 2022) used (Krejcie and Morgan, 1970) formula to study the impact of COVID-19 on FinTech adoption in Malaysia.

This study collected data via an online survey, yielding 463 valid responses (Ahmad, 2024). The survey included specific items categorized based on the research framework and employed closed-ended questions using either a 5-point or 7-point Likert scale, depending on relevant literature. The data analysis involved reliability and validity assessments, descriptive statistics to understand participant characteristics, and multivariate analysis to evaluate the relationships between independent variables, dependent variables, and the mediator. Confirmatory Factor Analysis was conducted to ensure the measurement tool's reliability and validity. Furthermore, PLS-SEM was utilized to assess the structural model and construct relationships using SmartPLS software (Becker, 2023). There are multiple justifications for choosing this method, including its nonparametric characteristics and the advantage of not requiring data to follow a normal distribution. It also demonstrates strong performance with small sample sizes and in handling complex model structures. As (Hair et al., 2022) outlined, the approach follows a two-step process: first, assessing the measurement model, then evaluating the structural model.

Results

Descriptive statistics

The descriptive analysis of the survey data, conducted using SPSS, examined direct, indirect, mediating, and moderating variables. Digital Literacy, Trust, and Intention were evaluated on a 7-point Likert scale, while Brand Image and Data Security were assessed using a 5-point Likert scale. The average scores for the 7-point Likert scale constructs ranged from 4.52 to 5.02; for the 5-point scale constructs, scores ranged from 2.64 to 3.49 (Table *1*). Standard deviations varied between 0.91 and 1.56. These results suggest that individuals in Kuwait possess solid digital skills and are well-positioned to adopt FinTech services. Respondents show a preference for established brands in the FinTech sector and can readily identify these brands. Additionally, while there are concerns about data security, the findings indicate that Kuwaiti participants have a positive outlook on FinTech services and are optimistic about their adoption.

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Brand Image	463	4.00	1.00	5.00	3.49	0.91
Digital Literacy	463	6.00	1.00	7.00	5.02	1.32
Data Security	463	4.00	1.00	5.00	2.64	0.94
Trust	462	6.00	1.00	7.00	4.52	1.31
Intention	462	6.00	1.00	7.00	4.84	1.56

TABLE 1: Descriptive Statistics Results of the Study Variables

Demographic profile of the respondents

The survey sample comprises 71.3% male respondents and 28.3% female respondents. This gender distribution closely mirrors the demographic composition of the country, where 61.3% of the population is male and 38.6% is female, according to (Statista Research Department, 2023). This alignment suggests that the study's findings reflect the general population. Regarding age distribution, 14.5% of participants are between 18 and 23 years old, 44.7% fall within the 24-32 age range, 33.9% are between 33 and 44 years old, and 6.9% are 45 years or older. Most respondents (78.6%) are between 24 and 44, a key demographic for FinTech adoption. Regarding educational attainment, 1.3% of respondents hold a PhD, 10.6% have a master's degree, 69.3% possess a bachelor's degree, 17.5% completed high school, and 1.3% selected other educational backgrounds. This indicates that the survey participants are generally highly educated and well-positioned to engage with innovative FinTech solutions. Income distribution among the respondents is as follows: 15.6% earn between KD 100 and KD 250, 21.2% earn between KD 251 and KD 500, 37.1% earn between KD 501 and KD 1000, 14% earn between KD 1001 and KD 1500, 5.8% earn between KD 1501 and KD 1999, and 6% earn over KD 2000. More than 60% of respondents have incomes above KD 500, highlighting a substantial earning capacity that could favorably influence the adoption of FinTech services. The remaining 40% includes freelancers and small business owners who could benefit from digital transactions for business operations. These details are summarized in Table *2*.

Variable	Item	Frequency	Percent
Gender	Male	330	71.3
	Female	131	28.3
Age	18–23	67	14.5
	24–32	207	44.7
	33–44	157	33.9
	45+	32	6.9
Education	PhD	6	1.3
	Masters	49	10.6
	Bachelors	321	69.3
	High School	81	17.5
	Primary School	0	0
	Others	6	1.3
Average Monthly Income	KD 100–250	72	15.6
	KD 251–500	98	21.2
	KD 501–1000	172	37.1
	KD 1001–1500	65	14.0
	KD 1501–1999	27	5.8
	KD 2000+	28	6.0

TABLE 2: Demographic Profile of Respondents

Assessment of measurement model

The research at hand centers on reflective constructs as defined in prior literature by (Nikou et al., 2022), (Setiawan et al., 2021), (Chen, 2013), (Zhang et al., 2018), and (Alkhwaldi et al., 2022). Consequently, the proposed evaluation of the measurement model involves examining indicator reliability and internal consistency. It also includes assessing convergent validity and discriminant validity to demonstrate the survey tool's adequacy using SmartPLS (Hair et al., 2022). The study findings demonstrate that the instrument's indicator reliability, as presented in Table 3, ranges from 0.679 to 0.963, which falls within an acceptable range (Hair et al., 2022). The evaluation of internal consistency reliability, following the recommendations of (Hair et al., 2022), involves multiple measures. Cronbach's alpha is considered the minimum threshold, while Composite Reliability (rho_c) is treated as the upper benchmark. The results indicate that the reliability values obtained in this study meet the acceptable threshold of 0.7. Additionally, an Average Variance Extracted observed a value greater than 0.5, demonstrating the constructs' convergent validity, as (Hair et al., 2022) suggested. These outcomes are detailed in Figure 2 and Table 3.

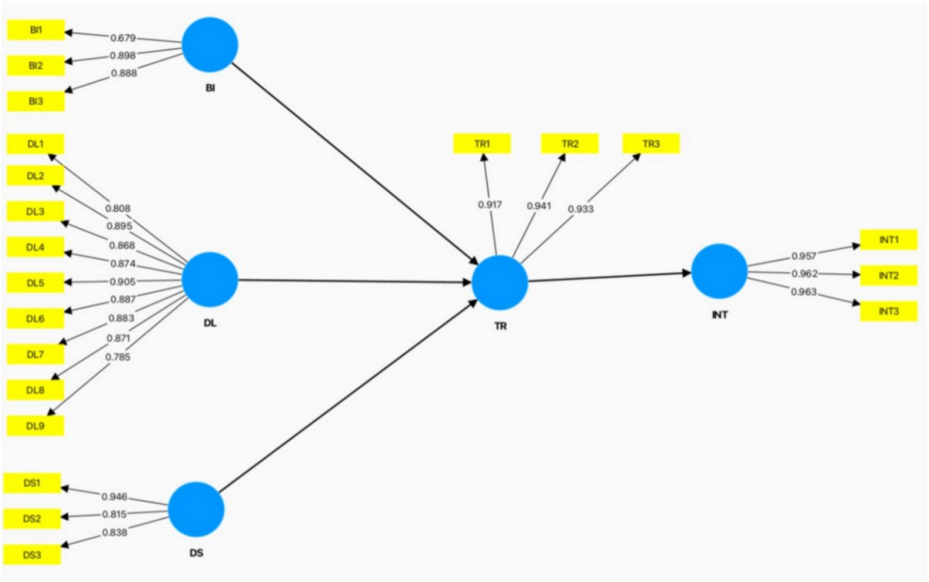

FIGURE 2: Outcome of Measurement Model in SmartPLS

BI = Brand Image, DL = Digital Literacy, DS = Data Security, TR = Trust, INT = Intention

Items	Loadings	Cronbach's alpha	Composite reliability (rho_c)	AVE
Brand Image (BI)		0.767	0.866	0.685
BI1	0.679			
BI2	0.898			
BI3	0.888			
Digital Literacy (DL)		0.958	0.964	0.748
DL1	0.808			
DL2	0.895			
DL3	0.868			
DL4	0.874			
DL5	0.905			
DL6	0.887			
DL7	0.883			
DL8	0.871			
DL9	0.785			
Data Security (DS)		0.864	0.901	0.754
DS1	0.946			
DS2	0.815			
DS3	0.838			
Trust (TR)		0.922	0.951	0.865
TR1	0.918			
TR2	0.940			
TR3	0.933			
Intention (INT)		0.958	0.973	0.923
INT1	0.957			
INT2	0.961			
INT3	0.963			

TABLE 3: Items Loading, Cronbach's Alpha, Composite Reliability, and AVE

BI = Brand Image, DL = Digital Literacy, DS = Data Security, TR = Trust, INT = Intention, AVE = Average Variance Extracted

Finally, the Heterotrait-Monotrait ratio (HTMT) analysis was conducted using a bootstrapping technique with a 90% confidence interval (CI), as recommended by (Henseler et al., 2015), to establish the instrument's discriminant validity. The analysis revealed that none of the values exceeded the threshold of 0.85, further confirming the instrument's discriminant validity. The detailed HTMT results with 90% CI values are in Table *4*.

	BI	DL	DS	INT	TR
BI					
DL	0.537 (0.447, 0.618)				
DS	0.176 (0.108, 0.284)	0.181 (0.091, 0.281)			
INT	0.465 (0.374, 0.549)	0.505 (0.424, 0.578)	0.102 (0.042, 0.202)		
TR	0.600 (0.520, 0.670)	0.535 (0.454, 0.608)	0.096 (0.053, 0.210)	0.635 (0.571, 0.694)	

TABLE 4: Results of HTMT Criterion Analysis

BI = Brand Image, DL = Digital Literacy, DS = Data Security, TR = Trust, INT = Intention

Assessment of the structural model relationships

Following the recommendation of (Hair et al., 2022), this study employed a bias-corrected and accelerated (BCa) bootstrap confidence interval to assess the structural model, accounting for the skewed nature of the dataset. The analysis involved generating 10,000 bootstrap samples, utilizing a one-tailed test with a 95% confidence interval (corresponding to a 0.05 significance level) based on 463 valid responses (Ahmad, 2024). The choice of a one-tailed test was driven by the study's directional hypothesis (Ruxton and Neuhäuser, 2010). This procedure included the evaluation of path coefficients (β), the determination of the coefficient of determination (R^2), the assessment of predictive relevance (Q^2), and the estimation of effect sizes (f^2). Figure *3* presents the results of the model evaluation conducted using SmartPLS.

Figure *3* presents the outer loadings along with their corresponding p-values. At the same time, the inner model includes information on path coefficients and t-values, all assessed at a 0.05 significance level using one-tailed bootstrapping. According to (Suhr, 2008), a path coefficient of 0.1 or less suggests a small effect, approximately 0.3 indicates a medium effect, and above 0.5 signifies a large effect. (Hair et al., 2022) further specify that a t-value of 1.65 or higher in a one-tailed test at a 5% significance level confirms a significant relationship between variables. These guidelines were applied in the hypothesis testing of the direct effects, as depicted in Figure *3* and Table *6*, where most relationships exhibited medium significance.

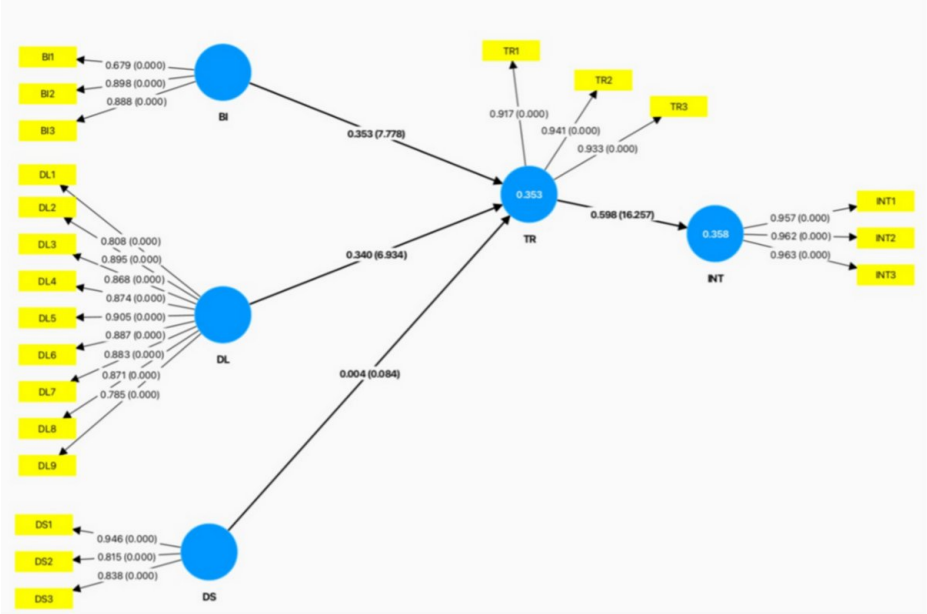

FIGURE 3: Outcome of Bootstrapping Procedure in SmartPLS

BI = Brand Image, DL = Digital Literacy, DS = Data Security, TR = Trust, INT = Intention

Assessing lateral collinearity is crucial for accurately representing the relationships between variables.

According to (Kock and Lynn, 2012), this step is essential in any structural equation modeling (SEM) analysis. In PLS-SEM, collinearity is measured using the Variance Inflation Factor (VIF). While (Hair et al., 2022) recommend a VIF threshold of 5 as a general guideline for minimal collinearity, they suggest that a value closer to or below 3 is more desirable to avoid potential collinearity problems. The results presented in Table 5 show that all VIF values in the inner model fall well below the preferred threshold of 3, indicating that collinearity is not a concern in this model.

Predictors	VIF
BI -> TR	1.296
DL -> TR	1.307
DS -> TR	1.038
TR ->INT	1.000

TABLE 5: Results of Collinearity Assessment of the Inner Model

BI = Brand Image, DL = Digital Literacy, DS = Data Security, TR = Trust, INT = Intention, VIF = Variance Inflation Factor

A model's effectiveness is primarily gauged by its coefficient of determination (R^2), which measures the extent to which the independent variables explain the variance in the dependent variable. The interpretation of R^2 values is a topic of ongoing debate, influenced by factors such as the complexity of the model and the research context. (Chin, 1998) offered a classification for R^2 values, considering 0.26 as substantial, 0.13 as moderate, and 0.02 as weak for endogenous latent variables. In contrast, (Hair et al., 2022) suggested that while an R^2 of 0.1 might be acceptable in some scenarios, a value above 0.65 would be more desirable in others. Recently, (Ozili, 2022) argued that an R^2 range of 0.1 to 0.5 can be considered acceptable within the social sciences, provided the explanatory variables are statistically significant. In this study, the R^2 values for the endogenous variables, Intention and Trust, were 0.353 and 0.358, respectively, as shown in Table 6, indicating that the model demonstrates a reasonable level of effectiveness.

The concept of "effect size," denoted as f^2, is an essential statistical measure used to evaluate the influence of independent variables on dependent variables (Hair et al., 2022). While path coefficients are obtained by regressing the dependent variable on its immediate antecedent, the f^2 effect size measures the change in the R^2 value when a particular antecedent variable is removed from the model. (Cohen, 1988) categorizes f^2 values as follows: 0.02 indicates a small effect, 0.15 a medium effect, and 0.35 a large effect. As shown in Table 6, most factors, including Brand Image (0.149) and Digital Literacy (0.136), exert a medium influence on the R^2 value of Trust (TR). However, Data Security (0.00) demonstrated no effect. Brand Image has the most substantial impact, followed by Digital Literacy. Additionally, Trust has a large effect on Intention, with an f^2 value of 0.557.

Predictors	β	SD	t statistics	p values	R^2	f^2
BI -> TR	0.353	0.045	7.778	0.000		0.149
DL -> TR	0.340	0.049	6.934	0.000	0.353	0.136
DS -> TR	0.004	0.053	0.084	0.466		0.000
TR -> INT	0.598	0.037	16.257	0.000	0.358	0.557

TABLE 6: Results of Hypothesis Testing (Direct Effects)

BI = Brand Image, DL = Digital Literacy, DS = Data Security, TR = Trust, INT = Intention, β = Path Coefficient, SD = Standard Deviation, R2 = Coefficient of determination, f2 = Estimation of effect sizes

(Hair et al., 2022) emphasize that the Q^2 value in a PLS path model is crucial for evaluating the model's practical effectiveness in managerial decision-making and its reliability in producing accurate results. In this study, the Q^2 value was calculated using the Stone-Geisser method, utilizing a blindfolding procedure with 10 folds and repetitions in SmartPLS V4. A Q^2 value greater than zero signifies that the model has predictive relevance. Additionally, (Hair et al., 2022) suggest assessing the model's predictive capability by

comparing the Root Mean Square Error (RMSE) against benchmarks from a Linear Regression Model (LM). If most indicators in the PLS-SEM analysis have values lower than the LM benchmark, the model is deemed to have moderate predictive power. The results in Table 7 show that most indicators are below the LM benchmark, confirming that the model has moderate predictive power.

Predictors	$Q^2_{predict}$	PLS-SEM_RMSE	LM_RMSE
INT	0.238		
INT1	0.239	1.446	1.433
INT2	0.214	1.439	1.434
INT3	0.206	1.401	1.412
TR	0.341		
TR1	0.268	1.213	1.220
TR2	0.303	1.166	1.171
TR3	0.309	1.156	1.175

TABLE 7: Results of Latent and Manifest Variable

INT = Intention, TR = Trust, Q²predict = Predictive relevance, PLS-SEM = Partial Least Square - Structural Equation Modeling, RMSE = Root Mean Square Error, LM = Linear Regression Model

Table 8 highlights that trust is pivotal in connecting Brand Image and Digital Literacy to Intention, supported by significant path coefficients, a t-value above 1.65, and a p-value below 0.05. Earlier, the direct positive relationships between Digital Literacy and Brand Image with Trust were discussed, showing a significant positive association with Intention. According to (Hair et al., 2022), this form of mediation is considered partial or complementary, where both direct and indirect effects are significant and aligned. However, Trust does not mediate the relationship between Data Security and Intention in this study.

Predictors	β	SD	t statistics	p values	5.0%	95.0%	Decision
BI -> TR -> INT	0.211	0.031	6.742	0.000	0.160	0.264	Supported
DL -> TR -> INT	0.203	0.034	5.985	0.000	0.149	0.261	Supported
DS -> TR -> INT	0.003	0.031	0.086	0.466	-0.031	0.088	Not Supported

TABLE 8: Test of Mediation (Indirect Effect)

BI = Brand Image, DL = Digital Literacy, DS = Data Security, TR = Trust, INT = Intention, β = Path Coefficient, SD = Standard Deviation

The summary of the hypotheses testing results is presented in Table 9.

Hypotheses	Statement	Decision
H1	Brand Image (BI) positively and significantly affects Trust (TR) within FinTech services.	Supported
H2	Digital Literacy (DL) has a positive and significant effect on Trust (TR) in FinTech services.	Supported
H3	Data Security (DS) significantly and adversely affects Trust (TR) within FinTech services.	Not supported
H4	Trust (TR) positively and substantially affects the Intention (INT) to adopt FinTech services.	Supported
H5a	Trust (TR) serves as a positive and significant mediator in the association between Brand Image (BI) and Intention (IN) to adopt.	Supported
H5b	Trust (TR) serves as a positive and significant mediator in the connection between Digital Literacy (DL) and Intention (IN) to adopt.	Supported
H5c	Trust (TR) serves as a positive and significant mediator in the connection between Data Security (DS) and Intention (IN) to adopt.	Not supported

TABLE 9: Summary of Hypotheses

Discussion

This study primarily focused on understanding the factors driving FinTech adoption in Kuwait, particularly given the region's relatively lower adoption rate. Key constructs such as digital literacy, brand image, data security, trust, and intention were examined to provide deeper insights into how these elements influence the adoption of FinTech services.

The study demonstrates that brand image significantly enhances trust, with a coefficient of β = 0.353, a t-value of 7.778, and a p-value less than 0.05. These results are in line with the findings of (Setiawan et al., 2021), (Chandra et al., 2010), and (Chen, 2013). (Setiawan et al., 2021) reported that brand image is shaped by effective marketing communication and comprehensive brand and product development. (Chandra et al., 2010) emphasized the role of Mobile Service Providers and their technology in fostering consumer trust in mobile payments. (Chen, 2013) argued that users link a service provider’s positive reputation with sound risk management, further strengthening their trust. These insights support our findings, highlighting that a positive brand image is crucial for building confidence in FinTech services.

The study's results also confirm the initial hypothesis, showing a positive relationship between digital literacy and trust, with a coefficient of 0.340, a t-statistic of 6.934, and a p-value below 0.01. This aligns with the findings of (Odei-Appiah et al., 2022) and (Laidroo et al., 2021), which indicate that a lack of digital skills can impede the adoption of FinTech services. (Kakinuma, 2022) also argues that digital literacy should be viewed as a skill for managing information and as a critical factor in promoting a safer and more inclusive society. (Mahmud et al., 2023) also suggest that improved digital literacy helps individuals better understand their financial options. These insights are consistent with (Nikou et al., 2022), who found that digital literacy significantly shapes attitudes toward technology use.

In contrast, data security did not significantly influence trust in FinTech service providers, as evidenced by a coefficient of β = 0.004, a t-value of 0.084, and a p-value greater than 0.05. This finding aligns with the study by (Ahmed and Sur, 2023). However, it diverges from the perspectives of (Sila, 2013), (Matos and Krielow, 2019), (Egala et al., 2021), and (Stewart and Jurjen, 2018), who have emphasized the critical role of data security in establishing trust. For instance, (Stewart and Jurjen, 2018) argue that data security should be incorporated early in product development to build trust. (Egala et al., 2021) highlight the increasing importance of mitigating global cyber threats. The lack of significant impact of data security in this study may be attributed to a general lack of awareness about cybersecurity and its implications among the Kuwaiti population.

Rabaa’i (2023), through a recent survey, identified that apprehensions about data security can hinder individuals’ willingness to adopt mobile wallet services. However, this negative influence is significantly reduced when users develop trust in the system. A similar perspective is echoed by Ahmed and Sur (2023), who also emphasize the crucial role of trust in alleviating data security concerns following the increased use of technologies like digital banking systems. Considering Kuwait's high level of digital inclusion, it is likely that participants in the current study possess a strong sense of trust in the nation's digital ecosystem. This trust may account for their limited concern about data security, as they appear confident in the robustness and reliability of Kuwait’s infrastructure for delivering secure FinTech services.

The study reveals a strong and significant relationship between trust and the intention to adopt FinTech, with a coefficient of β = 0.598, a t-value of 16.257, and a p-value less than 0.05. These findings are consistent with the research by (Ali et al., 2021), (Zhang et al., 2018), (Khuong et al., 2022), and (Rabaa'i, 2023). (Pavlou, 2003) highlights the essential role of trust in e-business, notably when face-to-face interactions between consumers and service providers are lacking. This is especially critical for services involving significant financial transactions, such as those offered by FinTech companies. Consequently, the research underscores the importance of FinTech firms actively cultivating trust with potential customers to foster greater financial inclusion and boost the adoption of their services.

The study supports two hypotheses regarding the mediating role of trust (H5a and H5b), while H5c is not supported. Specifically, trust mediates the relationship between brand image and the intention to adopt FinTech services. This suggests a favorable brand image enhances trust, increasing individuals' intention to engage with the services. These findings are consistent with the research by (Setiawan et al., 2021), (Chandra et al., 2010), and (Chen, 2013), which underscore the critical role of a positive brand image in building consumer trust and encouraging the adoption of services in Kuwait.

Hypothesis H5b posited that trust mediates the relationship between digital literacy and the intention to adopt FinTech services. This finding suggests that individuals with high digital literacy are more likely to adopt FinTech services if they also trust the service providers. This result is consistent with the recommendations of (Nikou et al., 2022), (Odei-Appiah et al., 2022), and (Laidroo et al., 2021), who emphasize the role of trust in enhancing the adoption of FinTech among digitally literate users.

In this study, trust did not mediate the relationship between the intention to adopt FinTech services and data security. This finding contrasts with the research of (Matos and Krielow, 2019), (Egala et al., 2021), and (Stewart and Jurjen, 2018), who identified data security as a key factor influencing service adoption. Additionally, (Rabaa'i, 2023) found that while data security negatively impacts individuals' willingness to adopt mobile wallets, this negative effect is reduced when trust is present. This discrepancy might be attributed to the fact that participants in this study had confidence in the security measures of Kuwait's FinTech infrastructure, leading to less concern about data security.

Theoretical contributions

This study expands the existing literature on FinTech acceptance and adoption, particularly in Kuwait, where the industry is still in its early stages. Previous research has primarily extended constructs from the TAM (Junger and Mietzner, 2020), (Usman et al., 2020). (Singh et al., 2021), (Rehman and Zeb, 2023) or the Unified Theory of Acceptance and Use of Technology (UTAUT) (Baptista and Oliveira, 2015) and (Singh et al., 2021) to analyze consumer behavior toward FinTech services in different region or context.

In contrast, this study contributes to the Kuwaiti context, representing, to the author’s knowledge, the first research to incorporate diverse constructs under TAM’s umbrella. Potential reasons for the lack of prior studies in this area include insufficient incentives for researchers, low public awareness of scientific research, and inadequate funding (Al-Sulaili, 2018). The (Organization for Economic Cooperation and Development, 2021) also identified several barriers to research development, including challenges in international collaboration, a lack of incentives for initiating new projects, reluctance to seek external funding due to strict budget regulations, limitations in reallocating research budgets, inefficiencies in procurement processes, delays in hiring skilled researchers from abroad, and inflexible financial policies. These challenges hinder the progress of scientific research in the region, underscoring the need for social scientists to engage in studies relevant to their respective countries. Thus, this study seeks to bridge this knowledge gap and support policymakers and businesses in developing regulations, products, and services that align with consumer needs.

Additionally, this research validates the relevance of key constructs in predicting the intention to adopt FinTech services. This study offers a framework that can be applied in other markets and regions by introducing a comprehensive model that integrates key TAM constructs. (Leahey et al., 2023) emphasize that novel scientific research methodologies can disrupt the field, fostering theoretical and empirical advancements (Sovacool et al., 2018). The model's strong explanatory power further supports its potential for future research applications.

Moreover, this study identifies digital literacy, brand image, and trust as significant predictors of FinTech adoption. Researchers from various disciplines can examine these constructs in different contexts to gain further social insights. Ultimately, this study contributes substantially to the literature on innovative financial services in Kuwait by extending theoretical insights into the relationships between digital literacy, brand image, data security, trust, and intention to adopt FinTech services.

Practical contributions

Kuwait's FinTech industry, though still nascent due to stringent regulations and rigorous testing (Handoush, 2023), is progressively advancing and regularly launching new services. A recent example is

WAMD, a service that facilitates digital transactions (Kuwait Times, 2024). In contrast, other regional players like Saudi Arabia and the UAE have achieved FinTech adoption rates of 40% and 34%, respectively (Deloitte, 2020). They are exploring diverse areas within the sector, such as crowdfunding, robo-advising, fundraising, insurance, and risk management. The findings of this study are crucial for governmental and regulatory bodies when evaluating new services for the market and will help service providers design innovative products that meet consumer needs and expectations. For example, the study highlights the critical role of trust, suggesting that service providers should focus on building consumer confidence in digital finance to enhance adoption. The study also highlighted that digital skills have a positive impact on FinTech adoption, suggesting that responsible institutions in Kuwait should focus on improving these skills across the population to foster greater digital financial inclusion. This could involve providing online courses to enhance basic proficiency in digital devices and financial technology (Boitan and Marchewka-Bartkowiak, 2021). Furthermore, service providers should prioritize this aspect by offering detailed user manuals or video demonstrations whenever new services are introduced to ensure users can fully understand and utilize the offerings.

In this study, establishing a strong brand image is crucial for fostering trust with potential customers. FinTech companies must focus on enhancing their brand reputation to build consumer confidence. Globally, consumers expect tailored communication and high service levels from FinTech providers (Marshall et al., 2017). Consequently, Kuwaiti companies should develop platforms like social media channels or mobile apps to increase brand visibility and engagement. Implementing a customer support helpline will further strengthen the brand image and build consumer trust. The study does not provide support for the concept of data security, which contrasts with the findings of (Matos and Krielow, 2019), (Egala et al., 2021), (Abbad, 2021), (Singh et al., 2020), and (Stewart and Jurjen, 2018). Despite this, stakeholders must acknowledge the importance of data security and global cyber threats. The limited concern observed in this study may be attributed to a general lack of awareness about these issues among the Kuwaiti public. Therefore, government agencies and relevant organizations need to enhance public awareness about cybersecurity, particularly concerning financial transactions.

Policy contributions

The study highlights the significant role of trust, underscoring the need for policymakers to regulate FinTech services and products effectively to build consumer confidence. Kuwait has introduced the FinTech Regulatory Sandbox Framework to support FinTech services' growth and test new technologies and business models. In this context, it is vital for regulators and government bodies to transparently share the outcomes of these tests to further boost consumer trust in innovative FinTech offerings.

The study found data security insignificant, likely due to limited public awareness of growing cybersecurity threats. This lack of understanding may expose consumers to risks such as phishing attacks and financial losses. To address this, government policymakers and service providers should implement initiatives to raise public awareness about online security and associated risks. Incorporating cybersecurity education into school curricula at all levels could significantly enhance the population's understanding and preparedness against such threats.

Limitations and suggestions for future research

This study has several limitations. It focuses on Kuwait, a country with high digital inclusion, as evidenced by internet and mobile penetration rates of 98% and 146.6%, respectively (KFAS, 2019) and (Marmore, 2019). Future research should apply this model in countries with emerging technology infrastructures, considering various cultural, economic, and environmental factors. (Venkatesh et al., 2003) also highlight that demographic factors can significantly impact technology acceptance and usage. Future studies should incorporate these personal characteristics into the model to explore their moderating effects on consumer intentions.

Another limitation of this study is its cross-sectional nature, as it was conducted at a single point in time. Future research would benefit from a longitudinal approach to track changes in users' behavioral intentions over time regarding FinTech adoption. Additionally, investigating user behavior in Kuwait before and after adopting FinTech services could provide valuable insights. The study's limited support for data security, which contrasts with findings from prior research, suggests the need for further examination of this factor in different regions and contexts to clarify its role in FinTech adoption. Finally, while this study provided a broad overview of FinTech adoption in Kuwait, FinTech includes diverse services such as digital payments, insurance, crowdfunding, and wealth management. Future research should focus on specific FinTech services, particularly innovative areas like the insurance sector, to gain deeper insights into their adoption.

Holistic comparison with past studies

This study introduces a unique research model that sets itself apart from prior studies by applying TAM in the Kuwaiti context for the first time. Although similar models have been examined in other regions, e.g. (Singh et al., 2020) and (Singh et al., 2020), research on FinTech adoption in Kuwait remains limited. The

closest comparable work is the (Rabaa'i, 2023) study, which utilized the UTAUT2 framework. By testing this new model, the study aims to bridge existing gaps in the literature and provide fresh insights into FinTech adoption within the GCC region.

Trust has been positioned as a mediator in this study, marking a departure from its treatment in previous research by (Ahmed and Sur, 2023), (Shahzad et al., 2022), (Saif et al., 2022), and (Rabaa'i, 2023). Mediation plays a pivotal role in behavioral science research, as it sheds light on the mechanisms through which interventions exert their effects and helps explain the drivers of broader behavioral changes (Enders et al., 2013). From a theoretical perspective, this study contributes to the existing literature by examining trust as a mediator in the Kuwaiti context. Practically, the findings hold significant value for professionals and decision-makers, highlighting trust as a critical intermediary linking digital literacy and brand image to the intention to adopt FinTech. These insights underscore the importance of fostering trust to enhance customer acceptance and adoption of FinTech services.

Further, digital literacy, brand image, and data security have been explored by previous researchers across different regions and contexts, e.g. (Rehman and Zeb, 2023), (Setiawan et al., 2021), (Ali et al., 2018), (Taufiq et al., 2023), (Nikou et al., 2022), (Rabaa'i, 2023), and (Zhang et al., 2023). However, these constructs remain underexplored in the limited body of literature on FinTech in Kuwait. This study addresses this gap, providing a theoretical foundation for future researchers to build upon its findings in diverse contexts and industry sectors.

Conclusions

The advent of FinTech has revolutionized financial transactions, substantially influencing industries such as banking, insurance, and wealth management. This study was driven by the observed low adoption rates of FinTech in Kuwait and aimed to explore the local attitudes toward these services. Utilizing TAM, the research developed a model incorporating factors such as digital literacy, brand image, data security, and trust. The model was analyzed using the PLS-SEM method, demonstrating a satisfactory variation level and predictive relevance. The key findings highlighted digital literacy, brand image, and trust as critical factors influencing the adoption of FinTech services among Kuwaiti consumers. Conversely, the model showed limited evidence regarding the significance of data security, highlighting the need for further exploration in this area. This research offers both theoretical and practical contributions. Notably, the model integrating digital literacy, brand image, data security, intention, and trust has not been previously tested in Kuwait using the TAM framework. This innovative approach provides a comprehensive view of FinTech adoption in Kuwait and sets the stage for future studies to assess the model in different regions. Additionally, the study emphasizes the crucial role of trust in influencing FinTech adoption, suggesting that regulators and service providers should focus on building trust within their services. Furthermore, the research underscores the importance of digital literacy and brand image, offering valuable insights for FinTech companies in Kuwait to refine their strategies and improve their offerings. Moreover, it highlights the importance of trust in building consumer confidence in FinTech services, highlighting the role of effective regulation, such as Kuwait's FinTech Regulatory Sandbox Framework. It also identifies a lack of public awareness regarding data security, recommending that policymakers and service providers enhance cybersecurity education and awareness to better protect consumers from emerging online threats.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Rohail Hassan, Syed Yaser Tanvir Ahmad

Acquisition, analysis, or interpretation of data: Rohail Hassan, Syed Yaser Tanvir Ahmad

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Supervision: Rohail Hassan

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the

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